

# GOVERNMENT POLYTECHNIC, KOLHAPUR

(An Autonomous Institute of Government of Maharashtra)

**Curriculum Document** 

## **CURRICULUM : MPECS-2016**

(Outcome Based Curriculum)

for

## **DIPLOMA IN CIVIL ENGINEERING**

Secretary

Chairman

Programmewise Board of Studies (PBOS)

Civil EngineeringProgramme

Government Polytechnic, Kolhapur

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## SECTION - I

# CURRICULUM PHILOSOPHY AND

## **STRUCTURE**

### 1. CURRICULUM DEVELOPMENT : INTRODUCTION AND PROCESS OF DEVELOPMENT OF OUTCOME BASED CURRICULUM

### **Curriculum Design and Development :**

Curriculum is an absolute instructional and effective instrument designed with a student centered approach. It incorporates systematic method of teaching learning process. It is a sequence of planned academic activities; on completion of which the desired programme outcomes are expected to be attained in the student. The curriculum and the course contents are expected to motivate the students to acquire desired level of knowledge and skills. An emphasis and an attempt has been made in the curriculum to get a perfect blending of theoretical concepts and actual requirements of industry. Keen attention has been provided to make it more structured by incorporating the valuable suggestions of industrial experts of PBOSs and feed back by the field and academic professionals. An overview of systematic and scientific mode of implementation and evaluation has also been pondered; consequently a practicable model of it has been achieved. It incorporates specific guidelines and assessment criteria for theory/practical/oral modes of evaluation. Specification table for each course has been provided to prepare question paper justifying meticulous coverage.

### **Curriculum philosophy :**

The impact of globalization and rapid changes in the engineering science and technology have been a great cause of comprehensive and noticeable change in engineering fraternity, hence the institutions. Only way to incorporate such a transformation, is to modify the curriculum, preserving the consistency of engineering education. Frequent review and feedback from the experts and the freedom of autonomous status of the institution have encouraged to undertake relevant changes in the curriculum to make it versatile. Consequently the desired competencies and skills are transformed amongst the students in pursuing their preparedness to cope up with the global changes. It aims to promote self reliance and satisfaction of acquiring modern engineering concepts and multi capabilities within the students to make them model technicians.

# "Curriculum is an educational program designed and implemented to achieve specified programme outcomes"

Hence, in a broad sense, a curriculum incorporates the following :

- To define the purpose of education
- To accept systematic planning methods
- To confirm implementation strategies
- To identify and to incorporate needs of industries
- To follow the policy directives
- To cope-up with social concerns
- To aim at personality development of students
- To allow future developments and challenges in emerging science and technology.

### **Outcome-based Curriculum**

Outcome based curriculum is the curriculum based on the concepts of outcome-based education (OBE) philosophy. India is a permanent signatory of the Washington Accord - the international agreement among bodies responsible for accrediting engineering programmes with the National Board of Accreditation (NBA) as the national authority for accrediting degree and diploma programmes in engineering in India. Hence as per the accreditation criteria of the NBA, the curriculum of the Institute is expected to be outcome based.

Outcome Based Education (OBE) is an educational approach in which all the activities of an education system are based on attainment of pre-defined learning outcomes of student. The approach is to be included in the following three aspects of education system :i) Curriculum Design, ii) Curriculum Implementation, iii) Students' Evaluation. The flow diagram shown below summarizes the elements of Outcome-based Education System. The glossary of terms used in academic autonomy and OBE are provided for reference.

### OUTCOME BASED EDUCATION SYSTEM



### **Glossary of terms related to Outcome Based Education**

**Outcome-Based Education (OBE)** - It is an educational approach in which all the activities of an education system are based on attainment of pre-defined learning outcomes of student.

The approach is to be included in the following three aspects of education system :i) Curriculum Design, ii) Curriculum Implementation, iii) Students' Evaluation

**Washington Accordand NBA** – It is an International Agreement among bodies responsible for accrediting undergraduate engineering degree programmes. Established in 1989, the signatory countries as of 2014 are Australia, Canada, Taiwan, Hong Kong, India, Ireland, Japan, Korea, Malaysia, New Zealand, Russia, Singapore, South Africa, Sri Lanka, Turkey, the United Kingdom and the United States. National Board of Accreditation (NBA), India has become the permanent signatory member of the Washington Accord on 13<sup>th</sup> June 2014.

The membership of Washington Accord is an international recognition of the quality of undergraduate engineering education offered by the member country and is an avenue to bring it into the world class category. It encourages and facilitates the mobility of engineering graduates and professionals at international level.

NBA accreditation is a quality assurance scheme for higher technical education in India.

The Washington Accord covers engineering degrees and diploma under outcome-based education approach.

**Vision of Institute -** It is a statement that defines concisely the aspirations to be achieved in the near future by the Institute

**Mission of Institute -** It is a set of statements that defines the broad steps to be executed to achieve the vision of the Institute

**Vision of Programme -** It is the vision statement for a particular educational programme (like Civil Engineering Programme, Mechanical Engineering Programme, etc.). Programme Vision should be consistent with the Institute vision

**Mission of Programme -** It is the set of statements that define the broad steps to be executed to achieve the vision of the educational programme

**Programme Educational Objectives (PEOs)** - It is a set of 3 to 5 statements defining the objectives to be attained in order to execute the mission

**Programme Outcomes (POs)** – It is a set of ten generic outcomes, stated by NBA, expected from any engineering diploma-holder in India

**Programme-specific Outcomes (PSOs)** – It is a set of 2 to 4 outcomes to be defined by the programme under consideration in addition to the POs

**Course Outcomes** (**COs**) – It a set of about 6 outcomes, expected to be attained by student on learning a course. Course Outcomes shall be defined in curriculum for each course. Course outcomes are worded using action verbs like solve, explain, calculate, compare, distinguish, describe, draw, etc.

Mission-PEO Consistency Matrix - It is a matrix showing degree of consistency of PEOs with mission

PO-CO Consistency Matrix – It is a matrix showing degree of consistency of COs with POs and PSOs

**Competency** – It is the set of specific abilities, categorized as cognitive, psychomotor and affective domains of learning, from which course outcomes statements are derived

Cognitive domain – It is the set of abilities related to thinking

**Bloom's Revised Taxonomy of Cognitive Domain :** It is a six-level cumulative hierarchy of cognitive abilities in the order of increasing complexity as follows :

Remembering > Understanding > Applying > Analyzing > Evaluating > Creating

Psychomotor Domain : It is the set of abilities related to physical and psychological skills

**Taxonomy of Psychomotor Domain** : It is a six-level cumulative hierarchy of cognitive abilities in the order of increasing complexity as follows :

Perception > Set > Guided response > Mechanism > Adaptation > Origination

Affective Domain : It is the set of abilities related to attitudinal development

**Taxonomy of Affective Domain** : It is a five-level cumulative hierarchy of affective abilities in the order of increasing complexity as follows :

Receiving > Responding > Valuing > Organizing > Characterizing

**Educational Technology** : It is the systematic study of theoretical foundations and material tools to facilitate learning

### **Glossary of terms used in Academic Autonomy and MPECS**

**Academic Autonomy** – It is the freedom and responsibility offered to the Institute by the Government to attain high quality standards in the following three dimensions :

i) Design of own curricula ii) Conduct of own examinations iii) Award of own diploma

**Multi-point Entry and Credit System (MPECS)** – It is a system of education in which student can be admitted at different entry levels of qualification and he is offered *credits* along with marks on passing in a course

**Credits** – It is the number of weekly instructional hours provided for a course in the curriculum **Programme** – It is the particular branch of Engineering in which Diploma is awarded. e.g. Civil Engineering Programme, Mechanical Engineering Programme, etc.

**Curriculum** – It is a document providing plan of the complete academic activity to be conducted by student for award of Diploma in a Programme in tune with the vision of the Institute

**Course** – It is a particular subject defining study and evaluation unit of the curriculum. e.g. Applied Mechanics, Engineering Drawing-1, etc.

Syllabus - It is the complete academic information regarding a particular course in a curriculum

**Course Registration** (**CR**) - It is the procedure to be carried out by every student at the beginning of every semester in which he/she has to declare the courses he/she is going to study in that semester as per academic time table of the Institute. The registration is to be done as per Rules of Registration of the Institute.

**Examination Registration (ER)** - It is the procedure to be carried out by every student at the beginning of every semester in which he/she has to declare the courses in which he/she is going appear for examination in that semester as per examination time table of the Institute. The registration is to be done as per Rules of Registration of the Institute.

**Curriculum MPECS-2016 -** It is the Curriculum of the Institute revised in the year 2016. It is applicable to the students admitted since 2016

**Programme Department** – It is the department of the Institute offering Diploma in a particular Programme. e.g. Civil Engineering Department, Mechanical Engineering Department, etc.

Programme Dean – He/she is the Head of Department of a Programme Department

Allied Department – It is department that does not award diploma and contributes to curriculum implementation of many Programmes. e.g. Applied Mechanics Department, Workshop Department, Science Department, English Department, Mathematics Department, etc.

### Academic Autonomy and MPECS at Government Polytechnic, Kolhapur –

- Bodies and Cells under Academic Autonomy :
  - i) Governing Body
  - ii) Board of Studies
  - iii) Programme-wise Boards of Studies
- Examination Committee Curriculum Revisions under Autonomy : 1992, MPECS-2001, MPECS-2006, MPECS-2010, MPECS-2013, MPECS-2016
- Award of Diploma in Convocation Ceremony every year

### **Curriculum Development Model :**



## 2. VISION, MISSION, PROGRAMME EDUCATIONAL OBJECTIVES (PEOs), PROGRAMME OUTCOMES (POs) AND PROGRAMME-SPECIFIC OUTCOMES (PSOs)

### Vision of Institute :

Institute of high recognition developing competent technicians for quality services and entrepreneurship to cater the needs of industry and society.

### **Mission of Institute :**

- To educate and train in multi-disciplinary multi-level programmes to develop technicians and skilled manpower having global competency
- To ensure employability, encourage entrepreneurship, promote lifelong learning
- To inculcate in the students the qualities of a good citizen at individual, social and professional level
- To provide quality management system with focus on effective student-centric education
- To utilize faculty expertise and Institute infrastructure to render quality consultancy services

### Vision of Programme :

• Civil engineering technicians having global competencies for quality services and entrepreneurship for infrastructure development of the nation .

### **Mission of Programme :**

- 1. To educate and train the technical manpower of high competency in Civil Engineering.
- 2. To ensure employability, encourage entrepreneurship, promote lifelong inter-disciplinary liaison to face ever changing needs, risks and constraints.
- 3. To generate civil engineering technicians who successfully adapt to local situations and provide innovative solutions for the betterment of the society.
- 4. To provide and implement quality management system for civil engineering technician education.

### **Programme Educational Objectives (PEOs):**

- 1. Adopt prevailing Civil Engineering based technology to solve current Civil Engineering problems as well as inter-disciplinary.
- 2. Provide responsible and eco-friendly solutions to Civil Engineering based problems in ethical standards and leadership qualities.
- 3. Contribute as an individual or as an team member by probing, analyzing and communicating effectively to solve relevant problems.

### **Programme Outcomes (POs)**

- **1. Basic knowledge :** An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems.
- 2. Discipline Knowledge : An ability to apply discipline- specific knowledge to solve core and/or applied engineering problems.
- **3.** Experiments and practice : An ability to plan and perform experiments and practices and to use the results to solve the engineering problems.
- **4. Engineering Tools :** Applied appropriate technology and tools with and understanding of the limitations.
- 5. The Engineer and society : Demonstrate knowledge to asses societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice
- 6. Environment and sustainability : Understand the impact of the engineering solutions in societal and environmental contexts and demonstrate the knowledge and need forsustainable development.
- **7.** Ethics : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **8. Individual and team work :** Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.
- 9. Communication : An ability to communicate effectively.
- 10. Life-long learning : Recognize the need for, and have the preparation and ability to engage in independent and life –long learning in the context of technological changes.

### **Programme Specific Outcomes (PSOs)**

- 1. To plan for collection of data, prepare design, drawings and estimate.
- 2. To develope supervisory and middle level management skills for construction and maintenance of Civil Engineering structures.
- 3. To take decisions to identify and solve problems on construction sites.

Job profiles and related competencies for the diploma holder :

- 1) Supervision of Construction site.
  - a) Prepare working drawings, work out quantities ,organise site, prepare schedules of activities and labour schedule.
  - b) supervise construction with focus on adhering to sequence of activities as per schedule ensuring quality control at each stage of construction, handling labour problem, maintaining progress,
  - c) Carry out measurement and process payment of bills.
- 2) Repair and maintenance Section.
  - a) Prepare schedules for preventive as well as routine maintenance Section.
  - b) Organize physical as well as human resources for implementing maintenance schedule.
  - c) Obtain progress report of maintenance at regular intervals.
- 3) Drawing and Estimating Section
  - a) Study designs of civil Engg. structures and drawings.
  - b) Prepare both submission as well as working drawings of individual components.
  - c) Prepare various types of estimates and frame specification from project drawing.
  - d) Prepare tender papers.
  - e) Process Tender from
  - f) Assess the values of property.
- 4) Design and Planning section

Provide survey data necessary for design of Civil Engg. structures.

- 5) In House R & D
  - Works as Assistant to Development Engineer.
  - Assist development Engineer in preparing drawings of prototypes, conduct pilot testing of products and processing and also conduct small scale field tests.
  - 6) General
    - Capable of handling independent works.
    - Carry purchase of general equipments & Materials related to project.
    - Become an entrepreneur
    - Work on computer.
    - Obtain / select proper consultant for project.

\* \*\* \* \*

### 3. OVERVIEW AND SALIENT FEATURES OF CURRICULUM : MPECS-2016 3.1 Overview of Curriculum MPECS-2016

Total No	o. of	Credits	180		
No. of course	es	Total	38		
offered		Theory	29		
Max. no. ser	cou nest	rses in a er	08		
Total Max	imu	m Marks	4400		
Courses in Lo		No.	15		
IV and V	vei	Credits	65		
		Marks	1600		
Courses in Lovel		No.	09		
Courses in Level		Credits	42		
		Marks	975		
		No.	03		
Courses in Le II	vel	Credits	11		
		Marks	225		
		No.	11		
Courses in Le	vel	Credits	62		
		Marks	1600		
		No.	07		
Courses in Le IV	vel	Credits	35		
ĨV		Marks	850		
		No.	08		
Courses in Le V	vel	Credits	30		
		Marks	750		
%Ratio of M		Aarks-wise	66% : 34%		

			1
Th:Pr		Credit-wise	54% : 46%
No. of	Allied	l Courses	00
Optional	No.	of courses	03
Courses	Opt	ions/course	04
No. of Prac	tical	Internal	05
Exams		External	02
No. of Ora	No. of Orals		04
		External	09

Diploma shall be awarded on the basis of marks obtained in Level IV and Level V courses

### 3.2 Salient Features of Curriculum MPECS-2016

### Addition and deletion of Courses with respect to MPECS-2013 :

- 1) Addition of Civil Engineering Project I CEF 501 at level 5 diversified technology courses has been done.
- 2) Addition of Elective Energy Conservation And Audit CEF 315 at Level III : Basic Technology Courses has been done.
- 3) Deletion of Environmental Studies CCF 204 at Level II: Life Skills And Professional Skills Courses has been done.

### Major modifications in Course Contents with respect to MPECS-2013 :

1) Course contents of CCF 105 Basic Maths and CCF 106 Engineering Mathematics has been Simplified.

### Changes in Implementation Strategy and Treatmentwith respect to MPECS-2013:

1) Industrial of the subjects have been highlighted in curriculum content and Implementation Strategy.

### **Other salient features :**

**1. Industrial training** :- First four weeks after completion of fourth semester and next four weeks after completion of fifth semester. And due weightage has been given in civil Engineering project -1 (CEF501).

s	ame of Course Course Course Course L Pre-requi- site chourse course Cour		me k)	Examination Scheme (marks)									
Ν	Name of Course	Code	tion	v	Course	Th	Pract. /	Cr	Th	TS	TW	Pr	Or
	Level 1: Foundation Courses			C			Drg. / Tut						
1	Engineering Physics	CCF101	FPHA	1	-	04	02	06	80	20	-	50*	-
2	Engineering Chemistry	CCF103	FCHA	1	-	04	02	06	80	20	-	50*	-
3	Basic Maths	CCF105	FBMT	1	-	03	01	04	80	20	-	-	-
4	Engineering Mathematics	CCF106	FEMT	1	Basic Maths	03	01	04	80	20	-	-	-
5	Engineering Drawing - 1	CCF107	FEDA	1	-	02	04	06	80	20	25*	-	-
6	Engineering Drawing - 2	CCF108	FEDB	1	Engineeri ng Drawing - 1	02	04	06	80	20	25*	-	-
7	Applied Mechanics	CCF110	FAPM	1	-	04	02	06	80	20	25*	-	-
8	@Workshop Practice -I(Civil Engg)	CCF111	FWSA	1	-	-	02	02	-	-	50*	-	-
9	@Workshop Practice-II (Civil Engg)	CCF115	FWSE	1	FWSA- I	-	02	02	-	-	50*	-	-
	Level 2 : Life Skills and Professional	Skills Cou	rses										
10	@ Generic Skill	CCF201	FGNS	2		02	02	04	-	-	25*	50*	
11	Communication Skill	CCF202	FCMS	2		02	02	04	40	10	-	25*	
12	@ Professional Practices	CCF203	FPRP	2		01	02	03	-	-	25*		50*
	Level 3: Basic Technology Courses	1											
13	Applied Mathematics	CEF301	FAMT	3	EBMT & EEMT	03	01	04	80	20	-	-	-
14	Building Construction	CEF302	FBCO	3		04	02	06	80	20	50*	-	25**
15	Building Drawing	CEF303	FBDR	3	EEDA EEDB	02	4	06	80	20	50*	-	25**
16	@ Computer Aided Drg.	CEF304	FCAD	3			04	04	-	-	25*	50*	-
17	Soil Mechanics And Foundation Engineering	CEF305	FSMF	3	EAPM	03	02	05	80	20	25*	-	-
18	Mechanics of Structures	CEF306 CEF307	FMOS	3	EAPM	04	02	06	80	20	25*	-	25*
20	Surveying – 1	CEF308	FSR1	3		03	04	07	80	20	25*	50**	-
21	Surveying – 2	CEF309	FSR2	3	ESR1	03	04	07	80	20	25*	50**	-
22	Transportation Engg	CEF310	FTRE	3		04	02	06	80	20	50*	-	-
23	Elective-1 <from list="" of="" options=""></from>	CEF311- 315		3		03	02	05	80	20	50*	-	-
	Level 4: Applied Technology Courses	5											
24	Analysis of Structure	CEF 401	FAOS	4	EMOS	03	-	03	80	20	-	-	-
25	Design And Drafting Of RCC Structures	CEF 402	FRCC	4	EMOS	04	02	06	80	20	25*	-	25**
26	Estimating And Costing	CEF 403	FDSS	4	ENOS	03	02	05	80	20	25*	-	- 25**
27	Professional Practices(Civil)	CEF 404	FPPR	4	LBDK	04	04	03		- 20	25*	-	50*
29	Concrete Technology	CEF 406	FCTE	3		03	02	05	80	20	25*		25**
30	Elective-2 <from list="" of="" options=""></from>	CEF 407- 410	-	4	-	03	02	05	80	20	25*	-	-
	Level 5: Management and Diversifie	d Technol	ogy Cours	es									
31	Contracts and Accounts	CEF504	FCAA	5	-	03	-	03	80	20	-	-	-
32	Civil Engg. Project I	CEF501	FCPI	5			02	02	-	-	25*	-	
33	Civil Engg. Project II	CEF502	FCPII	5	FCPI		04	04	-	-	25*	-	50**
34	Construction field skills	CEF503	FCFS	5		-	04	04	-	-	50*	-	25*
35	Industrial Organization & Management	CCF501	FIOM	5		03	-	03	80	20	-	-	-
36	Environmental Engg.	CEF506	FENE	5		04	02	06	80	20	-	-	25**
37	Irrigation Engg.	CEF507	FIRE	5		04	01	05	80	20	-	-	25**
38	Elective-3 < from list of options>	511	-	5	-	03	-	03	80	20	-	-	-

### 4. TEACHING AND EXAMINATION SCHEME (LEVEL-WISE)

			Cours L e e	L Pre- e requi-	Teaching Scheme (hours per week)			Examination Scheme (marks)					
S N	Name of Course	Course Code	e Abbre via- tion	e v e l	requi- site Cours e	Th	Pra ct. / Drg . / Tut ori al	C re di ts	T h	T S	T W	Pr	Or
	Elective -	- 1 (ANY C	NE) : Ba	sic ]	Fechnolog	gy G	roup						
1	Advanced Construction Techniques & Equipments	CEF311	FACT	3	-	03	02	05	80	20	50	-	-
2	Adv. Construction Materials	CEF312	FACM	3	-	03	02	05	80	20	50	-	-
3	Higher Mathematics	CEF313	FHMT	3	-	03	02	05	80	20	50	-	-
4	Maintenance & Rehabilitation of Structures	CEF314	FMRS	3	-	03	02	05	80	20	50	-	-
5	Energy Conservation & Audit	CEF315	FECA	3	-	03	02	05	80	20	50	-	-
	Elective –	2 (ANY OI	NE) : App	plied	Technol	ogy <b>(</b>	Group						
6	Building Services	CEF407	FBSR	4	-	03	02	05	80	20	25	-	-
7	Plumbing Services	CEF408	FPSR	4	-	03	02	05	80	20	25	-	-
8	Quality Control	CEF409	FQCO	4	-	03	02	05	80	20	25	-	-
9	Town & Country Planning	CEF410	FTCP	4	-	03	02	05	80	20	25*	-	-
	Elective – 3	(ANY ON	E) : Dive	rsifie	ed Techno	ology	Group	5					
10	Earthquake Engineering	CEF508	FEQE	5	-	03	-	03	80	20	-	-	-
11	Industrial Waste Management	CEF509	FIWM	5	-	03	-	03	80	20	-	-	-
12	Solid Waste Management	CEF510	FSWM	5	-	03	-	03	80	20	-	-	-
13	Watershed Management	CEF511	FWSM	5	-	03	-	03	80	20	-	-	-

## **Optional Courses for Electives**

### **5. PATH-WISE COURSE STRUCTURES** Semester-wise Course Structure Path-1 : Students admitted to First Year - X std. pass outs

SR	Name of Course	Course	Course	Le	Pre- requi-	Tea (h	aching Sche ours per wee	me ek)		Exar	ninatio (Mai	n Schem rks)	9
NO	Name of course	Code	a-tion	I	site Course	Th	Pract. / Drg. / Tutorial	Cre dit s	Th	тs	тw	Pr	Or
	Semester 1												
1	Engineering Chemistry	CCF103	FCHA	1	Nil	04	02	06	80	20	-	50*I	-
2	Basic Mathematics	CCF105	FBMT	1	Nil	03	01	04	80	20	-	-	-
3	Engineering Drawing 1	CCF107	FEDA	1	Nil	02	04	06	80	20	25	-	-
4	Workshop Practice 1	CCF111	FWSA	1	Nil	-	02	02	-	-	50	-	-
5	Generic Skills	CCF201	FGNS	2	Nil	02	02	04	-	-	25	50*I	-
	Semester 2												
6	Engineering Physics	CCF101	FPHA	1	Nil	04	02	06	80	20	-	50*1	-
7	Engineering Mathematics	CCF106	FEMT	1	CCF105	03	01	04	80	20	-	-	-
8	Engineering Drawing 2	CCF108	FEDB	1	CCF107	02	04	06	80	20	25	-	-
9	Applied Mechanics	CCF110	FAPM	1	Nil	04	02	06	80	20	25	-	-
10	Workshop Practice 2	CCF115	FWSE	1	CCF111	-	02	02	-	-	50	-	-
11	Communication Skills	CCF202	FCMS	2	Nil	02	02	04	40	10	-	25*I	-
	Semester 3												
12	Applied Mathematics	CEF301	FAMT	3	CCF105 CCF106	03	01	04	80	20	-	-	-
13	Building Construction	CEF302	FBCO	3	-	04	02	06	80	20	50	-	25**
14	Building Drawing	CEF303	FBDR	3	CCF107 CCF108	02	04	06	80	20	50	-	25**
15	Soil Mechanics & Foundation Engineering	CEF305	FSMF	4	CCF110	03	02	05	80	20	25	-	-
16	Mechanics of Structures	CEF307	FMOS	3	CCF110	04	02	06	80	20	25		25
17	Surveying-1	CEF308	FSR1	3	-	03	04	07	80	20	25	50**	-
	Semester 4												
18	Professional Practices	CCF203	FPRP	2	-	01	02	03	-	-	25	-	50*1
19	Surveying- 2	CEF309	FSR2	3	CEF308	03	04	07	80	20	25	50**	-
20	Transportation Engineering	CEF310	FTRE	3	-	04	02	06	80	20	50	-	-

21	Hydraulics	CEF306	FHYD	3	CCF110	04	02	06	80	20	25	-	25**
22	Concrete Technology	CEF406	FCTE	3	-	03	02	05	80	20	25	-	25**
23	Elective-1 < from list of options>	CEF311 to 315	-	3	-	03	02	05	80	20	50	-	-
	Semester 5												
24	Computer Aided Drawing	CEF304	FCAD	3			04	04			25	50	
25	Analysis of Structure	CEF401	FAOS	4	CEF307	03	-	03	80	20	-	-	-
26	Design & Drafting of Steel Structures	CEF403	FDSS	4	CEF307	03	02	05	80	20	25	-	-
27	Professional Practice (Civil)	CEF405	FPPR	4	-	01	02	03	-	-	25	-	50*
28	Industrial Organization & Management	CCF501	FIOM	5	-	03	-	03	80	20	-	-	-
29	Environmental Engineering	CEF506	FENE	5	-	04	02	06	80	20	-	-	25**
30	Civil Engineering Project I	CEF501	FCPI	5	-	-	02	02	-	-	25	-	-
31	Elective-2 <from list="" of="" options=""></from>	CEF407 to 410	-	4	-	03	02	05	80	20	25	-	-
	Semester 6												
32	Design & Drafting of R.C.C. Structures	CEF402	FRCC	4	CEF307	04	02	06	80	20	25	-	25**
33	Estimating and Costing	CEF404	FEAC	4	CEF303	04	04	08	80	20	25	-	25**
34	Contracts and Accounts	CEF504	FCAA	5	-	03	-	03	80	20	-	-	-
35	Civil Engineering Project II	CEF502	FCPII	5	FCPI	-	04	04	-	-	25	-	50**
36	Construction Field Skills	CEF503	FCFS	5	-	-	04	04	-	-	50	-	25*
37	Irrigation Engineering	CEF507	FIRE	5	-	04	01	05	80	20	-	-	25**
38	Elective-3 < from list of options>	CEF508 to 511	-	5	-	03	-	03	80	20	-	-	-

Sr No	Name of Course	Course	Course	Le	Pre- requi-	Teaching Scheme (hours per week)		me ek)		Exan	nination (Mar	n Scheme ·ks)	9
		Code	a-tion	I	site Course	Th	Pract. / Drg. / Tutorial	Cre dit s	Th	тs	тw	Pr	Or
	Semester 3												
1	Applied Mathematics	CEF301	FAMT	3	CCF105 CCF106	03	01	04	80	20	-	-	-
2	Building Construction	CEF302	FBCO	3	-	04	02	06	80	20	50	-	25**
3	Building Drawing	CEF303	FBDR	3	CCF107 CCF108	02	04	06	80	20	50	-	25**
4	Soil Mechanics & Foundation Engineering	CEF305	FSMF	4	CCF110	03	02	05	80	20	25	-	-
5	Mechanics of Structures	CEF307	FMOS	3	CCF110	04	02	06	80	20	25		25*
6	Surveying-1	CEF308	FSR1	3	-	03	04	07	80	20	25	50	-
	Semester 4												
7	Professional Practices	CCF203	FPRP	2	-	01	02	03	-	-	25	-	50*1
8	Surveying- 2	CEF309	FSR2	3	CEF308	03	04	07	80	20	25	50**	-
9	Transportation Engineering	CEF310	FTRE	3	-	04	02	06	80	20	50	-	-
10	Hydraulics	CEF306	FHYD	3	CCF110	04	02	06	80	20	25	-	25**
11	Concrete Technology	CEF406	FCTE	3	-	03	02	05	80	20	25	-	25**
12	Elective-1 < from list of options>	CEF311 to 315	-	3	-	03	02	05	80	20	50	-	-
	Semester 5												
13	Computer Aided Drawing	CEF304	FCAD	3			04	04			25	50*	
14	Analysis of Structure	CEF401	FAOS	4	CEF307	03	-	03	80	20	-	-	-
15	Design & Drafting of Steel Structures	CEF403	FDSS	4	CEF307	03	02	05	80	20	25	-	-
16	Professional Practice (Civil)	CEF405	FPPR	4	-	01	02	03	-	-	25	-	75*
17	Industrial Organization & Management	CCF501	FIOM	5	-	03	-	03	80	20	-	-	-
18	Environmental Engineering	CEF506	FENE	5	-	04	02	06	80	20	-	-	25**
19	Civil Engineering Project I	CEF501	FCPI	5	-	-	02	02	-	-	25	-	-
20	Elective-2 <from list="" of="" options=""></from>	CEF407 to 410	-	4	-	03	02	05	80	20	-	-	-
	Semester 6												

### Path-2 : Students admitted Directly to Second Year

					-						-		
21	Design & Drafting of R.C.C. Structures	CEF402	FRCC	4	CEF307	04	02	06	80	20	25	-	25**
22	Estimating and Costing	CEF404	FEAC	4	CEF303	04	04	08	80	20	25	-	25**
23	Contracts and Accounts	CEF504	FCAA	5	-	03	-	03	80	20	-	-	-
24	Civil Engineering Project II	CEF502	FCPII	5	FCPI	-	04	04	-	-	25	-	50**
25	Construction Field Skills	CEF503	FCFS	5	-	-	04	04	-	-	50	-	25*
26	Irrigation Engineering	CEF507	FIRE	5	-	04	01	05	80	20	-	-	25**
27	Elective-3 < from list of options>	CEF508 to 511	-	5	-	03	-	03	80	20	-	-	-

# Note : Separate *Supplementary Input Sessions* for necessary content of First Year courses shall be designed and arranged for these students so as to bridge the gap of FY courses

### 6. EXEMPTIONS FOR COURSES

# Eligibility for Exemptions for First and Second Semester Courses of MPECS-2016 for students admitted on X-pass basis

			Whether eligible for exemption ?							
S	Name of Course	Course		1	(Yes/No	)	1			
N		Code	XII Science	XII Tech.	XII MCVC	XII Voc.	ITI			
1	Engineering Physics (CE/ME/SM/MT)	CCF101	YES	YES	No	No	No			
2	Engineering Physics (EE/IE/ET/IT)	CCF102	YES	YES	No	No	No			
3	Engineering Chemistry (CE/ME/SM/MT)	CCF103	No	No	No	No	No			
4	Engineering Chemistry (EE/IE/ET/IT)	CCF104	No	No	No	No	No			
5	Basic Mathematics	CCF105	YES	YES	No	YES	No			
6	Engineering Mathematics	CCF106	YES	YES	No	YES	No			
7	Engineering Drawing -1 (CE/ME/MT)	CCF107	No	YES	No	No	No			
8	Engineering Drawing-1(SM)	CCF117	No	YES	No	No	No			
9	Engineering Drawing -2 (CE/ME/SM/MT)	CCF108	No	YES	No	No	No			
10	Engineering Graphics (EE/IT/ IE/ET)	CCF109	No	YES	No	No	No			
11	Applied Mechanics	CCF110	No	No	No	No	No			
12	Workshop Practices-1 (CE)	CCF111	No	YES	YES	YES	YES			
13	Workshop Practices–1 (ME, SM, MT)	CCF112	No	YES	YES	YES	YES			
14	Workshop Practices (EE)	CCF113	No	YES	YES	YES	YES			
15	Workshop Practices (IE, ET)	CCF114	No	YES	YES	YES	YES			
16	Workshop Practices -2 (CE)	CCF115	No	YES	YES	YES	YES			
17	Workshop Practices -2 (ME, SM, MT)	CCF116	No	YES	YES	YES	YES			
18	Generic Skills	CCF201	No	No	No	No	No			
19	Communication Skills	CCF202	No	No	No	No	No			

Note : The above eligibility is subject to condition that the student has secured at least 40 % marks in the respective subject.

Students seeking exemption for any other subjects should contact Academic Coordinator / Controller of Examinations.

## 7. COURSE EQUIVALENCE FOR PREVIOUS MPECSs

SN	<b>MPECS-1994</b>	<b>MPECS-2001</b>	MPECS-2006	<b>MPECS-2010</b>	<b>MPECS-2013</b>	MPECS-2016
1.			R 101 Generic Skills	X 101 Generic Skills	CCE201 Generic Skills	CCF201 Generic Skills
2.	101 Communication Skill – I	0101 Communication Skill - I	R 102 Communication Skills.	X 106 Communication Skills.	CCE202Communication Skills	CCF202Communication Skills
3	102 Communication Skill – II	0102 Communication Skill - II	R 102 Communication Skills.	X 106 Communication Skills.	CCE202Communication Skills	CCF202Communication Skills
4	103 Applied Physics	0103 Applied Physics - I 0104 Applied Physics – II	R 103 Applied Physics - I R 104 Applied Physics – II	X 102 Basic Physics X 108 Applied Physics	CCE101 Engineering Physics CCE101 Engineering Physics	CCF101 Engineering Physics CCF101 Engineering Physics
5	104 Applied Chemistry	0105 Applied Chemistry - I 0106 Applied Chemistry - II	R 105AppliedChemistry. R 106 Chemistry of Engineering Materials.	X 103 Applied Chemistry. X 109 Chemistry of Engineering Materials.	CCE103 Engineering Chemistry CCE103 Engineering Chemistry	CCF103 Engineering Chemistry CCF103 Engineering Chemistry
6	105 Mathematics –I	0107 Mathematics - I	R 107 Basic Mathematics.	X 104 Basic Mathematics.	CCE105 Basic Mathematics	CCF105 Basic Mathematics
7	106 Mathematics – II	0108 Mathematics - II	R 108 Engineering Mathematics	XC 110 Engineering Mathematics	CCE106 Engineering Mathematics	CCF106 Engineering Mathematics
8	107 Applied Mechanics I	0116 Applied Mechanics	R 112 Applied Mechanics	X 111 Applied Mechanics	CCE110 Applied Mechanics	CCF110 Applied Mechanics
9	108 Introduction to Computer	0115 Introduction to Computer	R111Computer Fundamentals Applications	NIL	NIL	NIL
10	109 Engineering Drawing – I	0109 Engineering Drawing - I	R 109 Engineering Drawing – I	X 105 Engineering Drawing - I	CCE107 Engineering Drawing -I	CCF107 Engineering Drawing -I
11	110 Engineering Drawing – II	0110 Engineering Drawing - II	R 110 Engineering Drawing - II	X 107 Engineering Drawing - II	CCE108 Engineering Drawing - II	CCF108 Engineering Drawing - II
12	111 Workshop –I	0113 Workshop - I	R 113 Workshop Practice – I	CE 101 Basic Workshop Practice (Civil)	CCE111 Basic Workshop Practice-I (Civil)	CCF111 Basic Workshop Practice-I (Civil)
13	112 Workshop – II	0114 Workshop - II	R 114 Workshop Practice - II	CE 102 Basic Workshop Practice (Civil)	CCE115 Basic Workshop Practice -II (Civil)	CCF115 Basic Workshop Practice -II (Civil)
14	NIL	0111 Fundamentals of Engineering – I.	NIL	NIL	NIL	NIL
15	NIL	0112 Fundamentals of Engineering – II.	NIL	NIL	NIL	NIL
16	201 Mathematics- III	1201 Mathematics- III	C201 Applied Mathematics	CE201 Applied Mathematics	CEE301Applied Mathematics	CEF301Applied Mathematics
17	C202 Civil Engg. Drawing	1202 @ Civil Engg. Drawing	C202 Building Drawing	CE 202 Building Drawing	CEE303 Building Drawing	CEF303 Building Drawing
18	C203 Building Drawing	1203 Building Drawing	C202 Building Drawing	CE 202 Building Drawing	CEE303 Building Drawing	CEF303 Building Drawing
19			C203 @ Civil Engg. Drawing	CE 203 @ Civil Engg. Drawing	NIL	NIL
20	C204 Surveying - I	1204 Surveying - I	C204 Surveying – I	CE 204 Surveying – I	CEE308 Surveying -1	CEF308 Surveying -1
21	C205 Surveying – II	1205 Surveying - II	C205 Surveying – II	CE 205 Surveying – II	CEE309 Surveying – 2	CEF309 Surveying – 2
22	C206Construction Technology	1206Construction Technology	C206 Construction Technology	CE 206 Construction Technology	CEE302 Building Construction	CEF302 Building Construction
23	C207 Concrete Technology C211 Soil Mechanics	1207 Concrete Technology & Soil Mechanics	C207 Concrete Technology and Soil Mechanics	CE 207 Concrete Technology	CEE406 Concrete Technology	CEF406 Concrete Technology
24	C216 Roads & Bridges C212 Railways & Tunnel	1208 Transportation Engg. (RBR)	C208 Transportation Engg. (RBR)	CE 208 Transportation Engg.	CEE310 Transportation Engg	CEF310 Transportation Engg
25	C401@ Computer Programming	1209@ Computer Programming	NIL	NIL	NIL	NIL
26	NIL	NIL	C210@ Personality Development	NIL	NIL	NIL

27	C213 Construction Techniques	1211Construction Techniques	C 211 Construction Techniques	CE 211 Advanced Construction Techniques and equipments	CEE311 Advanced Construction Techniques and equipments	CEF311 Advanced Construction Techniques and equipments
28	C214 Construction Equipment's	1212 Construction Equipments	C212 Construction Equipment's	CE 211 Advanced Construction Techniques and equipments	CEE311 Advanced Construction Techniques and equipments	CEF311 Advanced Construction Techniques and equipments
29	NIL	NIL	C213 Advanced construction materials	CE 213 Advanced construction materials	CEE312 Advanced Construction Materials	CEF312 Advanced Construction Materials
30	C215 Rural Engineering	1213 Rural Engineering	NIL	NIL	NIL	NIL
31	C221 Basic Civil Engineering.(C)	0221 Elements of Civil Engineering.(C)	R221 Elements of Civil Engineering.(C)	NIL	NIL	NIL
32	C228 Higher Mathematics	0228 Higher Mathematics	NIL	NIL	CEE313 Higher Mathematics	CEF313 Higher Mathematics
33	NIL	NIL	R228 Higher Mathematics	NIL	CEE313 Higher Mathematics	CEF313 Higher Mathematics
34	NIL	NIL	NIL	CE212 Maintenance and Rehabilitation of Structures	CEE314 Maintenance and Rehabilitation of Structures	CEF314 Maintenance and Rehabilitation of Structures
35	NIL	NIL	NIL	NIL	CCE203 Professional Practices	CCF203 Professional Practices
36	NIL	NIL	NIL	NIL	CCE204 Environmental Studies	NIL
37						
38	C301 Mechanics of Structures	1301 Mechanics of Structures	C301 Mechanics of Structures	CE 210 Mechanics of Structures	CEE307 Mechanics of Structures	CEF307 Mechanics of Structures
39	C302 Analysis of Structures	1302 Analysis of Structures	C302 Analysis of Structures	CE 301 Analysis of Structures	CEE401 Analysis of Structures	CEF401 Analysis of Structures
40	C303 Design & Drafting of RCC Structures.	1303 Design & Drafting of RCC Structures.	C303 Design & Drafting of RCC Structures.	CE 302 Design & Drafting of RCC Structures.	CEE402 Design & Drafting of RCC Structures.	CEF402 Design & Drafting of RCC Structures.
41	C304 Quantity Surveying & Valuation	1304 Quantity Surveying & Valuation	C304 Estimating & Costing .	CE 303 Estimating & Costing .	CEE404 Estimating & Costing .	CEF404 Estimating & Costing
42	C314 Hydraulics	1305 Hydraulics	C305 Hydraulics	CE 304 Hydraulics	CEE 306 Hydraulics	CEF 306 Hydraulics
43	NIL	NIL	C306@ Career &Entrepreneurship Development	CE 305@ Personality and Entrepreneurship Development	NIL	NIL
44	C311 Town & Country Planning.	1311 Town & Country Planning.	C311 Town & Country Planning.	CE 307 Town & Country Planning.	CEE410 Town & Country Planning.	CEF410 Town & Country Planning.
45	NIL	NIL	NIL	CE 308 Building Services	CEE407 Building Services	CEF407 Building Services
46	C312 Foundation Engg.	1312 Foundation Engg.	C312 Foundation Engg.	CE 306 Soil Mechanics and Foundation Engg.	CEE305 Soil Mechanics and Foundation Engg.	CEF305 Soil Mechanics and Foundation Engg.
47	C313 Design & Drafting of Steel Structures	1313 Design & Drafting of Steel Structures	C313 Design & Drafting of Steel Structures	CE 309 Design & Drafting of Steel Structures	CEE403 Design & Drafting of steel Structures	CEF403 Design & Drafting of steel Structures
48	C315 Irrigation Engg.	1401 Irrigation Stru. & System.	C401 Irrigation Stru. & System.	CE 401 Irrigation Stru.& System.	CEE506 Irrigation Engg.	CEF507 Irrigation Engg.
49	C403Construction Management	1402Construction Management	C402Construction Management	CE402 Construction Management	CEE504 Construction Management	CCF501 Industrial Organization & Management
50	C404 Environmental Engg.	1403Environmental Engg.	C403 Environmental Engg.	CE403 Environmental Engg.	CEE505 Environmental Engg.	CEF506 Environmental Engg.
51	C305@ Project work & seminar (Flexibility in choice of project).	1404@ Project work & seminar (Flexibility in choice of project).	C404@ Civil Engg. Project (Flexibility in choice of project).	CE 404@ Civil Engg. Project (Flexibility in choice of project).	CEE502@Civil Engg. Project (Flexibility in choice of project).	CEF501Civil Engg. Project I CEF502Civil Engg. Project II (Flexibility in choice of project).

		) III		GE 1050	GEE 40.5	GDD 10.5
52		NIL	C405@ Professional	CE 405@	CEE405	CEF405
	NIL		Practices	Professional	@Professional	Professional
			Theorem	Practices	Practices(Civil)	Practices(Civil)
53	NIL	NIL	C414Solid waste	CE408Solid waste	CEE509Solid waste	CEF510Solid waste
			management	management	management	management
54	NIL	1417Earthquake	C416Earthquake	CE410Earthquake	CEE507Earthquake	CEF508Earthquake
		Engineering	Engineering	Engineering	Engineering	Engineering
55	C402Computer	1405@Computer	C209@ Cad in Civil	CE 209@ Cad in	CEE304Computer	CEF304Computer
	Application	Application – II	Engineering	Civil Engineering	Aided Drg.	Aided Drg.
56	C411 Env .Pollution	1411Env.Pollution&	NII	NII	NIL	NIL
	& Control.	Control.	INIL	NIL		
57	C412 Water	1412 Water	C413WaterShed	CE407WaterShed	CEE510WaterShed	CEF511WaterShed
	Management	Management	Management	Management	Management	Management
58	C413 Project	1413 Project	C406 Contracts and	CE 406 Contracts	CEE501Contracts	CEF504Contracts
	Management	Management	Accounts	and Accounts	and Accounts	and Accounts
59	C414 Industrial	1414 Industrial	C417 Industrial Waste	CE 411 Industrial	CEE508 Industrial	CEF509 Industrial
	C414 Industrial	1414 Industrial	C417 Industrial waste	Waste	Waste Management	Waste Management
	waste Management	waste Management	Management	Management	, i i i i i i i i i i i i i i i i i i i	C C
60	C415 Quality	1415 Quality		CE 409 Quality	CEE 409 Quality	CEF 409 Quality
00	Control	Control	C415 Quality Control	Control	Control	Control
61	C416	1416	NII	NUL	NIL	NIL
	Entrepreneurship	Entrepreneurship	NIL	NIL		
62	NII	NII	NIII	NII	CEE408 Plumbing	CEF408 Plumbing
_	NIL	NIL	NIL	NIL	Services	Services
63	NII	NII	NII	NII	CEE503@	CEF503@
	NIL	NIL	INIL	INIL	Construction Field	Construction Field
64						CEF 315 Energy
	NIL	NIL	NIL	NIL	NIL	Convervation
						& Audit ( Elective )

# 8. PROFORMAS FOR EVALUATION OF TERM WORK, ORALS AND PRACTICALS

**PROFORMA - I** 

**GOVERNMENT POLYTECHNIC, KOLHAPUR** 

PerformanceforFinalAssessmentofORAL/PRACTICAL

### ByInternal&ExternalExaminer

(For subjecthavingONLYORAL/PRACTICAL)

CourseCode&CourseName--

Programme-\_\_\_\_\_

Summer/WinterExam-\_\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-

RollNo	Marksof	Marksof	Performance	Performance	Marks	Marks
/Exam	Progressive	Continuous	ofTermEnd	ofTermEnd	outof	asper
No	SkillTest	Assessment	OR/PRbyInt ernal	OR/PR		Evaluation
	25	25	25	25	100	

NameandSignatureof InternalExaminer NameandSignatureof External Examiner

DPC		MA_II	
PRC	гок	IVIA-II	

### **GOVERNMENT POLYTECHNIC, KOLHAPUR**

### Performance for Final Assessment of ORAL/PRACTICAL

### ByInternalExaminer

### (ForsubjecthavingONLYORAL/PRACTICAL)

CourseCode&CourseName--\_\_\_\_

Programme-\_\_\_\_\_

Summer/WinterExam-\_\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_\_Date-\_\_\_\_\_Date-\_\_\_\_\_Date-\_\_\_\_\_Date-\_\_\_\_\_Date-\_\_\_\_\_Date-\_\_\_\_\_Date-\_\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date

RollNo	Marksof	Marksof	Performance	Marksout of	Marks
/Exam	Progressive	Continuous	ofTermEnd		asperEvaluation
No	SkillTest	Assessment	OR/PRbyInt ernal		Scheme
	25	25	50	100	
	1	1			

NameandSignatureofInternalExaminer

Р	RO	FOF	RMA	A-111
			11417	<b>、</b>

### **GOVERNMENT POLYTECHNIC, KOLHAPUR**

### PerformanceforFinalAssessmentofTERMWORK

### **ByInternalExaminer**

### (For subjecthavingONLYTERMWORK)

CourseCode&CourseName--\_\_\_\_

Programme -\_\_\_\_\_

Summer/WinterExam-\_\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_\_Date-\_\_\_

RollNo	Marksof	Marksof	Marksout of	Marks
/Exam	ProgressiveSkill	Continuous		asperEvaluation
No	50	50	100	

NameandSignatureofInternalExaminer

#### PROFORMA-IV

### **GOVERNMENT POLYTECHNIC, KOLHAPUR**

### PerformanceforFinalAssessmentofORAL/PRACTICAL

### By Internal&ExternalExaminer

### (ForsubjecthavingORAL/PR&TW)

CourseCode&CourseName--\_\_\_\_Programme-\_\_\_\_Pro

Summer/WinterExam-\_\_\_\_\_Date-\_\_\_\_\_

RollNo	Marksof	Performance	Performance	Marksout	Marks
/Exam	Progressive	ofTermEnd	ofTermEnd	of	asperEvaluation
No	SkillTest	OR/PR	OR/PR		Scheme
	25	25	50	100	

NameandSignatureof InternalExaminer

NameandSignatureof **External Examiner** 

#### PROFORMA-V

### **GOVERNMENT POLYTECHNIC, KOLHAPUR**

### PerformanceforFinalAssessmentofORAL/PRACTICAL

### **By InternalExaminer**

### (For subjecthavingORAL/PR&TW)

CourseCode&CourseName--\_\_\_\_\_

Programme-\_\_\_\_\_

Summer/WinterExam-\_\_\_\_\_Date-\_\_\_\_\_Date-\_\_\_\_\_

RollNo/	Marksof	PerformanceofTerm	Marksout of	Marks
ExamNo	Progressive	EndOR/PR		asperEvaluation
	50	50	100	
1				

NameandSignatureofInternalExaminer

### PROFORMA-VI

### GOVERNMENTPOLYTECHNIC, KOLHAPUR

### PerformanceforFinalAssessmentofTERMWORK

### **By InternalExaminer**

### (For subjecthavingORAL/PR&TW)

CourseCode&CourseName--\_\_\_\_\_

Programme-\_\_\_\_\_

Summer/WinterExam-\_\_\_\_\_Date-\_\_\_\_\_Date-\_\_\_\_\_Date-\_\_\_\_\_

RollNo/	MarksofContinuous	Marksout of	Marksasper
ExamNo	A		Frederation Cale and a
	100	100	
-			
-			

NameandSignatureofInternalExaminer

## **SECTION – II**

# SYLLABI OF COURSES (LEVEL-WISE)

## **CURRICULUM CONTENTS OF LEVEL – I**

## **FOUNDATION COURSES**

### **COURSE ID:**

Course Name	: ENGINEERING PHYSICS (CE/ME/SM/MT)
Course Code	: CCF101
<b>Course Abbreviation</b>	: FPHA

### **TEACHING AND EVALUATION SCHEME :**

**Pre-requisite** Course(s) : Nil

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

**Evaluation Scheme :** 

Component	Progressive Assessment		Semester end		Total
Component	Theory	Practical	Theory	Practical*	
Duration	Average of two tests of 20 marks each	One Skill Test (2 hours) *	One paper (3 hours)	One practical (2 hours)	
Marks	20		80	50 I	150

\* Assessment as per pro-forma II

### I – Internal Examination

### **RATIONALE :**

Physics is the foundation of engineering and technology. The development of all engineering areas requires good understanding of fundamental principles in physics. Studying physics develops scientific methodology and technical aptitude in the students. Applications of principles of physics in engineering fields create interest and motivate the students.
# **COMPETENCY :**

Apply principles of Physics to solve engineering problems as follows :

Cognitive : i) Understanding and applying principles and laws of Physics to simple practical

problems/ situations. ii)Observing iii) Classifying iv) Interpreting

Psychomotor : Handling of instruments, apparatus and tools

Affective : Skill of i) working in team ii) curiosity, interest and self-confidenc.

# **COURSE OUTCOMES :**

CCF101-1 Select proper material in engineering industry by analysis of its physical properties

CCF101-2 Use basic principles of wave motion for related engineering applications

CCF101-3 Use nanotechnology for quality improvement of materials

CCF101-4 Apply principles of optics, electricity to solve engineering problems

CCF101-5 Use LASERs, X-rays and photocell based equipments

CCF101-6 Apply principles of acoustics and ultrasonics for related engineering applications

### COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

					Program	me Outco	mes POs a	and PSOs					
Competency and COs	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long learning	PSO1 Plan & Design	PSO2 Construc tion & Mainten ance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply principles of Physics to solve engineering problems.	3	1	2	1	2	1	-	2	1	2	2	1	1
<b>CCF101-1</b> Select proper material in engineering industry by analysis of its physical properties	3	1	2	1	1	1	-	1	1	2	2	1	1

					Program	me Outco	mes POs	and PSOs					
Competency and COs	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long learning	PSO1 Plan & Design	PSO2 Construc tion & Mainten ance	PSO3 Proble m Solving on field
CCF101-2 Use basic principles of wave motion for related engineering applications	3	1	2	-	1	1	-	2	1	2	2	1	1
<b>CCF101-3</b> Use nanotechnology for quality improvement of materials	3	1	1	-	2	2	-	-	1	2	1	2	-
CCF101-4 Apply principles of optics, electricity to solve engineering problems	3	1	3	1	2	2	-	2	1	2	1	1	1
CCF101-5 Use LASERs, X-rays and photocell based equipments	3	1	2	1	2	1	-	1	1	2	1	2	2
CCF101-6 Apply principles of acoustics and ultrasonics for related engineering applications	3	1	2	1	2	1	-	1	1	2	3	3	2

# CONTENT :

# A) THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Cours	se Outcome CCF101-1 Select proper material in engineering in	ndustry by an	alysis of its
physic	cal properties	Γ	
1	ELASTICITY	06	08
	<ul> <li>1.1 Definitions of elasticity, plasticity, rigidity, deforming force, restoring force</li> <li>1.2 Stress, Strain and their types</li> <li>1.3 Elastic Limit, Statement of Hooke's law, modulus of elasticity and its types</li> <li>1.4 Behavior of wire under continuously increasing load- yield point, ultimate stress, breaking stress</li> <li>1.5 Factor of safety</li> <li>1.6 Applications of elasticity</li> <li>1.7 Numerical problems</li> </ul>		
2	PROPERTIES OF LIOUID	16	18
-	2.1 INTRODUCTION $$	10	10
	Definitions of density, specific volume,	(02)	(02)
	<ul> <li>specific weight, specific gravity, compressibility of liquid</li> <li>2.2 VISCOSITY</li> <li>2.2.1 Definition and meaning of viscosity, velocity gradient</li> <li>2.2.2 Newton's law of viscosity, Coefficient of viscosity</li> <li>2.2.3 Stokes law (Derivation not required)</li> <li>2.2.4 Derivation of expression for coefficient of viscosity of liquid by Stokes method</li> <li>2.2.5 Applications of viscosity.</li> <li>2.3 SURFACE TENSION</li> <li>2.3.1 Definition and molecular theory</li> <li>2.3.2 Angle of contact : definition and significance</li> <li>2.3.3 Capillary action : definition and examples</li> <li>2.3.4 Derivation of expression for surface tension by capillary rise method (experiment not required)</li> </ul>	(06)	(06)
	<ul><li>2.3.6 Applications of surface tension</li></ul>		
	11		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	No numerical on above topic		
Cour	se Outcome <b>CCF101-2</b> Use basic principles of wave motion fo	r related engi	neering
applic	cations	5	5
3	WAVE MOTION	06	08
	3.1 Definitions of periodic motion, Linear S. H. M.		
	3.2 Parameters of linear SHM : Amplitudes, Period,		
	Frequency and Phase		
	3.4 Concept and definition of wave		
	3.5 Parameters of wave- Frequency, periodic time,		
	phase and wavelength		
	3.6 Types of waves (transverse and longitudinal) and		
	their characteristics		
	3.7 Free and forced oscillations		
	3.8 Phenomenon of resonance and its applications		
Cour	se Outcome <b>CCF101-3</b> Use nanotechnology for quality improv	l vement of ma	terials
4	INTRODUCTION TO NANOTECHNOLOGY	04	06
т		04	00
	4.1 Definition of nanoscale, nanometer, nanoparticle		
	4.2 Definition and examples of nanostructured		
	materials		
	4.3 Applications of nanotechnology in electronics,		
	automobile, textile, space, medicine, cosmetics		
	and environment		
	No numericals on above topic		
Seme	ester end exam question paper should be such that total r	narks of que	stions on each
topic atten	is one and half times the marks allotted above but t npt questions of the above allotted marks only.	he candidat	es are able to

# Section II

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)	
Cours	se Outcome <b>CCF101-4</b> Apply principles of optics, electricity to sol	ve engineering problems		
5	<ul> <li>PROPERTIES OF LIGHT</li> <li>5.1 Refraction of light</li> <li>5.2 Laws of Refraction of Light, Snell's law</li> <li>5.3 Refraction through glass prism</li> <li>5.4 Derivation of prism formula</li> <li>5.5 Dispersion &amp; Dispersive Power</li> <li>5.6Numerical problems</li> </ul>	06	06	
6	<ul> <li>ELECTRICITY</li> <li>6.1 Concept of electric current , resistance</li> <li>6.2 Ohm's law, Specific resistance</li> <li>6.3 Resistances in series and parallel.</li> <li>6.4 Wheatstone's Network and Meter Bridge.</li> <li>6.5 Numerical problems</li> </ul>	06	08	
Course Outcome CCF101-5 Use LASERs, X-rays and photocell based equipments				
7	MODERN PHYSICS	14	18	
	<ul> <li>7.1 PHOTO ELECTRIC EFFECT</li> <li>7.1.1 Plank's hypothesis</li> <li>7.1.2 Photon and its characteristics</li> <li>7.1.3 Photo electric effect and its characteristics</li> </ul>	(06)	(08)	
	7.1.4 Plank-Einstein equation			
	7.1.5 Photocell – construction and symbol			
	7.1.6 Applications of photo electric effect			
	7.1.7 Numerical Problems	(0.1)	(00)	
	7.2 LASER	(04)	(06)	
	7.2.1 Introduction of LASER			
	7.2.2 Properties of laser			
	7.2.3 Spontaneous and stimulated emission			

	7.2.4 Population inversion and optical pumping				
	7.2.5 Applications of LASER				
	No numericals on above topic	(04)	(04)		
	7.3 X-RAYS				
	7.3.1 Nature and properties of x-rays.				
	7.3.2 Production of x-rays by Coolidge tube				
	7.3.3 Applications of x-rays				
	No numericals on above topic				
Cours applic	se Outcome <b>CCF101-6</b> Apply principles of acoustics and ultrasoni ations	cs for related	engineering		
8	ACOUSTICS AND ULTRASONICS	06	08		
	8.1 ACOUSTICS				
	8.1.1 Echo and reverberation of sound				
	8.1.2 Sabine's formula				
	8.1.3 Requirements of good acoustics				
	8.1.4 Acoustical planning of an auditorium				
	8.1.5 Numerical Problems				
	8.2 ULTRASONICS				
	8.2.1 Limits of audibility				
	8.2.2 Ultrasonic waves				
	8.2.3 Ultrasonic transducers : Piezoelectric and				
	Magnetostriction				
	8.2.4 Applications of ultrasonic waves				
-	No numericals on above topic				
Semes	nester end exam question paper should be such that total marks of questions on each topic is one and				

half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

Section	Name of tonic	Distribution	Course	Total		
no.		Remember	Understand	Application	outcome	marks
I/1	Elasticity	2	4	2	CCF101-1	08
I/2	Properties of liquids	10	6	2	CCF101-1	18
I/3	Wave motion	4	2	2	CCF101-2	08
I/4	Nanotechnology	2	4	-	CCF101-3	06
II/5	Properties of light	2	2	2	CCF101-4	06
II/6	Electricity	2	2	4	CCF101-4	08
11/7	Modern Physics	8	8	2	CCF101-5	18
11/8	Acoustics and Ultrasonics	2	4	2	CCF101-6	08
	Total	32	32	16		80

### Specification table for setting question paper for semester end theory examination :

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

# B) TERM WORK Term work shall consist of the following :

### Laboratory experiments and related skills to be developed :

Sr. No.	Title of Experiment	Skills to be developed	Course Outcome		
1	Overview of Field Applications of Physics	<ul><li>i) Information search</li><li>ii) Information presentation</li></ul>	CCF101-1 To		
			CCF101-6		
(Any 10 of the following experiments)					
2	To measure dimensions of given objects by using Vernier Caliper	<ul> <li>i) Determine least count and zero error in the measuring instrument.</li> <li>ii) Measuring internal and external dimensions of given objects</li> <li>iii) Handling the measuring instruments for measuring depth, thickness etc.</li> <li>iv) Tabulating observations.</li> </ul>	CCF101-1		
3	To measure the diameter of bob and thickness of plate by using Micrometer screw gauge	<ul> <li>i) Determine least count and zero error in the measuring instrument.</li> <li>ii) Measuring dimensions of given objects</li> <li>iii) Handling the measuring instruments for measuring depth, thickness etc.</li> <li>iv) Tabulating observations.</li> </ul>	CCF101-1		

4	To determine the viscosity of liquid by Stokes method.	<ul> <li>i) Measuring diameter of steel ball using micrometer screw gauge.</li> <li>ii) Measuring terminal velocity of steel ball in the liquid column.</li> <li>iii) Use of stop watch for measurement of time.</li> <li>iv) Tabulating observations.</li> <li>ii) Ecquiring the microscope property in</li> </ul>	CCF101-1
5	To determine the surface tension of liquid by capillary rise method	<ul> <li>ii) Focusing the incroscope property in order to get clear image.</li> <li>iii) Adjusting cross wires of microscope at particular place.</li> <li>iii) Taking readings for main scale and Vernier scale of traveling microscope.</li> <li>iv) Tabulating observations.</li> </ul>	CCF101-1
6	To measure unknown resistance of wire by Ammeter – Voltmeter method.	<ul> <li>i) Drawing the circuit diagram of the required experiment.</li> <li>ii) Connecting the instruments as per circuit diagram.</li> <li>iii)Measuring the value of potential difference &amp; current in the circuit.</li> </ul>	
7	To verify Snell's law using glass slab	<ul><li>i) Drawing necessary ray diagram</li><li>ii) Measuring angles of incidence and refraction</li><li>iii) Tabulating observations.</li></ul>	CCF101-4
8	To determine refractive index of prism by pin method	<ul> <li>i) Removing parallax between the imag and the pins by observing the refracted r through a prism.</li> <li>ii) Measuring the angle of refraction correct iii) Drawing the path of refracted ray throu the prism</li> <li>iv) Drawing inference regarding relati between angle of incidence &amp; angle refraction from i-δ graph</li> <li>v) Tabulating observations.</li> </ul>	CCF101-4
9	To determine velocity of sound by resonance tube	<ul> <li>i) Adjusting the resonating length by discriminating resonating sound from sound produced by the tuning fork.</li> <li>ii) Measuring internal diameter of resonating tube using vernier caliper</li> <li>iii) Drawing inference &amp; confirming Law nL = constant</li> <li>iv) Tabulating observations.</li> </ul>	CCF101-2
10	To study characteristics of photocell	<ul> <li>i) Drawing circuit diagram</li> <li>ii)Handling different delicate instruments.</li> <li>iii) Tabulating observations</li> <li>iv) Drawing graph</li> </ul>	CCF101-5
11	To determine the acceleration due to gravity by 'g' by simple pendulum	<ul> <li>i) Measuring length of pendulum</li> <li>ii) Finding least count of stopwatch</li> <li>iii)Measuring periodic time with the help of stop watch</li> <li>iv) Tabulating observations.</li> </ul>	CCF101-2

12	To measure unknown resistance by Wheatstone's meter bridge.	<ul> <li>i) Drawing the circuit diagram for series connections of the resistances.</li> <li>ii) Connecting the resistances for series method as per circuit diagram.</li> <li>iii) Finding the correct position of pull</li> </ul>	CCF101-4
		point & measuring correct balancing lenses on Meter bridge. iv)Tabulating observations.	

# C) INDUSTRIAL EXPOSURE

Mode of Exposure	Торіс
(Visit/Exp.Lect/Ind.Survey/)	
Field applications in theory lectures in	All topics in course syllabus
every topic	
Practical exercise on overview of field	Part of term work
applications of Physics	
	Mode of Exposure (Visit/Exp.Lect/Ind.Survey/) Field applications in theory lectures in every topic Practical exercise on overview of field applications of Physics

Report of each Industrial Exposure Activity shall be submitted by student as a part of term work for evaluation.

#### ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

### • Assessment Criteria for Term work : i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per given criteria.

Domain	Particulars	Marks out of 25
	Understanding	05
Cognitive	Observations, calculations &	05
	Result table	
	Operating Skills	05
Psychomotor	Neat & complete circuit	05
rsychomotor	Diagram / schematic	
	Diagram.	
Affective	Discipline and punctuality	5
Allective	Decency and presentation	
	25	

### ii) Progressive Skill Test :

One mid-term Progressive Skill Test of 25 marks shall be conducted as per criteria given below

# Criteria for Continuous Assessment of Practical work and Progressive skill Test :

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram.	05

2	Observations & Result Table	05
3	Sample Calculations with relevant Formulae.	05
4	Proper Graphs & Procedure / workmanship Safety measures	05
5	Oral Based on Term Work	05
	Total	25

• Criteria for assessment at semester end practical exam : Every student has to perform one practical within 2 hours at semester end practical exam which shall be assessed as per following criteria.

Sr. no	Criteria	Marks allotted
1	Preparedness for practical	10
2	Correct figures / diagrams	10
3	Observation tables	10
4	Result table / calculations / graphs	10
5	Safety / use of proper tools	10
	Total	50

# **INSTRUCTIONAL STRATEGIES :**

# Instructional Methods :

1. Lectures cum Discussions 2. Regular Home Assignments. 3. Laboratory work

#### **Teaching and Learning resources:**

1. Chalk board 2. Video clips 3. Slides 4. Item Bank 5. Charts

# **REFERENCE MATERIAL :**

# a) Books / Codes

Sr. No.	Author	Title	Publisher
1.	B.G. Bhandarkar	Applied Physics	Nirali publications
2.	Manikpure - Deshpande	Applied Physics	S. Chand publications
3	Narkhede, Pawar, Sutar	Applied Science	Nirali publications
4	Shelake, Shinde, Adwankar	Applied Science	Vision publications
5	B.L. Theraja	Engineering Physics	S. Chand Publishers – New Delhi
6	Beiser	Concept of modern physics	Tata Mc-Graw Hill
7	E. Zebro Wski	Physics for Technicians	Tata Mc-Graw Hill
8	V. Rajendran	Engineering Physics	Tata McGraw-Hill Publications

# b) Websites

- i) http://www.physicsclassroom.com
- ii) http://scienceworld.wolfram.com/physics/
- iii) http://physics.about.com/

\* \* \*

#### COURSE ID :

Course Name	: CHEMISTRY OF ENGINEERING MATERIALS
Course Code	: CCF103
Course Abbreviation	: FCHA

#### **TEACHING AND EVALUATION SCHEME :**

#### Pre-requisite Course(s) : <course name and code>

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

**Evaluation Scheme :** 

Component	Progressive	Assessment	Semest	Total	
	Theory	Practical	Theory	Practical*	
Duration	Two tests (1 hour each)	One Skill Test (2 hours)	One paper (3 hours)	One practical (2 hours)	
Marks	20 each	25	80	50*	150

\* Assessment as per pro-forma II.

#### **RATIONALE :**

Basic science such as Chemistry is the foundation of Engineering & Technology. It is most essential

to learn the basic science to understand the fundamental concepts in Engineering & Technology.

Engineering chemistry deals with the study of structure, composition and Properties of the materials,

which form the core of the fundamental sciences. Many Processes are based on principles of

Chemistry in various industries. Topics such as water, Electrochemistry, Corrosion and protection

of metals from corrosion, are some of the direct applications of chemistry in engineering. Hence

the knowledge of chemistry is essential to the aspiring engineers of all branches in their field.

Engineering materials like Steels, Rubber, Plastic, Thermocole, Glass wool, Adhesive, Paints,

Lubricants are the backbone of various industries, machines, equipment, & processes.

#### **COMPETANCY** :

Apply the knowledge of chemistry to use the engineering materials for various purposes depending on their chemical properties.

Cognitive: Understanding & applying properties of chemicals in engineering field.

Psychomotor : Handling & use of glasswares & chemicals handling.

Affective : i)Attitude of ii) Accuracy iii) Safety iv) Punctuality

#### **COURSE OUTCOMES :**

1.CCF-103-1 Understand the applications of basic concepts in chemistry.

2. CCF-103-2 Apply the knowledge of electrochemistry in industry for electroplating &

electrorefining.

**3. CCF-103-3** Interpret the reasons of corrosion & remedies by using proper techniques.

4. CCF-103-4 Use relevant water treatment process to solve industrial problems.

**5. CCF-103-5** Applying proper material for specific purpose.

**6.CCF-103-6** Apply knowledge of extraction, properties of iron in engineering applications.

**7. CCF-103-7** Study properties of lubricants, polymers, insulators, adhesives, composite materials for different applications.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic knowle dge	PO 2 Discipli ne knowle dge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long learning	PSO1 Plan and Design	PSO2 Construction and Mainten ance	PSO3 Solve problem on Construc tion site
<b>Competency:</b> Apply the knowledge of chemistry to use the engineering materials for various purposes depending on their chemical properties.	3	3	3	2	-	1	-	-	-	1	1	1	1
CCF-103-1 Understand the applications of basic concepts in chemistry.	3	3	3	2	-	1	-	-	-	1	1	1	1
CCF-103-2 Apply the knowledge of electrochemistry in industry for electroplating & electrorefining.	3	3	3	3	1	2	-	-	-	2	1	1	1
CCF-103-3 Interpret the reasons of corrosion & remedies by using proper techniques.	3	3	3	2	-	2	-	-	-	1	1	1	1
CCF-103-4 Use relevant water treatment process to solve industrial problems.	3	3	3	3	1	2	-	-	-	2	1	1	2
CCF-103-5 Applying proper material for specific purpose.	3	2	3	2	2	1	-	-	-	2	1	1	2
CCF-103-6 Apply knowledge ofextraction, properties of iron in engineering applications.	3	2	2	-	2	1	-	-	-	1	1	1	2
CCF-103-7 Study properties of lubricants, polymers, insulators, adhesives, composite materials for different applications.	3	3	2	2	3	3	-	-	-	3	1	1	2

# CONTENT :

# A. THEORY :

Section I

Sr. No.	<b>Topics / Sub-topics</b> se outcomes CCF103-1 Understand the applications of basic c	Lectures (Hours) oncepts in ch	Theory Evaluation (Marks) emistry.					
1	<ul> <li>ATOMIC STRUCTORE</li> <li>1.1 Atom :Fundamental particles, Nature of atom</li> <li>1.2 Atomic Number, Mass Number, Isotopes and Isobars</li> <li>1.3 Bohr's theory of atom</li> <li>1.4 Statement of Hund's rule of maximum multiplicity, Pauli's exclusion principle Aufbau's principle</li> </ul>							
Course	<ul> <li>1.5 Rules of distribution of planetary electrons</li> <li>1.6 Electronic configuration of atoms with atomic number 1-30</li> <li>1.7 Lewis and Langmuir's concept of stable electronic configuration</li> <li>1.8 Electovalency and Co-valency</li> <li>1.9 Formation Of electrovalent compounds- NaCl, MgO</li> <li>1.10 Formation of Covalent compounds-H<sub>2</sub>O,CO<sub>2</sub></li> <li>1.11</li> </ul>	07	08					
electr	oplating & electrorefining.	sti y ili iliuusti	y loi					
2	ELECTROCHEMISTRY							
	<ul> <li>2.1 Definitions- Conductor, Electrolyte, Electrode</li> <li>2.2Difference between metallic conduction and electrolytic conduction</li> <li>2.3 Distinguish between Atom &amp; Ion</li> <li>2.4 Arrhenius Theory Of Ionisation</li> <li>2.5 Degree of Ionisation &amp; Factors affecting degree of ionisation</li> <li>2.6 Electrolysis of CuSO4 solution by using</li> </ul>	07	08					
	a) Pt -electrodes							
	b) Cu-electrodes							
	<ul><li>2.7 Industrial applications of electrolysis</li><li>2.7 .1 Electroplating</li></ul>							
	2.7.2 Electro refining of Metals.							

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	2.8 Faraday's Laws of Electrolysis		
	2.9 Numerical problems based on Faraday's laws		
Cour techr	se outcomes CCF103-3 Interpret the reasons of corrosion 8 hiques.	remedies by	using proper
3.	CORROSION AND PROTECTIVE COATING 3.1 Definition & types of corrosion	07	08
	3.2 Dry or Atmospheric corrosion , Oxide Film Formation		
	& its types ,Factors affecting atmospheric corrosion		
	3.3 Wet or electrochemical corrosion		
	3.4 Factors influencing immersed corrosion		
	3.5 Methods of protection of metal from corrosion -		
	Hot dipping (Galvanizing & Tinning) ,Metal spraying,		
	Metal cladding, Cementation or sherardizing		
<b>Cour</b> prob	se outcomes CCF103-4 Use relevant water treatment proces lems.	s to solve indu	ustrial
4	WATER 4.1 Impurities in natural water	11	16
	4.2 Hard water & Soft water		
	4.3 Hardness of water- Temporary & Permanent		
	4.4 Reactions of hard water with soap		
	4.5 Disadvantages of hard water for domestic & Industrial		
	purpose - Textile Industry, Sugar Industry, Paper		
	Industry, Dying Industry		
	4.6 scale formation in boilers , it's causes,		
	disadvantages & removal of scale		
	4.7 Sterilization of water - Chlorination -by Cl <sub>2</sub> ,		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)		
	bleaching powder, chloramine with chemical				
	reactions				
	4.8 Ion Exchange method to remove total hardness of				
	water				
	4.9 pH definition, pH scale , applications of pH				
	in boiler, sugar industry & sewage				
	TOTAL	32	40		
Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.					

Sr. No.	Topics / Subtopics	Lectures (Hours)	Theory Evaluation (Marks)		
	ourse outcomes. CCE 102 E Applying analysis material for an sifi		(		
	Surse outcomes CCF-103-5 Applying proper material for specific	purpose.			
C	CF-103-6 Apply knowledge of extraction, properties of iron in eng	ineering appl	ications.		
5	METALLURGY & ALLOYS				
	5.1 Occurrence of metals, Definition of mineral, ore,				
	Flux, Gangue & Slag				
	5.2 Flow chart of metallurgical processes				
	5.3 Concentration of ores – Physical Methods - Gravity				
	Separation Method, Electromagnetic separation				
	method, Froth floatation method				
	<ul><li>5.4 Chemical Methods - Calcination &amp; Roasting .</li><li>5.5 Ores of Iron.</li></ul>		12		
	5.6 Extraction of Iron from its ore - Blast Furnace – construction, Working ,Reactions, Products.	12			
	5.7 Properties & uses of cast iron , wrought Iron and				
	5.8 Definition , Classification & Purposes of making alloy				
	5.9 Composition, Properties, & Engineering				
	applications of Nonferrous Alloys - Duralumin,				
	Monal metal, Woods metal & Ferrous Alloys -Heat				
	resisting steel, Magnetic steel, Stainless steel				
Cours	e outcomes CCF-103-5 Study properties of lubricants, polymer	s, insulators,	adhesives,		
comp	composite materials for different applications.				

6	<b>LUBRICANTS</b> 6.1 Definition , Classification & Functions of lubricant.		
	6.2 Lubrication & it's types - Boundary lubrication,		
	Fluid film lubrication ,Extreme pressure lubrication		
	6.3 Characteristics of lubricants		
	Viscosity, Viscosity index, Oiliness, Volatility, cloud		06
	& pour point, Flash & Fire point, Acid Value,	05	
	6.4 Selection of lubricant for Gears, cutting tools, Concrete Mixture Machine, Sewing machine		
Cours	e outcomesCCF-103-5 Applying proper material for specific pu	irpose.	
7	<b>PAINT AND VARNISH</b> 7.1 Oil Paint Definition & characteristics of oil paint		
	7.2 Purpose of using oil paint		
	7.3 Ingredients of oil paint with suitable example & its	05	06
	functions - Drying oil (vehicle), Drier, Pigment,		
	Thinner, Filler (extender), Plasticizer		
	7.4 Varnish - Definition, Types, Constituent,		
	Properties & applications.		
	7.5 Distinction between paint & varnish <b>7.6</b> Water based and solvent base paints.		
Cours	e outcomes CCF-103-7 Study properties of lubricants, polyme	rs. insulators.	adhesives.
compo	osite materials for different applications.	-,,	,
8	CHEMISTRY OF NONMETALIC ENGINNERING		
0	MATERIALS		
	8.1 INSULATORS		
	8.1.1 Definition & Characteristics of good insulator		
	8.1.2 Preparation, Properties & uses of - Glass wool		
	8.2 ADHESIVES		
	8.2.1 Definition of Adhesives		
	8.2.2 Characteristics of good Adhesives		
	8.2.3 Properties & uses of Adhesives.		
	8.3 COMPOSITE MATERIALS		
	8.3.1 Definition, Classification , Properties Applications		
	of Composite materials		

<ul> <li>8.4 PLASTICS</li> <li>8.4.1 Polymer, Polymerization, methods of polymerization- Addition &amp; condensation</li> <li>8.4.2 Classification of plastics -Thermo-softening plastic &amp;Thermosetting plastics.</li> <li>8.4.3 Engineering properties &amp; applications of plastic</li> <li>8.5 RUBBER</li> <li>8.5.1 Elastomer , Natural Rubber &amp; Synthetic rubber</li> <li>8.5.2 Drawbacks of Natural Rubber</li> <li>8.5.3 Vulcanization of Rubber</li> <li>8.5.4 Characteristics &amp; related applications of rubber - Tack, Rebound, Elasticity &amp; Abrasion resistance</li> </ul>	10	16		
TOTAL	32	40		
Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.				

# Specification table for setting question paper for semester end theory examination :

Section /	Name of tonic		Distribution of marks	5	Course	Course Total	
Topic no.		Remember	Understand	Application	come	marks	
/1	Atomic structure	06	02	-	CCF103-1	08	
I/2	Electrochemistry	02	02	04	CCF103-3	08	
۱/3	Corrosion &protective coating	04	02	02	CCF103-5	08	
I/4	Water	08	04	04	CCF103-6	16	
11/5	Metallurgy & Alloys	02	05	05	CCF-103- 3&CCF-103- 4	12	
II/6	Lubricants	02	02	02	CCF-103-4	06	
11/7	Paint & Varnish	02	02	02	CCF-103-1	06	
11/8	Chemistry of nonmetallic engg. materials	04	04	08	CCF-103-4	16	
	Total					80	

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

### B. TERM WORK Term work shall consist of the following :

by Ostwald's viscometer

#### Course Sr. **Title of Experiment** Skills to be developed No. Outcomes 1 Introduction to Chemistry laboratory Awareness of chemicals, glasswares & instruments CCF-103-1 used in chemistry laboratory to CCF-103-7 2 Preparation of 1 N, 0.5 N & Skill of weighing , handling Glassware & measuring 0.1 N NaOH, HCI, Oxalic acid, solutions FeSO<sub>4</sub>, etc. CCF-103-1 3 Titration of strong acid and strong base. (HCl X NaOH) Skills of determining accurate end point of titration & CCF-103-1 development of measurement skills. 4 Skills of determining accurate end point of titration & Titration of strong acid, strong base& weak acid (HCI X NaOH X H<sub>2</sub>C<sub>2</sub>O<sub>4</sub>.H<sub>2</sub>O CCF-103-1 development of measurement skills. 5 Titration of weak base, strong acid Skills of determining accurate end point of titration & & strong base (Na<sub>2</sub>CO<sub>3</sub>X H<sub>2</sub>SO<sub>4</sub> X development of measurement skills. КОН CCF-103-1 6 Estimation of chloride content Measurement skill utilization of practical data for in water by Mohr' s method testing & estimation CCF-103-3 Determination of hardness of Measurement skill utilization of practical data for 7 water by E.D.T.A method testing & estimation CCF-103-4 8 Determination of viscosity of oil Measurement skill utilization of practical data for

testing & estimation

#### i) Laboratory experiments and related skills to be developed :

CCF-103-7

9	Estimation of Ca in limestone.	Measurement skill utilization of practical data for testing & estimation	CCF-103-1
10	Estimation of % of Fe in given sample of steel	Measurement skill utilization of practical data for testing & estimation	CCF-103-1

# a) Assessment criteria for Practical Work :

#### i) Continuous Assessment of Practical Assignments:

Every practical assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	05
Cognitive	Application	05
Developmentor	Operating Skills	05
rsychomotor	Drawing / drafting skills	05
Affective	Discipline and punctuality	05
Allective	Decency and presentation	-
TOTAL 25		

### ii) Progressive Skills Test :

### **Criteria for Progressive skill Test :**

Sr. No.	Criteria	Marks allotted
1	Neat & complete circuit Diagram / schematic Diagram.	05
2	Observations & Result Table	05
3	Sample Calculations with relevant Formulae.	05
4	Proper Graphs & Procedure / workmanship Safety measures	05
5	Oral Based on Term Work	05
	Total	25

Assessment at semester end practical exam as per Pro-forma II.

### iii) Industrial Exposure :

Sr. No.	Mode of Exposure (Visit/Exp.Lect/Ind.Survey/)	Торіс
1.		
2.		

Report of each Industrial Exposure Activity shall be submitted by student as a part of term work for evaluation.

#### **INSTRUCTIONAL STRATEGIES :**

#### InstructionalMethods :

1. Lectures cum Discussions 2. Regular Home Assignments. 3. ...

#### **Teaching and Learning resources:**

1. Chalk board 2. O.H.P. 3.Slides 4. Item Bank 5. ...

# **REFERENCE MATERIAL :a) Books / Codes**<at least 5>

Sr. No.	Author	Title	Publisher
1.	Jain & Jain	Engineering chemistry	Dhanpatrai publishing co.
2.	S. C. Rangawala	Engineering materials	Engineerin publication
3.	Jain & Agarwal	Metallurgical Analysis	Agarwal publications
4.	O. P. Khanna	Material science & technology	Khanna publication on 2006
5.	Rollason	Metallurgy for Engineers	ASM publication
6.	J. C. Kuriacose	Chemistry in Engineering & Vol. 1 & 11	Mc Graw Hill publishing company
7.	P. C. Jain	Chemistry of Engineering Materials	
8.	S. S. Dara	A text of Engineering Chemistry	

### b) Websites <at least 3>

- iv) <u>www.substech.com</u>
- v) <u>www.kentchemistry.com</u>

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#### COURSE ID :

Course Name	: BASIC MATHEMATICS
Course Code	: CCF105
Course Abbreviation	: FBMT

### **TEACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s) : < nil >

#### **Teaching Scheme :**

Scheme component	Hours / week	Credits
Theory	03	04
Practical	01	

#### **Evaluation Scheme :**

	Progressive Asses	ressive Assessment Term End		Total	
Component	Theory	Tutorials	Theory	Practical	
Details and Duration	Average of two tests of 20 marks each	As mentioned in the syllabus	Term End Theory Exam (03 hours)	NIL	
Marks	20		80		100

#### **RATIONALE:**

Mathematics is an important prerequisite for the development and understanding of engineering and technological concepts. For an engineer and technologist, knowledge of mathematics is an effective tool to pursue and master the applications in the engineering and technological fields. Algebra provides the language and abstract symbols of mathematics. The topics Matrices and Determinants are helpful for finding optimum solution of system of simultaneous equations which are formed in the various branches of engineering using different parameters .Trigonometry is the study of triangles and angles. Contents of this subject will form foundation for further study in mathematics.

#### **Competency:**

Apply principles of Basic Mathematics to solve mathematical problems as follows -

- 1.Cognitive: To understand the mathematical concepts
- 2. Psychomotor: Proper handling of scientific calculator
- 3. Affective : Attitude of accuracy, punctuality, proper reasoning and presentation

#### Course Outcomes(CO's) :

**CCF105-1**: To solve simultaneous equations using Cramer's rule.

- **CCF105-2**: To resolve a given function into partial fractions.
- **CCF105-3** : To solve simultaneous equations by using inverse of matrix method.
- **CCF105-4** : To expand any binomial expression for positive integral index.
- **CCF105-5**: To memorize and solve problems using trigonometric formulae.

#### COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

					Program	nme Outc	omes POs	and PSO	s				
Competency and COs	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long leaning	PSO1 Plan & Design	PSO2 Constr uction & Mainte nance	PSO3 Solve problem on Constructi on site
<b>Competency:</b> Apply principles of Basic Mathematics to solve mathematical problems	3	2	3	2	-	-	1	2	1	3	2	1	1
CCF105-1 : To solve simultaneous equations using Cramer's rule.	3	2	2	-	-	-	1	1	1	3	2	1	-

CCF105-2 : To resolve a given function into partial fractions.	3	2	3	-	-	-	1	1	1	3	2	1	-
CCF105-3 : To solve simultaneous equations by using inverse of matrix method.	3	2	3	1	2	-	1	2	3	3	2	2	-
CCF105-4:Toexpandanybinomialexpressionforpositiveintegralindex.	3	2	3	1	2	-	1	2	3	3	2	2	-
CCF105-5 : To memorize and solve problems using trigonometric formulae.	3	2	3	1	2	-	1	2	3	3	3	2	1

# CONTENT :

# A) THEORY :

# Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)		
Cour	se Outcome CCF105-1 : To solve simultaneous equations using	Cramer's ru	ile		
1	<ul> <li>Determinants</li> <li>1.1 Definition of nth order determinant</li> <li>1.2 Expansion of second and third order determinants</li> <li>1.3 To solve simultaneous equations having 3 unknowns using Crammer's Rule</li> <li>1.4 Consistency of equations using Determinants</li> </ul>	04	06		
Course Outcome CCF105-2: To resolve a given function into partial fractions					
2	<ul> <li>Partial Fractions</li> <li>2.1 Definition of rational, proper and improper fractions</li> <li>2.2 Various cases of Partial fractions and Examples</li> </ul>	06	12		
Cour meth	se Outcome <b>CCF105-3</b> : To solve simultaneous equations od	by using in	verse of matrix		
3	<ul> <li>Matrices</li> <li>3.1 Definition of a matrix, Types of matrices</li> <li>3.2 Algebra of matrices</li> <li>3.3 Equality of two matrices, Transpose of a matrix</li> <li>3.4 Minor and Co-factor of an element of a matrix</li> <li>3.5 Adjoint and Inverse of a matrix</li> <li>3.6 Solution of simultaneous equations by Inverse of a matrix method</li> </ul>	10	16		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)		
Cour	se Outcome CCF105-1 : To solve simultaneous equations using	Cramer's ru	ıle		
<i>Course Outcome</i> <b>CCF105-4</b> : To expand any binomial expression for positive integral index.					
4	<ul> <li>Binomial Theorem</li> <li>4.1 Statement of theorem for positive integral power</li> <li>4.2 Expansion</li> <li>4.3 Simple Examples on expansion</li> </ul>	04	06		
	Total	24	40		
<ul> <li>1.Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.</li> <li>2.In each topic, corresponding applications will be explained</li> </ul>					

## Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)				
<i>Course Outcome CCF105-5</i> : To memorize and solve problems using trigonometric formulae.							
5	Trigonometric Ratios and Identities	02	04				
	5.1 Fundamental Identities(Simple examples)						
	5.2 Definition of radian measure						
	5.3 Conversion of degree into radian and vice versa of standard angles						

Sr. No.	Topics / Sub-topics	Topics / Sub-topics (Hours) (Marks			
Cour	rse Outcome <b>CCF105-5</b> : To memorize and solve problems using	g trigonomet	ric formulae.		
6	Trigonometric ratios of Compound and Allied Angles	06	08		
	6.1 Proofs of sine ,cosine and tan of (A+B) and (A-B) 6.2 Examples				
7	Trigonometric ratios of Multiple Angles	05	10		
	7.1 Proofs of sine, cosine and tangent of 2θ, 3θ				
	7.2 Examples				
8	Factorization and Defactorization Formulae	04	08		
	8.1 Proofs of above for mulae				
	8.2 Examples				
9	Inverse Trigonometric Ratios	07	10		
	9.1 Definition				
	9.2 Principle value				
	9.3 Proof of standard formulae				
	9.4 Examples				
	Total	24	40		
1.Sen topic quest 2.In e	nester end exam question paper should be such that total n is one and half times the marks allotted above but the canc tions of the above allotted marks only. each topic corresponding applications will be explained	harks of que	stions on each ble to attempt		

Topic No	Name of tonic	Distrik	Total		
	Name of topic	Knowledge	Comprehension	Application	Marks
1	Determinants	-	2	4	06
2	Partial Fractions	2	2	8	12
3	Matrices	2	2	12	16
4	Binomial Theorem	2	-	4	06
5	Trigonometric Ratios and Identities	2	-	2	04
6	Allied Angles	2	2	4	08
7	Compound Angles	2	-	8	10
8	Factorisation & De- factorisation angles	2	-	6	08
9	Inverse Trigonometric ratios	2	2	6	10
TOTAL		16	10	54	80

#### Specification table for setting question paper for semester end theory examination :

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

# **B)** TUTORIALS :

Sr.No	Topics	Tutorial Content (10 problems in each tutorial)	COURSE OUTCOMES
1	Determinants	Examples on expansion of determinants,	CCF105 - 1
1	Determinants	Cramer's rule, consistency of equations.	
2	Partial	To resolve given function into partial fractions-	CCF105 - 2
2	Fractions	Different cases	
3	Matrices	Examples on addition ,Subtraction and Multiplication of Matrix	CCF105 - 3

4	Matrices	To find adjoint ,Inverse of a given matrix,To solve simultaneous equation by Matrix method	CCF105 - 3
5	Binomial Theorem	To expand (x+y) <sup>n</sup> by Binomial theorem,	CCF105 - 4
6	Trigonometric Ratios and Identities	Examples on conversion of degree to radian and vice versa, simple examples on trigonometry.	CCF105 - 5
7	Allied Angles	Examples on Allied angles	CCF105 - 5
8	Compound Angles	Examples on Compound angles	CCF105 - 5
9	Factorisation & De- factorisation angles	Examples on Examples on Allied angles	CCF105 - 5
10	Inverse Trigonometric Ratios	Examples on principle value and trigonometrics functions	CCF105 - 5

# **INSTRUCTION STRATEGIES :**

#### Instructional Methods:

- 1. Lectures cum Demonstrations
- 2. Tutorials

# Teaching and Learning resources:

- 1. Chalk board
- 2. Item Bank

### **REFERENCE MATERIAL:**

#### a) Books:

Sr. No.	Author	Title	Publisher
1.	G.V. Kumbhojkar	A Text Book on Engineering Mathematics (First Year Diploma	Phadake Prakashan, Kolhapur
2.	Patel, Rawal and others	Basic Mathematics	Nirali Prakashan,Pune
3.	P.M.Patil and Others	Basic Mathematics	Vision Prakashan, Pune
4.	Engineering Mathematics	S. S. Sastry	Prentice Hall of India

_			Pune Vidyarthi
5.	S.P.Desnpande	Mathematics for polytechnic	Griha,Pune

# b) Website

- i) <u>www.khanacademy.org</u>
- ii) www.easycalculation.com
- iii) www.math-magic.com

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#### COURSE ID :

Course Name	: ENGINEERING MATHEMATICS
Course Code	: CCF106
Course Abbreviation	: FEMT

#### TEACHING AND EVALUATION SCHEME:

#### Pre-requisite Course(s) : CCF105 Basic Mathematics

#### **Teaching Scheme :**

Scheme component	Hours / week	Credits
Theory	03	04
Practical	01	

#### **Evaluation Scheme :**

	Progressive Assess	ment	Terr	Total	
Component	Theory	Assignments	Theory	Practical	
Details and Duration	Average of two tests of 20 marks each	As mentioned in the syllabus	Term End Theory Exam (03 hours)		
Marks	20		80		100

### **RATIONALE:**

This subject is an extension of Basic mathematics of first semester and a bridge to further study of applied mathematics. The knowledge of mathematics is useful in other technical areas. Differential calculus has applications in different engineering branches. For example concepts such as bending moment, curvature, maxima and minima. Numerical methods are used in programming as an essential part of computer engineering. In Metrology and quality control statistical methods are used to determine the quality and suitability of components. Engineering mathematics lays the foundation to understand technical principles in various fields.

### **Competency:**

Apply principles of Engineering Mathematics to solve Engineering problems as follows-

1.Cognitive: Understanding and applying principles of Engineering Mathematics to

Engineering problems

**2. Psychomotor:** a) Use of co-ordinate geometry in animation, autocad, computer graphics etc.

b) Proper handling of calculator.

3. Affective : Attitude of accuracy, punctuality, presentation, visualization.

### Course Outcomes(CO's) :

- **CCF106-1**: To solve problems on two dimensional co-ordinate geometry for straight line and circles.
- **CCF106-2**: To find approximate solution of algebraic equations and simultaneous equations by various methods.

**CCF106-3**: To find limits of different types of functions using various methods.

**CCF106-4** : To solve the problems of maxima, minima and geometrical applications.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

				I	Programm	e Outcom	ies POs ar	nd PSOs					
Competency and COs	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long leaning	PSO1 Plan & Design	PSO2 Construc tion & Mainten ance	PSO3 Solve problem on Constructi on site
<b>Competency:</b> Apply principles of Engineering Mathematics to solve Engineering problems	3	2	3	2	-	-	1	2	1	3	2	2	1
<b>CCF106-1</b> : To solve problems on two dimensional co- ordinate geometry for straight line and circles.	3	2	2	-	-	-	1	1	1	3	3	2	1

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

								-	-		-		
CCF106-2 : To find approximate solution of algebraic equations and simultaneous equations by various methods.	3	2	3	-	-	-	1	1	1	3	2	1	-
CCF106-3 :To find limits of different types of functions using various methods.	3	2	3	1	2	-	1	2	3	3	2	2	-
<b>CCF106-4</b> : To solve the problems of maxima, minima and geometrical applications.	3	2	3	1	2	-	1	2	3	3	3	2	1

# **CONTENT:**

# C. THEORY:

	Section I		
Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	<b>Course outcome CCF106-1 :</b> To solve problems on two dimens for straight line and circles.	ional co-ora	linate geometry
1	<ul> <li>Point and Distances</li> <li>1.1 Distance formula (Only mention, No examples )</li> <li>1.2 Section formula &amp; midpoint formula (No Examples &amp; without proof )</li> <li>1.3 Centroid of a triangle &amp; Area of Triangle</li> <li>1.4 Collinearity</li> </ul>	02	04

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	<b>Course outcome CCF106-1 :</b> To solve problems on two dimens for straight line and circles.	ional co-ora	linate geometry
2	The Straight line		
	2.1 Slope,intercepts & various methods of finding slope		
	2.2 Conditions for two straight lines to be parallel and		
	Perpendicular to each others		
	2.3 Various forms of equations of straight line	06	08
	2.4 Perpendicular distance of a point from a line		
	2.5 Distance between two parallel lines		
	2.6 Angle between two straight lines		
	2.7 Intersection of two straight lines & the equation of line passing through this point of intersection		
3	Circle		
	<ul><li>3.1 Equations of Circle (various forms)</li><li>3.2 Examples to find equation of circles</li></ul>	04	08
	<b>Course outcome CCF106-2</b> : To find approximate solution	of algebraic	equations and
	simultaneous equations by various methods.		
4	Numerical solution of Algebraic Equations		
	4.1 Bisection Method	06	10
	4.2 Regula- Falsi Method		
5	Numerical solution to simultaneous equations		
	5.1 Jacobi's Method	06	10
	5.2 Gauss-Seidel method	06	10
	Total	24	40
Se	ction	П	
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Sr. No.	Topics / Sub-topics	Lectures (Hours) (Hours)			
		(Warks)			
	<i>Course outcome CCF106-3</i> : To find limits of different types methods.	s of function	is using various		
6	Functions				
	<ul> <li>6.1 Definition and Concept of function</li> <li>6.2 Definition of Odd &amp; Even functions, Explicit &amp; implicit functions, Composite functions, Parametric functions</li> <li>6.3 Value of a function</li> <li>6.4 Examples on value of functions, Odd &amp; Even functions , Composite functions</li> </ul>	03	06		
7	Limits				
	7.1 Definition				
	7.2 Limits of algebraic functions by				
	factorization,				
	simplification,				
	rationalization,	06	08		
	Limit as x→∞				
	7.3 Limits of trigonometric functions by				
	factorization,				
	formula $\frac{\sin x}{x}$ as $x \rightarrow 0$ ,				
	substitution .				
	<b>Course outcome CCF106-4 :</b> To solve the problems of maxima, applications.	, minima an	d geometrical		
8	Differentiation				
	<ul> <li>8.1 Definition, Derivative of standard functions (without poof),</li> <li>8.2 Derivative of sum, difference, product and quotient of two or more functions</li> <li>8.3 Derivative of composite functions</li> <li>8.4 Derivative of Inverse functions</li> <li>8.5 Derivative of Implicit functions</li> </ul>	12	20		
	8.6 Derivative of Parametric functions				

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	<i>Course outcome CCF106-3</i> : To find limits of different types methods.	s of functior	ns using various
	<ul><li>8.7 Derivative of exponential and logarithmic functions</li><li>8.8 Logarithmic differentiation</li><li>8.9 Differentiation of second order</li></ul>		
9	<ul> <li>Applications Of Derivatives</li> <li>9.1 Geometrical meaning of derivative (To find equation of Tangent and normal )</li> <li>9.2 Maxima and minima of functions</li> </ul>	03	06
	Total	24	40

# Specification table for setting question paper for semester end theory examination:

	Name of tonic	Distrib	Total		
	Name of topic	Knowledge	Comprehension	Application	Marks
1	Point and Distances	2		2	4
2	Straight line	2	2	4	8
3	Circle	2	2	4	8
4	Numerical solution of Algebraic Equations and	2	2	16	20
5	simultaneous Equations				
6	Functions	2	-	4	6
7	Limits	2	2	4	8
8	Differentiation	4	4	12	20
9					
10	Applications Of Derivatives			6	6
Total		16	12	52	80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

Sr	Topic	Tutorial Content (10 problems in each tutorial)	COURSE
No.	-		OUTCOMES
1	Point and	Examples on Centriod of triangle, area of	CCF106 - 1
	Distances	triangle,colliarity	
2	Straight line	Examples on different cases of straight line, To find	CCF106 - 1
		perpendicular distance of a point from a line, angle	
		between two lines, intersection of lines.	
3	Circle	To find equation of Circle- Different forms	CCF106 - 1
4	Num.solution	Numerical solution of algebraic equations.	CCF106 - 2
5	of Algebraic & simultaneous Eq	Numerical solution of simultaneous equations	CCF106 - 2
6	Functions	Examples on functions	CCF106 - 3
7	Limits	Evaluation of limits by Factorisation,Rationalization,Simplification,Infinity method Evaluation of limits of Trigonometric functions	CCF106 - 3
8	. Differentiation	To find derivatives by product rule, quotient rule, Chain rule, Inverse function, Implicit function	CCF106 - 4
9	. Differentiation	To find derivatives of Parametric function, Logarithmic function, Derivatives of second order	CCF106 - 4
10	Applications of Derivatives.	To find equation of Tangent, Normal & To find Maxima and Minima of a function.	CCF106 - 4

D.	<b>TUTORIALS :</b>	Note - Tutorials	are to be used to	get enough practice
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### **INSTRUCTIONAL STRATEGIES:**

### Instructional Methods:

- 1. Lectures cum Demonstrations
- 2. Tutorials

# Teaching and Learning resources:

- 1. Chalk board
- 2. Item Bank

# **REFERENCE MATERIAL:**

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Sr. No.	Author	Title	Publisher
1.	G.V. Kumbhojkar	Engineering Mathematics III	Phadake Prakashan, Kolhapur
2.	Patel,Rawal,	Engineering Mathematics	Nirali Prakashan,Pune
3.	Mathematics for Polytechnic	S. P. Deshpande	Pune Vidyarthi Griha Prakashan
4.	Sameer Shah	Engineering Mathematics	Tech-Max Publication, Pune
5.	A.M. Vaidya	Applied Mathematics	Central Techno

b) Websites i) www.khanacademy.org ii) www.easycalculation.com

iii) <u>www.math-magic.com</u>

\* \* \*

### COURSE ID :

Course Name	: ENGINEERING DRAWING -1	(CE/ME/MT)
Course Code	: CCF107	
Course Abbreviation	: FEDA	

TEACHING AND EVALUATION SCHEME: Pre-requisite Course(s) : Nil

### **Teaching Scheme:**

Scheme component	Hours / week	Credits
Theory	02	06
Practical	04	00

#### **Evaluation Scheme:**

Mode of Evaluation	Progressiv	e Assessment	Term	n End Examina	Examination			
	Theony	Practical	Theory	Term Work	Oral Examination	Total		
	meory	ractical	Examination		(External)			
Details of Evaluation	Average of two tests of 20 marks each	<ul> <li>i. 25 marks for each practical</li> <li>ii. One PST of 25 marks</li> </ul>	Term End Theory Exam (03 hours)	As per Proforma- III	-			
Marks	20		80	25	-	125		

### **RATIONALE:**

Engineering drawing is the language of engineers. The concept of engineering drawing is used to develop, express the ideas, and convey the instructions which are used to carry out jobs in the field of Engineering. The course illustrates the techniques of drawing in actual practice. This Preliminary course aims at building a foundation for the further course in drawing and other allied subjects. This subject is useful in developing, drafting and sketching skills of students.

#### COMPETENCY:

Use various drawing Instruments for drafting and sketching solid geometry

Cognitive: Understand various drawing procedures..

Psychomotor: Draw engineering curves & projections of lines, planes & solids

Affective: Attitude of using i) Procedures ii) Practices iii) Drawing Instruments iv) Accuracy

v) Drafting Skill

### **COURSE OUTCOMES:**

**CCF107-1** Understand various fundamentals in engineering drawing.

**CCF107-2** Produce different types of engineering curves.

CCF107-3 Produce the projection of point & lines inclined to one reference plane..

**CCF107-4** Produce the projection of different planes & solids.

**CCF107-5** Produce sectional views of different types of solids.

### COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": no correlation ]

Competenc y and COs	PO 1 Basic knowle dge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineeri ng Tools	PO 5 The engine er and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individua I and team work	PO 9 Commun ication	PO 10 Life- long learnin g	PSO1 Work in mfg& service sector	PSO2 Acquain ted with current technol ogy	PSO3 Pursue higher educati on
Competenc y:	3	1	2	-	-	-	-	-	2	3	2	-	-
CCF107-1	3	1	2	-	-	-	-	-	1	3	2	-	-
CCF107-2	3	1	2	-	-	-	-	-	1	2	2	-	-
CCF107-3	3	1	2	-	-	-	-	-	1	3	2	-	-
CCF107-4	3	1	2	-	-	-	-	-	2	3	2	-	-
CCF107-5	3	1	2	-	-	-	-	-	2	3	2	-	-

# CONTENT: A. THEORY:

# SECTION - I

Sr. No.	Topics	Teaching (Hours)	Theory Evaluation Marks
	Course Outcome CCF107-1 Understand various fundamentals in engine	ering drawin	g
1.	Introduction To Engineering Drawing		
	1.1 Drawing Instruments and their uses		
	1.2 Standard sizes of drawing sheets (ISO-A series)		
	1.3 Letters and numbers (single stroke vertical)		
	Convention of lines and their applications.		
	1.4 Scale (reduced, enlarged & full size) Plain scale and		08
	Diagonal scale.		
	1.5 Dimensioning technique as per SP-46 (Latest Edition)		
	Types and applications of chain, parallel and		
	Co-ordinate dimensioning		
	Course Outcome CCF107-2 Produce different types of engineerin	g curves	
2.	Engineering Curves		
	2.1 Conic curves and their applications		
	2.2 Ellipse by Arc's of circle method &		
	Concentric circles method.		
	2.3 Parabola by Directrix and focus method		
	& Rectangle method	07	20
	2.4 Hyperbola by Transverse Axis focus		
	Method & Rectangular hyperbola (Inclined axes).		
	2.5 Involutes of circle, triangle, square & pentagon,		
	2.6 cycloid, epicycloids, hypocycloid		
	2.7 Helix & Archimedean spiral.		
	<b>Course Outcome CCF107-3</b> Produce the projection of point & lines inclined to	one referenc	e plane

3.	Projection Of Point And Lines		
	3.1 Projection of points when point is in first quadrant Only		
	3.2 Projection of Line inclined to one Reference plane	03	12
	and Parallel to other Reference Plane		
	(Both ends of line should be in first quadrant )		

Sr. No.	Topics	Teaching (Hours)	Theory evaluation Marks
Cours	e Outcome CCF107-4 Produce the projection of different planes & solids.		
4.	Projection Of Planes		
	4.1 Projection of Planes - Circular, Square, Triangular, Rectangular, Pentagonal, Hexagonal Shapes Inclined To One Reference Plane And perpendicular to other Reference Plane.	05	08
	( Planes in First Quadrant Only)		
Cours	e Outcome CCF107-4 Produce the projection of different planes & solids.		
5.	Projection Of Solids		
	5.1 Projection of Solids Like Cube, Prisms, Pyramids,		
	Cone, Cylinders and Tetrahedron.	05	16
	(Axis of Solids inclined to one reference plane and		
	Parallel to other Reference Plane)		
Cours	e Outcome CCF107-5 Produce sectional views of different types of solids.		
6.	Sections of Solids		
	6.1 SectionsOf Solids Like Cube, Prisms, Pyramids, Cone and Cylinders.		
	(Axis of Solids being vertical and Section plane inclined to one reference plane and perpendicular to other Reference Plane)	06	16
	<b>Course Outcome CCF107-1</b> Understand various fundamentals in engine	ering drawin	g
7.	AUTOCAD		
	7.1 Introduction to CAD software (Basic commands like		
	Draw, modify). Advantages of CAD,	02	NIL
	7.2 Geometrical Constructions		
	7.3 Draw a basic 2-D geometrical entities using CAD		
	Total	32	80

### SECTION – II

1.Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

2.No theory question on chapter no.7

Торі	Name of tonic	Distributio	n of marks (Cog wise)	nitive level-	Course	Total
c No.	Name of topic	Remembe r	Understand	Applica- -tion	Outcome	Marks
1	Introduction To Engineering Drawing	04	02	02	CCF107-1	08
2	Engineering curves	04	04	12	CCF107-2	20
3	Projection of Point And Lines	04	04	04	CCF107-3	12
4	Projection of Planes	02	04	02	CCF107-4	08
5	Projection of Solids	04	04	08	CCF107-4	16
6	Sections of Solids	02	12	02	CCF107-5	16
	Total	20	30	30		80

# Specification table for setting question paper for semester end theory examination:

### **B. TERM WORK**

# Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as Term Work as detailed in practical sessions of batches of about 22 students:

Sr.	Laboratory experience	Skills developed	Course	
no	· · · · · · · · · · · · · · · · ·		Outcome	
1	Geometrical Constructions Using CAD (1 Sheet)	To develop drawing skill	CCF107-1	
2	Engineering curves (1 Sheet)	To develop drawing ability in conics	CCF107-2	
3	Projections of line (1 Sheet)	To develop drawing ability in Projections of line	CCF107-3	
4	Projections of Planes (1 Sheet)	To develop drawing ability in Projections of Planes	CCF107-4	
5	Projections of Solids (1 Sheet)	To develop drawing ability in Projections of Solids	CCF107-4	
6	Sections of Solids (1 Sheet)	To develop drawing ability in Sections of Solids	CCF107-5	

# Criteria for Continuous Assessment of Practical work and Progressive Skill Test:

# a) Continuous Assessment of Drawing Practical

Every practical Sheet shall be assessed for **25** marks as per criteria given below:

Sr No.	Criteria	Marks allotted
1	Attendance	05
2	Preparedness	05
3	Correctness and understanding	10
4	Line work and neatness	05
	Total	25

### b)Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given below:

Sr	Criteria	Marks allotted
No.		
1	Correctness and understanding	10
2	Line work and neatness	05
3	Dimensioning and judgment without measurement	05
4	Proper use of instrument	05
	Total	25

### **INSTRUCTIONAL STRATEGIES :**

### Instructional Methods :

- 1. Lectures cum Demonstrations
- 2. Classroom practices

### Teaching and Learning resources :

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Computer, printer etc.
- 5. Question Bank

### **REFERENCE MATERIAL :**

### a) Reference Books:

Sr. No.	Author	Title	Publisher
1.	N. D. Bhatt	Engineering Drawing	Charotar Publishing House 2010
2.	Amar Pathak	Engineering Drawing	Dreamtech Press, 2010
3.	D.Jolhe	Engineering Drawing	Tata McGraw Hill Edu., 2010
4.	M.B.Shah, B.C.Rana	Engineering Drawing	Pearson, 2010
5.	K. Venugopal	Engineering Drawing and Graphics + AutoCAD	New Age Publication, Reprint 2006
6.	IS Code, SP – 46	Engineering Drawing Practice	

# b) Web References:

# 1)http://www.design-technology.info/IndProd/drawings/

- 2)http://graphicalcommunication.skola.edu.mt/syllabus/engineering-drawing/
- 3)<u>http://en.wikipedia.org/wiki/Engineering\_drawing</u>
- 4)<u>http://www.engineeringdrawing.org/</u>
- 5)<u>http://www.teachengineering.org/view\_activity</u>
- 6)www.howtoread.co.in/2013/06/how-to-read-ed.html
- 7) <u>http://www.slideshare.net/akhilrocker143/edp</u>
- 8) http://www.24framesdigital.com/pstulpule

### COURSE ID :

Course Name	: ENGINEERING DRAWING - II	(CE/ME/SM/MT)
Course Code	: CCF108	
Course Abbreviation	: FEDB	

### **TEACHING AND EVALUATION SCHEME**

# Pre-requisite Course(s) : CCF107 Engineering Drawing - I Teaching Scheme:

Scheme component	Hours / week	Credits
Theory	02	06
Practical	04	00

### **Evaluation Scheme:**

	Progressiv	e Assessment	Term				
Mode of			Theory		Oral	Total	
Evaluation	Theory	Practical	Evamination	Term Work	Examination	TOLAI	
			Examination		(External)		
	Average of	i. 25 marks					
Details of	two tests of	for each	Term End	As per	-		
Evaluation	20 marks	practical	Theory Exam	Proforma-			
LValuation	each	ii. One PST of	(03 hours)	111			
		25 marks					
Marks	20		80	25	-	125	

### RATIONALE:

Engineering drawing is the graphical language of engineers. It describes the scientific facts, Concepts, principles and techniques of drawing in any engineering field to express the ideas, conveying the instructions, which are used to carry out jobs in engineering field. This course aim for building a foundation for the further course in drawing and other allied subjects

# COMPETENCY:

Read, draw & interpret the engineering drawing of simple objects.

Cognitive Understand &visualize the given component drawing.

Psychomotor Produce engineering drawing from the given problem

Affective Attitude of using i) Procedures ii) Practices iii) Drawing instruments iv) Techniques

v) Drafting skil

### **COURSE OUTCOMES:**

T

**CCF108-1** Produce orthographic drawing from given pictorial view.

**CCF108-2** Produce sectional orthographic drawing from given pictorial view.

**CCF108-3** Draw proportionate free hand sketches.

**CCF108-4** Interpret the views & complete the missing view.

**CCF108-5** Visualize & draw accordingly the pictorial view by correlating the given views.

**CCF108-6** Construct development of lateral surfaces.

### COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

Competen cy and Cos	PO 1 Basic knowled ge	PO 2 Discipline knowledg e	PO 3 Experim ents and practice	PO 4 Engineeri ng Tools	PO 5 The engineer and society	PO 6 Environm ent and sustainab ility	PO 7 Ethics	PO 8 Individual and team work	PO 9 Communi cation	PO 10 Life-long learning	PSO1 Work in mfg& service sector	PSO2 Acquain ted with current technolo gy	PSO3 Pursue higher educati on
Competen cy:	3	1	2	-	-	-	-	-	2	3	2	-	-
CCF108-1	3	1	2	-	-	-	-	-	1	3	2	-	-
CCF108-2	3	1	2	-	-	-	-	-	1	2	2	-	-
CCF108-3	3	1	2	-	-	-	-	-	1	3	2	-	-
CCF108-4	3	1	2	-	-	-	-	-	2	3	2	-	-
CCF108-5	3	1	2	-	-	-	-	-	2	3	2	-	-
CCF108-6	3	1	2	-	-	-	-	-	2	3	2	-	-

# A. THEORY:

# **CONTENT:**

# SECTION - I

Sr. No.	Topics	Teaching (Hours)	Theory Evaluation Marks			
Cours	e Outcome CCF108-1 Produce orthographic drawing from given pictorial view	Ι.				
1.	<ul> <li>Orthographic Projection         <ol> <li>Introduction of Orthographic             Projection-First and Third angle Projection Method             </li> <li>Conversion of Pictorial view into Orthographic Views.</li></ol></li></ul>	06	16			
Cours	<b>Course Outcome</b> CCF108-2 Produce sectional orthographic drawing from given pictorial view.					
2.	<ul> <li>Sectional Views.</li> <li>2.1 Types of sections</li> <li>2.2 Conversion of pictorial view into sectional Orthographic views.</li> <li>(First Angle Projection Method only)</li> </ul>	06	16			
Cours	e Outcome CCF108-3 Draw proportionate free hand sketches.					
3.	<ul> <li>Free Hand Sketches</li> <li>3.1Profiles of Screw Threads( V and Square Thread) Conventional representation of threads.</li> <li>3.2 Free hand sketches of nuts and bolts, Washer, Locking arrangement of nuts, Foundation bolts</li> <li>3.3Riveted and Welded Joints.</li> </ul>	04	08			

### SECTION - II

Sr. No.	Topics	Teaching (Hours)	Theory evaluation Marks
Cours	e Outcome CCF108-4 Interpret the views & complete the missing view.		
4.	<ul> <li>Missing Views.</li> <li>4.1 Interpretation of the given two orthographic views and draw missing view from the given two Orthographic views and Convert one of the given view into sectional Orthographic views</li> <li>(First Angle Projection Method only)</li> </ul>	04	08

<i>Course Outcome</i> CCF108-5 <i>Visualize</i> & <i>draw</i> accordingly the pictorial view by correlating the given views.					
5.	Isometric Projection				
	5.1 Introduction				
	5.2 Isometric Axis				
	5.3 Isometric scale	06	16		
	5.4 Isometric view and Isometric Projection				
	5.5 Conversion of Orthographic Views into Isometric				
	View/Projection(Including rectangular, cylindrical objects, representation				
	of slots on sloping as well as plane surfaces)				
Course OutcomeCCF108-6 Construct development of lateral surfaces.					
6.	Developments of Surfaces				
	6.1 Methods of Development				
	6.2 Developments of Lateral surfaces of right solids				
	Cube,Prism,Cylinders,Pyramid and Cone	06	16		
	6.3 Applications of Development such as Tray, Funnel, Chimney, Pipe ends				
	etc.				
	Total	32	80		
1.Sem	nester end exam question paper should be such that total marks of question	s on each to	pic is one and		
half t	imes the marks allotted above but the candidates are able to attempt quest	tions of the a	bove allotted		
marks	s only.				

# Specification table for setting question paper for semester end theory examination:

Торі	Nome of tonic	Distribution of marks (Cognitive level- wise)			Course	Total
c No.		Remembe r	Understand	Applica- -tion	Outcome	Marks
1	Orthographic projection	04	02	02	CCF108-1	08
2	Sectional Views.	04	04	12	CCF108-2	20
3	Free Hand Sketches	02	04	04	CCF108-3	12
4	Missing Views	02	04	02	CCF108-4	08
5	Isometric Projection	04	04	08	CCF108-5	16
6	Developments of Surfaces	04	12	02	CCF108-6	16
	Total	20	30	30		80

# **B. TERM WORK**

# Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as Term Work as detailed in practical sessions of batches of about 22 students:

Sr.	Laboratory experience	Skills developed	Course	
no			Outcome	
1	Orthographic projection (1 Sheet)	To develop drawing ability to draw Orthographic projection	CCF108-1	
2	Orthographic projection Using CAD (1 Sheet)	To develop CAD software skill in drawing and design.	CCF108-1	
3	Sectional Views. (1 Sheet)	To develop drawing ability in sectional views	CCF108-2	
4	Free Hand Sketches (1 Sheet)	To develop ability to draw free hand sketches of machine components, screw thread profile, riveted and welded joints	CCF108-3	
5	Missing Views (1 Sheet)	To develop ability to draw Missing views and convert given view into sectional view.	CCF108-4	
6	Isometric Projection (1 Sheet)	To develop ability to draw Isometric projection	CCF108-5	
7	Development of Surfaces (1 Sheet)	To develop drawing ability in Development of surfaces of cone, prism, pyramid and cylinder	CCF108-6	

# Criteria for Continuous Assessment of Practical work and Progressive Skill Test:

# a) Continuous Assessment of Drawing Practical

Every practical Sheet shall be assessed for **25** marks as per criteria given below:

Sr No.	Criteria	Marks allotted
1	Attendance	05
2	Preparedness	05
3	Correctness and understanding	10
4	Line work and neatness	05
	Total	25

# b) Progressive Skill Test :

One mid-term *Progressive Skill* Test of 25marks shall be conducted as per criteria given below:

Sr No.	Criteria	Marks allotted
1	Correctness and understanding	10
2	Line work and neatness	05
3	Dimensioning and judgment without measurement	05
4	Proper use of instrument	05
	Total	25

# **INSTRUCTIONAL STRATEGIES :**

### Instructional Methods :

- 1. Lectures cum Demonstrations
- 2. Classroom practices

### Teaching and Learning resources :

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Computer, printer etc.
- 5. Question Bank.

#### **REFERENCE MATERIAL :**

#### a) Reference Books:

Sr. No.	Author	Title	Publisher
1.	N. D. Bhatt	Engineering Drawing	Charotar Publishing House 2010
2.	Amar Pathak	Engineering Drawing	Dreamtech Press, 2010
3.	D.Jolhe	Engineering Drawing	Tata McGraw Hill Edu., 2010
4.	M.B.Shah, B.C.Rana	Engineering Drawing	Pearson, 2010
5.	K. Venugopal	Engineering Drawing and Graphics + AutoCAD	New Age Publication, Reprint 2006
6.	IS Code, SP – 46	Engineering Drawing Practice	

### b) Web References:

1)http://www.design-technology.info/IndProd/drawings/

- 2) http://graphicalcommunication.skola.edu.mt/syllabus/engineering-drawing/
- 3) <u>http://en.wikipedia.org/wiki/Engineering\_drawing</u>
- 4) http://www.engineeringdrawing.org/
- 5) <u>http://www.teachengineering.org/view\_activity</u>
- 6) www.howtoread.co.in/2013/06/how-to-read-ed.html
- 7) <u>http://www.slideshare.net/akhilrocker143/edp</u>
- 8) <u>http://www.24framesdigital.com/pstulpule</u>

### COURSE ID :

Course Name	: APPLIED MECHANICS
Course Code	: CCF110
Course Abbreviation	: FAPM

### **TEACHING AND EVALUATION SCHEME :**

	Pre-rec	uisite	Course	(s)	:	<nil></nil>
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# **Teaching Scheme :**

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

# **Evaluation Scheme :**

	Progressiv	e Assessment	Term End Examination		
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Total
Details of Evaluation	Average of two tests of 20 marks each	<ul> <li>i. 25 marks for each practical</li> <li>ii. One PST of 25 marks</li> </ul>	Term End Theory Exam (03 hours)	As per Proforma-III	
Marks	20		80	25	125

### **RATIONALE :**

Applied mechanics mainly deals with engineering problems regarding equilibrium and motion of material bodies under the action of mechanical and gravitational forces. As most branches of engineering come across situations involving bodies subjected to mechanical and gravitational forces, this course becomes one of the basic courses in engineering.

### COMPETENCY

Apply principles of applied mechanics to solve engineering problems as follows :

Cognitive : Understanding and applying principles of mechanics to engineering problems

Psychomotor : i) Operating simple lifting machines ii) drawing graphic constructions

Affective : Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

### **COURSE OUTCOMES :**

**CCF110-1** Determine resultant of coplanar force systems

**CCF110-2** Solve problems on bodies in equilibrium with and without friction

CCF110-3 Solve problems on statics graphically

CCF110-4 Solve problems on centre of gravity of laminas and solids

CCF110-5 Solve problems on motion using kinematic and kinetic equations

**CCF110-6** Solve problems on simple lifting machines

#### COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

					Program	me Outco	mes POs a	and PSOs					
Competency and COs	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long learning	PSO1 Plan and Design	PSO2 Construc tion and Mainten ance	PSO3 Problem Solving on field
<b>Competency:</b> Apply principles of applied mechanics to solve engineering problems.	3	1	3	2	-	-	-	2	1	2	-	-	1
<b>CCF110-1</b> Determine resultant of coplanar force systems	3	1	-	-	-	-	-	2	1	2	-	-	1
CCF110-2Solveproblems on bodiesin equilibrium with	3	1	3	3	-	-	-	2	1	2	-	-	1

					Program	me Outco	mes POs :	and PSOs					
Competency and COs	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long learning	PSO1 Plan and Design	PSO2 Construc tion and Mainten ance	PSO3 Problem Solving on field
and without friction													
CCF110-3 Solve problems on statics graphically	2	1	3	1	-	-	-	2	1	1	-	-	1
CCF110-4 Solve problems on centre of gravity of laminas and solids	3	1	2	2	-	-	-	2	1	2	-	-	1
CCF110-5 Solve problems on motion using kinematic and kinetic equations	3	1	2	1	-	-	-	2	1	2	ł	ł	1
CCF110-6 Solve problems on simple lifting machines	2	1	1	1	-	-	-	2	1	1	-	-	1

# CONTENT :

# A) THEORY:

	Section I			
Sr. N o.	Topics / Sub-topics			
	Course Outcome CCF110-1 Determine resultant of coplanar force systems			
1	Resolution and Composition of Forces	10	12	
	<ul> <li>1.1 Definition and meaning of the terms mechanics, applied mechanics, particle, rigid body, mass, force, weight</li> <li>1.2 Attributes of a force : Magnitude, direction, sense and position. Principle of transmissibility. Graphical representation of force <ol> <li>1.3 Force systems : Definition and types of force systems like coplanar and non-</li> <li>coplanar. Types of coplanar force systems like concurrent, non-concurrent, parallel, non-</li> </ol> </li> <li>parallel. Field examples of various force systems</li> </ul>			
	1.4 Moment of a force about a point			
	1.5 Couple : properties of couple. Field examples of moments and couples			

Sr. N o.	Topics / Sub-topics	Lectu res (Hour s)	Theor y Evalu ation (Mark )
	Course Outcome CCF110-1 Determine resultant of coplanar force systems	I	I
	1.6 Resolution of a force into two orthogonal and oblique components		
	1.7 Composition of forces : Definition and meaning of resultant of a force system. Law of parallelogram of forces. Varignon's theorem. Determination of resultant of coplanar force systems by analytical method		
	Course Outcome CCF110-2 Solve problems on bodies in equilibrium with and without friction		
`2	Equilibrium of Bodies	10	10
•	<ul> <li>2.1 Definition of equilibrium of a body and equilibrant. Conditions of equilibrium. Law of moments.</li> <li>2.2 Supports : Definition, types and reactions. Free-body diagrams of bodies. Field examples.</li> <li>2.3 Lami's theorem. Field examples.</li> <li>2.4 Beams : Definition, types and field examples. Types and field examples of loads. Problems on support reactions of statically determinate beams carrying concentrated loads, uniformly distributed loads and concentrated moments (analytical method)</li> <li>2.5 Staticaly determinate problems on bodies in equilibrium (analytical method)</li> </ul>		
3	Friction	06	
	<ul><li>3.1Definition of friction. Static and dynamic friction. Laws of friction. Coefficient of friction. Angle of repose, Angle of friction. Field examples.</li><li>3.2Problems involving bodies on horizontal and inclined rough surfaces and ladder.</li></ul>		10
	Course Outcome CCF110-3 Solve problems on statics graphically		
4	Graphic Statics	06	08
	• 4.1Advantages and limitations of graphical methods. Bow's notation. Space diagram,vector diagram,		
	4.2Parallelogram, triangle and polygon laws of forces		
	4.3Problems on resultant of concurrent force systems		
	4.4Funicular polygon. Problems on resultant of non-current force systems		
	4.5Problems on reactions of statically determinate beams with simple and hinged supports carrying concentrated loads		
	Total	32	40
Sem allot	ester end exam question paper should be such that total marks of questions on each topic is one and half tir ted above but the candidates are able to attempt questions of the above allotted marks only.	nes the	marks

# Section II

Sr. N o.	Topics / Sub-topics		Theory Evaluati on (Marks)			
	Course Outcome CCF110-4 Solve problems on centre of gravity of laminas and solids					
5	Centroid and Centre of Gravity	08	08			
	<ul> <li>5.1 Definition and field applications of centroid and centre of gravity</li> <li>5.2 Centroid of standard line figures. Problems involving composite figures made up of standard line figures</li> <li>5.3 Centroid of standard laminas. Problems involving composite laminas made up of standard laminas</li> <li>5.4 Centre of gravity of standard solids. Problems involving simple composite solids made up of standard up of standard solids</li> </ul>					
	Course Outcome CCF110-5 Solve problems on motion using kinematic and kinetic equation	ns				
6	Rectilinear Motion	08	08			
	6.1 Definition of motion, dynamics, kinematics,					
	kinetics, displacement, speed, velocity, acceleration, motion under gravity. Simple problems with uniform acceleration. Field examples					
	6.2 Newton's laws of motion. Simple problems					
	6.3 Definition of momentum. Law of conservation of momentum. Simple problems					
7	Angular Motion	04	06			
	7.1 Definition of angular motion, angular displacement, angular velocity, angular acceleration, torque, moment of inertia. Field examples					
	7.2 Kinematic and kinetic equations of angular motion. Simple problems with uniform angular acceleration					
8	Work, Power, Energy	04	08			
	8.1 Definition of work done by a force. Work done by torque					
	8.2 Definition of energy. Forms of energy. Law of conservation of energy. Field examples					
	8.3 Definition of power					
	8.4 Simple problems on work, power and energy					
	Course Outcome CCF110-6 Solve problems on simple lifting machines	1	1			
9	Simple Lifting Machines	08	10			
	9.1Definition of simple lifting machine, load, effort, mechanical advantage, velocity ratio,					

Sr. N o.	Topics / Sub-topics	Lectu res (Hour s)	Theory Evaluati on (Marks)		
	efficiency at a load. Field examples				
	9.2Law of machine, maximum mechanical advantage, maximum efficiency, reversibility or non- reversibility of a machine at a load				
	9.3Friction in machine, ideal machine, effort lost in friction, ideal effort, ideal load				
	9.4Problems on simple lifting machines.(Problems or questions on any particular machines are not expected; they shall be covered in practicals)				
	Total	32	40		
Sem allot	ester end exam question paper should be such that total marks of questions on each topic is one and half ted above but the candidates are able to attempt questions of the above allotted marks only.	times th	e marks		

# Specification table for setting question paper for semester end theory examination :

Topic		Distribution	n of marks (Cog wise)		Course	
No.	Name of topic	Remember	Understand	Applica- -tion	Total Marks	Outcome
1	Resolution & Compositio of Forces	02	04	06	12	CCF110-1
2	Equilibrium of bodies	02	04	04	10	CCF110-2
3	Graphics Statics	02	02	04	08	CCF110-3
4	Friction	02	04	04	10	CCF110-2
5	Centroid and Centre of Gravity	02	02	04	08	CCF110-4
6	Rectilinear Motion	02	02	04	08	CCF110-5
7	Angular Motion	02	02	02	06	CCF110-5
8	Work, Power,Energy	02	02	04	08	CCF110-5
9	Simple Lifting Machines	02	04	04	10	CCF110-6
TOTAL		18	26	36	80	

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

# B) TERM WORK

# Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work as detailed in the *Laboratoty Manual for Applied Mechanics* developed by the Institute .

Sr	Title of Practical Exercise	Skills / Competencies to be	Course
No.		developed	Outcome
1	Collection and presentation of four graphics/ videos on field applications of mechanics	<ol> <li>Information collection and presentation</li> <li>Motivation through field exposure</li> </ol>	CCF110-6
2-7	<ol> <li>Experiment on resultant of force system( any one)</li> <li>Verification of law of parallelogram of forces</li> <li>Verification of Varignon's theorem of moments for non-concurrent force system</li> </ol>	<ol> <li>Self learning ability using laboratory manual</li> <li>Measuring dimensions and angles</li> <li>Applying concepts studied</li> </ol>	CCF110-1
	<ul> <li>Experiments on equilibrium of bodies</li> <li>3. Verification of law of polygon of forces</li> <li>4. Verification of Lami's theorem</li> <li>5. Determination of reactions of beam</li> <li>6Determination of coefficient of friction and verification of laws of friction</li> </ul>	<ol> <li>Plotting and interpreting graphs</li> <li>Drawing real view diagrams of machine</li> <li>Time management and team</li> <li>working skills</li> <li>Presentation skills</li> </ol>	CCF110-2
	<b>Experiment on centroid</b> 7.Determination of centroid and centre of gravity		CCF110-4
`8-11 	<ul> <li>Experiments on simple liftingmachines:(any four)</li> <li>Study of differential axle and wheel</li> <li>Study of simple screw jack</li> <li>Study of worm and worm wheel</li> <li>Study of single gear crab</li> <li>Study of double gear crab</li> <li>Study of Weston's differential pulley block</li> <li>Study of two sheaves and three sheaves pulley block</li> <li>Study of worm geared pulley block</li> </ul>	<ol> <li>Studying mechanism of machine</li> <li>Deriving expression for velocity ratio of machine</li> <li>Measuring dimensions of machine parts using thread, etc.</li> <li>Taking readings of loads and efforts</li> <li>Plotting and interpreting graphs</li> <li>Drawing real view diagrams of machine</li> <li>Time management, team working and presentation skills</li> </ol>	CCF110-6
12	<b>Graphic Statics :</b> One problem each on concurrent force system, parallel force system, non-current non-parallel force system and reactions of beam on graph papers	<ol> <li>Planning paper space</li> <li>Choice of proper scale</li> <li>Drawing and presentation skills</li> <li>Applying concepts studied</li> </ol>	CCF110-3

# C) INDUSTRIAL EXPOSURE :

(Included inLaboratory Manual for Applied Mechanics)

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Every chapter of theory syllabus
2.	Field examples of course application	Term-work assignment

# ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

### • Assessment Criteria for Term work : i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Comitivo	Understanding	05
Cognitive	Application	05
Developmentor	Operating Skills	10
Psychomotor	Drawing / drafting skills	10
Affactivo	Discipline and punctuality	10
Allective	Decency and presentation	10
	50	

# ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given in *Laboratory Manual for Applied Mechanics* Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

# **INSTRUCTIONAL STRATEGIES :**

### Instructional Methods :

- 1. Lectures cum Demonstrations
- 2. Classroom practices

### Teaching and Learning resources :

- 1. Chalk board 3. Audio presentations
- 2. LCD presentation 4. Item Bank

### **REFERENCE MATERIAL :**

# a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	Dixit,Nehate,Shaikh	Text Book on Applied Mechanics	Vision
2.	Sunil Deo	Text book on Engineering Mechanics	Nirali
3.	Bhavikatti and Rajashekharappa	Engineering Mechanics	Peerson
4.	Mariam & Mariam	Engineering Mechanics	John Wiley & Sons Inc
5.	Beer & Johnston	Vector Mechanics : Statics and Dynamics	McGraw Hill Inc

b) Websites i) <u>http://en.wikipedia.org/wiki/Applied\_mechanics</u>

### COURSE ID :

Course Name	: WORKSHOP PRACITCE- I
Course Code	: CCF111
Course Abbreviation	: FWSE

### **TEACHING AND EVALUATION SCHEME :**

Pre-requisite	Course(s)	:	<nil></nil>
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**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	NIL	02
Practical	02	

### **Evaluation Scheme :**

	Progressive Assessi	Terr	Total		
Component	Theory	Practical	Theory	Term work	, otai
Details and Duration	Average of two tests of 20 marks each	One mid- term Skill Test (2 hrs)	Term End Theory Exam (03 hours)	As per Pro- forma - III	
Marks	NIL			50	50

### **RATIONALE :**

Workshop machines mainly deals with various trades such as welding, plumbing, wood working and black smithy

The workshop practices are commonly used in Engineering Industry. A technician has to work in such environment with his peers, superiors and subordinates for a major part of his life. Therefore the emphasis on the practical work is needed for the primary experience of working in the team.

### **COMPETENCY** :

### Prepare a simple job using welding, plumbing, smithy and wood working

**Cognitive** : Apply various trade practices in civil engineering.

- **Psychomotor** : i) Prepare job in pipe fitting.
  - ii) Prepare wood working article.
    - iii) Prepare article consisting simple fabrication
  - iv) Prepare job in black smithy

Affective : Develop attitude of i) Interpret drawing ii) Safety

# **COURSE OUTCOMES :**

- **CCF 112-1** Select different types of wood material.
- **CCF 112-2** Select different types of tools used in workshop.
- **CCF 112-3** Preparing simple components in workshop.
- CCF 112-4 Interpret drawing.

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**CCF 112-** 5 Practicingsafety in workshop.

### COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

Competen cy and COs	PO 1 Basic knowled ge	PO 2 Discipline knowledg e	PO 3 Experim ents and practice	PO 4 Engineeri ng Tools	PO 5 The engineer and society	PO 6 Environm ent and sustainab ility	PO 7 Ethics	PO 8 Individual and team work	PO 9 Communi cation	PO 10 Life-long learning	PSO 1 Work in mfg& service sector	PSO 2 Acquain ted with current technolo gy	PSO 3 Pursue higher educati on
Competen cy:	1	-	3	-	-	-	-	3	-	-	2	-	-
CCF112-1	1	-	3	-	-	-	-	3	-	-	2	-	-
CCF112-2	1	-	3	-	-	-	-	3	-	-	2	-	-
CCF112-3	1	-	3	-	-	-	-	3	-	-	2	-	-

Competen cy and COs	PO 1 Basic knowled ge	PO 2 Discipline knowledg e	PO 3 Experim ents and practice	PO 4 Engineeri ng Tools	PO 5 The engineer and society	PO 6 Environm ent and sustainab ility	PO 7 Ethics	PO 8 Individual and team work	PO 9 Communi cation	PO 10 Life-long learning	PSO 1 Work in mfg& service sector	PSO 2 Acquain ted with current technolo gy	PSO 3 Pursue higher educati on
CCF112-4	1	-	3	-	-	-	-	3	-	-	2	-	-
CCF112-5	1	-	3	-	-	-	-	3	-	-	2	-	-

		1 .		
Sr. No.	Topics/ Sub-Topics	Practical (Hours)/ Evaluatio n(Marks)	Skills/ Competencies to be developed	Course outcome
1	Welding shop :-	09/15		
	<ul> <li>a) Demonstration of various welding tools, joints of metals, type of welding machines.</li> <li>b) Demonstration of arc welding techniques.</li> <li>c) How to use current setting, Earthing connection etc. and any one job composite job involving Butt, Lap joint from the following pieces of work - <ul> <li>i) Window frame.</li> <li>ii) Grill.</li> <li>iii) Sanitary window frame.</li> <li>iv) Supporting frame.</li> <li>v) Stool frame.</li> <li>vi) Bench frame etc.</li> </ul> </li> </ul>		<ul> <li>a) Study of welding tools, Identifying materials</li> <li>b)Measuring dimensions</li> <li>c) Interpretation of drawing</li> <li>d) Operating welding machines.</li> <li>e) Time management and observing safety habits</li> </ul>	CCF 2 to CCF 5
2.	<ul> <li>Plumbing shop :-</li> <li>a) Demonstration of tools. Invading pipe joint</li> <li>b) One job involving pipe joint and fittings (Per one group of 04 students).</li> <li>c) Job used for wash basin pipe fitting, cock fitting, coupling etc.</li> <li>d) Demonstration of PVC pipe joint used in civil engineering works with various PVC fittings &amp; accessories.</li> </ul>	07/10	<ul> <li>a) Study of plumbing tools, Identifying materials</li> <li>b)Threading with dies on pipes.</li> <li>c) Interpretation of drawing</li> <li>d) Selection of Pipe joints and fittings</li> <li>e) Time management and observing safety habits</li> </ul>	CCF 2 to CCF 5

# 1) Course Contents :- TERM WORK

3.	Wood	Working shop :-			
	a) b)	Demonstration of different wood working tools & machines. Identify, select & use various Marking,	09/15	a) Study of wood working tools, Identifying materials	CCF 1 to CCF 5
	c)	Measuring, Cutting, Holding & Striking tools & equipments. Operate control different machines &		b)Measuring dimensions c)Interpretation of drawing	
		equipments in respective shop.		d) Selection of wooden	
	(b	Know basic wood workshop operations.		joints and proper tools	
	e)	Demonstration of different wood working processes like Planning, Marking, Chiseling, Grooving, Turning of wood etc.		e) Time management and observing safety habits	
	f)	One simple job based on the above processes for 04 to 06 students group.			
4	Smithy	v shop :-		a)Studying forging tools,	
4	a) b) c) Note - (saleab	Demonstration of different forging tools. Demonstration of different forging processes like bending the bar of various size/diameters etc. One job like used in survey engineering per, flat chisel, fan hook or any hardware item. One job of standard size ble/marketable article of per student)	07/10	a)studying forging tools, Identifying materials b)Measuring dimensions c)Interpretation of drawing d) Selection of tools e) Time management and observing safety habits	CCF 2. to CCF 5

# The students will submit the following.

1) Workshop record book showing the details of the job viz. Drawing, Raw material size, time

required completing the job.

2) The journal consisting of the neat sketches, specifications use of the hand tool, and hand operations based on the demonstration in all the trades during the practical work.

### ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

# • Assessment Criteria for Term work :

### i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitive	Understanding	05
	Application	05
Psychomotor	Operating Skills	10

	Drawing / drafting skills	10
Affective	Discipline and punctuality	10
	Decency and presentation	10
	50	

### ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 50 marks shall be conducted. Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

# **Instructional Strategies :-**

- 1) Demonstration during Practicals.
- 2) Workshop Record Book.
- 3) Workshop Journal.

### Teaching and learning resources:-

Shop Demonstration

Hands on training on machine

### **Reference Books :-**

Author	Title	Publisher
S. K. Hajra Chaudhary, Bose, Roy	Elements of workshop Technology – Volume I & II	Media Promoters and Publishers limited
B.S. Raghuvanshi	Elements of workshop Technology – Volume I & II	Dhanpat Rai & Co.

### Websites:

- 1) <u>http://nptel.ac.in</u>
- 2) www.egr.msu.edu/~pkwon/me478

### COURSE ID :

Course Name	: WORKSHOP PRACTICE II (CE)
Course Code	: CCF115
Course Abbreviation	: FWSE

# **TEACHING AND EVALUATION SCHEME :**

### Pre-requisite Course(s) : CEF111

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	NIL	02
Practical	02	

### **Evaluation Scheme :**

	Progressive Assess	Terr	Total		
Component	Theory	Practical	Theory	Term work	, i o tui
Details and Duration	Average of two tests of 20 marks each	One mid- term Skill Test (2 hrs)	Term End Theory Exam (03 hours)	As per Pro- forma - III	
Marks	NIL			50	50

### Ranonale :-

Workshop practice II mainly deals with Wood working, Fitting and Sheet Metal work.

These are commonly used in Engineering Industry. A technician has to work in such environment with his peers, superiors and subordinates for a major part of his life. Therefore the emphasis on the practical work is needed for the primary experience of working in the team.

Such working upgrades the mental and manual abilities / skills of using efficiently the basic tools in most of the industries. The students are required to supervise, maintain equipments, where he needs the knowledge of basic workshop skills such as welding, plumbing, drilling, taping, etc.

#### COMPETENCY : Prepare a simple job using wood working, sheet metal and fitting technique

**Cognitive** : Use different types of tools in sheet metal and fitting trade.

**Psychomotor** : i) Prepare simple job in wood working sheet metal.

- ii) Prepare aluminium window frame.
- Affective : Develop attitude of i) Interpret drawing ii) Safety

### **COURSE OUTCOMES :**

- **CCF 115-1** Select different types of Sheet metal and Fitting tools.
- **CCF 115-2** Prepare a simple job in Wood working, Sheet Metal, Fitting trade.
- **CCF 115-3** Bend and cut a bar.
- CCF 115-4 Interpret drawing.

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**CCF 112-** 5 Practicingsafety in workshop.

### COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

	00.4	20.2	20.2	20.4	<b>PO 5</b>	200	20.7	20.0	20.0	50.40	2004	<b>NGO 3</b>	<b>NCO 3</b>
Competen cy and COs	PO 1 Basic knowled ge	PO 2 Discipline knowledg e	PO 3 Experim ents and practice	PO 4 Engineeri ng Tools	PO 5 The engineer and society	PO 6 Environm ent and sustainab ility	PO 7 Ethics	PO 8 Individual and team work	PO 9 Communi cation	PO 10 Life-long learning	PSO 1 Work in mfg& service sector	PSO 2 Acquain ted with current technolo gy	PSO 3 Pursue higher educati on
Competen cy:	1	-	3	-	-	-	-	3	-	-	2	-	-
CCF112-1	1	-	3	-	-	-	-	3	-	-	2	-	-
CCF112-2	1	-	3	-	-	-	-	3	-	-	2	-	-
CCF112-3	1	-	3	-	-	-	-	3	-	-	2	-	-
CCF112-4	1	-	3	-	-	-	-	3	-	-	2	-	-
CCF112-5	1	-	3	-	-	-	-	3	-	-	2	-	-

<b>Sr.</b> <b>No.</b>	Topics/ Sub-Topics Wood Working shop :- Any one composite job from the following	Practical (Hours)/ Evaluation (Marks) 12/18	Skills/ Competencies to be developed a) Study of wood working tools,	Course outcome
	<ul> <li>involving different operations, joints, turning, planning, surface finishing by emery paper, varnishing etc.</li> <li>i) Window frame.</li> <li>ii) Sanitary window frame of aluminum, teakwood etc.</li> <li>iii) Show cases used in various building/houses etc.</li> <li>iv) Notice board.</li> <li>v) Chairs.</li> </ul>		Identifying materials b) Measuring dimensions c) Interpretation of drawing d) Operating planer, cutting machines and tools e) Prepare utility article f) Time management and observing safety habits	CCF 5
2	<ul> <li>Sheet Metal Shop :-</li> <li>a) Demonstration of different sheet metal tools &amp; machines.</li> <li>b) Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering, riveting etc.</li> <li>c) To select the proper gauge &amp; type of different G.I. sheets required for job undertaken.</li> <li>d) One composite job from the following - <ul> <li>i) Plates used for centering.</li> <li>ii) Hold Fast used for door frame.</li> <li>iii) Dustbin used in civil engineering office.</li> <li>iv) Bucket.</li> <li>v) Tray.</li> <li>vi) Trunk.</li> <li>vii) Tin Box etc.</li> <li>Note - Batch size should be selected depending volume of the work.</li> </ul> </li> </ul>	10/16	<ul> <li>a) Study of sheet metal tools,</li> <li>Identifying materials</li> <li>b)Measuring dimensions</li> <li>c)Interpretation of drawing</li> <li>d) Operating sheet cutting bending machines</li> <li>e) Time management and observing safety habits</li> <li>f) Prepare utility article</li> </ul>	CCF 1 to CCF 5
3	<ul> <li>Fitting Shop :-</li> <li>a) Demonstration of different fitting tools &amp; drilling machines &amp; power tools.</li> <li>b) Demonstration of different operations like marking filing cutting drilling tapping etc.</li> </ul>	10/16	a)Studying fitting tools, Identifying materials b)Measuring dimensions c)Interpretation of drawing	CCF 1 to CCF 5

# 2) Course Contents :- TERM WORK

c) Demonstration of bending bars.	d) Operating drilling, hacksaw,
d) Demonstration of stirrups.	threading machines
<ul><li>e) One simple job in aluminum window frame.</li><li>f) One job in stirrups.</li><li>g) Window frame.</li></ul>	e) Time management and observing safety habits f) Prepare utility article

### The students will submit the following.

1) Workshop record book showing the details of the job viz. Drawing, Raw material size, time required completing the job.

2) The journal consisting of the neat sketches, specifications use of the hand tool, and hand operations based on the demonstration in all the trades during the practical work.

### ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

### Assessment Criteria for Term work :

### i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	05
Cognitive	Application	05
Developmentor	Operating Skills	10
Psycholiotol	Drawing / drafting skills	10
Affective	Discipline and punctuality	10
Allective	Decency and presentation	10
	50	

### ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 50 marks shall be conducted. Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

### **Instructional Strategies :-**

- 1) Demonstration duringPracticals.
- 2) Workshop Record Book
- 3) Workshop Journal.

# Teaching and learning resources:-

# Shop Demonstration

Hands on training on machine

# **Reference Books :-**

Author	Title	Publisher		
S. K. Hajra Chaudhary, Bose, Roy	Elements of workshop Technology – Volume I & II	Media Promoters and Publishers limited		
B.S. Raghuvanshi	Elements of workshop Technology – Volume I & II	Dhanpat Rai & Co.		

# Websites:

- 1) <u>http://nptel.ac.in</u>
- 2) www.egr.msu.edu/~pkwon/me478
# **CURRICULUM CONTENTS OF LEVEL – II**

# LIFE SKILL AND PROFESSIONAL SKILL COURSES

#### COURSE ID :

Course Name	:	GENERIC SKILLS
Course Code	:	CCF201
Course Abbreviation	:	FGNS

#### **TEACHING AND EVALUATION SCHEME:**

Pre-requisite Course(s) : <nil >

**Teaching Scheme:** 

Scheme component	Hours / week	Credits
Theory	02	04
Practical	02	

**Evaluation Scheme:** 

Mode of	Progre	ssive Assessment	Te	Total		
Evaluation	Theory	Practical	Theory	Practical **	TW	
Detailsof Evaluation	- Nil -	One mid-semester Skill Test(2 hrs) * of 25 marks	- Nil -	Term End Practical Exam (2 hrs)	Pro- forma VI	
Marks	- Nil -		- Nil -	50	25	75

\*\* Practical Examination to be conducted by internal examiner (course teacher) and external examiner (course teacher of different classfrom the Institute) and marks to be entered as per Proforma V.

## **RATIONALE:**

Acquisition of technical and entrepreneurial competencies is founded on certain generic skills that are fundamentally essential for all disciplines of technology. Considering the age group and socioeconomical background of the students of the Institute, a set of minimum essential generic skills has been identified and categorized as i) Concentration skills, ii) Language skills, iii) Learning Skills, iv) Aesthetic Skills, v) Behavioral Skills and vi) Creativity Skills. These generic skills will be studied and practiced in this course. Communication Skills form another major category of generic skills which shall be studied in separate course named *Communication Skills*. For mastery and perfection in these skills, consistent practice and an integrated application is necessary in all subjects of the Programme. Generic skills are essential to improve the overall quality of learning of the student for all the subjects.

#### COMPETENCY :

Apply generic skills to achieve refinement in overall development of personality as follows:

Cognitive : Understanding and applying generic skills in various situations

**Psychomotor** :i) Use of proper concentration ii)analyzing routine activity for formal and informal learning iii) Use of correct vocabulary.iv) use of aesthetic skills in all dimensions of life.

Affective :Attitude of i) concentration ii)confidence iii) manners iv) neatness v) aesthetic presentation

#### **COURSE OUTCOMES :**

CCF201-1 Apply concentration skills in various tasks.

- CCF201-2 Apply learning skills to gain new knowledge, skills and techniques.
- CCF201-3 Make use of language skills for effective interaction.
- CCF201-4 Organise study skills, self motivation for best performance.
- CCF201-5 Adapt behavioural and asthetics skills.
- CCF201-6 Adapt creativity skills for doing work creatively.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long learning	PSO1 Plan and Design	PSO2 Constr uction and Mainte nance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply generic skills to learn to achieve refinement in overall development of personality as follows:	2	2	3	-	1	-	2	2	2	3	1	1	1
CCF201- Apply concentration skills in various tasks.	2	2	1	-	2	-	-	2	2	2	1	-	1
CCF201-2 Apply learning skills to gain new knowledge,skill and techniques.	2	2	2	-	2	1	1	2	2	2	1	-	1
CCF201-3 Make use of language skills for effective interaction.	2	2	2	-	1	1	2	2	2	3	1	-	1
CCF201-4 Organise study skills, self motivation for best performance.	2	2	2	-	2	-	2	2	2	2	1	-	1
CCF201-5 Adapt behavioural and asthetics skills.	2	2	2	-	2	-	2	2	2	2	1	-	1
CCF201-6 Adapt creativity skills for doing work creatively.	2	1	1	-	1	-	1	2	2	2	1	-	1

## CONTENT:

## E. THEORY :

Sr. No.	Topics / Sub-topics	Lectures
		(nours)
	<b>Course Outcomes CCF201-1</b> Apply concentration skills in various tasks	
1	Overview of generic skills	02
	<ol> <li>1.1 Definition of generic skills, life skills, soft skills. Difference between generic skills and specialized skills</li> <li>1.2 Important generic skills for technicians: Concentration skills, learning skills, language skills, communication skills, aesthetic skills, behavioral skills, creativity skills</li> <li>1.3 Importance of generic skills</li> <li>1.4</li> </ol>	
Cours techr	Se Outcomes CCF201-2 Apply learning skills to gain new knowledge, skills and niques.	1
2	Concentration Skills	06
	2.1 Concentration of mind : Meaning and importance. Hurdles and	
	common remedies.	
	2.2 Thoughts : Intensity, speed and duration of thoughts. Positive, negative	
	and neutral thoughts. Emotions. Management of thoughts.	
	2.3 Concentration skills : Breathing exercises and pranayam	
	2.4 Concentration skills : Chanting omkar	
	2.5 Concentration skills : Prayer - Daily input of positive Thoughts	
	2.6 Concentration skills : Meditation	
	Course Outcomes CCF201-3 3 Make use of language skills for effective intera	ction.
3	Learning Skills	08
	<ul> <li><b>3.1 Fundamentals of Learning :</b> Definition, characteristics and rewards of learning. Affective, cognitive and psychomotor domains of learning.</li> <li>Barriers in learning. FIPN analysis.</li> </ul>	
	<b>3.2 Process of Learning :</b> Reception, understanding, consolidation, retrieval, internalization, application, reinforcement and enhancement	
	<b>3.3 LearningSkills:</b> Skillsof observing, listening, reading, notes taking, memorizing, problem solving, graphic,experimenting, surveying,	

	calculating skills, Cognitive skills.	
	3.4 Studying skills : Planning and scheduling, Methods ofstudy as per	
	natureof subject content.	
	<b>3.5 Self-motivation:</b> Meaning and importance. Improving self-motivation through activities like inspiring case studies, web search &presentation, technical quiz/games, group studying, making videos, industry exposure	
Cour	se Outcomes CCF201-4 Organise study skills, self motivation for best performa	nce.
		1
4	Language Skills	06
	4.1 Vocabulary. Pronunciation. Spellings. Recitation.	
	4.2 Listening and recitation.	
	4.3Word games.	
	Course Outcomes CCF201-6 Adapt creativity skills for doing work creatively.	
5	Aesthetic Skills	02
	5.1 Sense of aesthetics. Appearance. Neatness. Decency. Sense of colours and graphics	
	5.2 Application of aesthetics in appearance, work, note book and paper writing, submission work	
	<b>Course Outcomes CCF201</b> -6 Adapt creativity skills for doing work creatively.	
6	Behavioral Skills	04
	6.1 Manners and etiquettes. Discipline. Sincerity. Morales. Politeness.	
	Social and civic sense. Assertion without aggression.	
Cour	se Outcomes CCF201-6 Adapt creativity skills for doing work creatively.	1
7	Creativity Skills	04
	7.1 Meaning and importance of creativity. 7.2 Doing things creatively.	
	TOTAL	32
		1

## F. TERM WORK

## Practical Exercises and related skills to be developed:

The following practical exercises shall be conducted as Term Work detailed in the *Workbook on Generic Skills* developed by the Institute in practical sessions of batches of about 22 students:

Sr. No.	Title of the Lab work	Skills / Competencies to be developed	Course Outcome
1.	Introduction Game	Self-expression, inter-personal rapport	CCF201-1
2.	Concentration Skills - 1: Chanting of Omkar	Concentration	CCF201-2
3.	Concentration Skills - 2: Breathing exercises	Concentration	CCF201-2
4.	Concentration Skills - 3: Prayer	Concentration, recitation, positive thinking	CCF201-2
5.	Concentration Skills - 4: Meditation	Concentration, thought management	CCF201-2
6.	Language Skills - 1 : Vocabulary Exercise	Vocabulary improvement	CCF201-4
7.	Language Skills - 2 : Recitation Exercise	Pronunciation, language acquaintance	CCF201-3 & 4
8.	Language Skills - 3 : Grammar	Language skills	CCF201-3 & 4
9.	Learning Skills - 1 : Domain Analysis of an activity	Understanding learning domains	CCF201-3 & 4
10.	Learning Skills - 2 : FIPN Analysis of Learning	Learning analysis	CCF201-3 & 4
11.	Learning Skills - 3 : Reading and Notes taking	Effective reading and notes taking	CCF201-3 & 4
12.	Learning Skills - 4 : Listening and Notes taking	Effective listening and notes taking	CCF201-3 & 4
13.	Learning Skills - 5 : Studying Skills	Effective self-studying	CCF201-5
14.	Technical Skills - 1 : Calculating Skills	Efficient use of calculator	CCF201-5
15.	Technical Skills - 1 : Text-graphic Conversion	Graphic and language skills	CCF201-5

16.	Aesthetic Skills	Attitude of aesthetic presentation	CCF201-6
17.	Behavioral Skills	Behavior, mannerism and etiquettes	CCF201-6
18.	Creativity Skills	Attitude of creativity and innovation	CCF201-6
19.	Self-motivated Activities	Self-motivation Skills	CCF201-6

## C. INDUSTRIAL EXPOSURE:

(Included in Workbook on Generic Skills)

SN	Mode of Exposure	Торіс
1.	Self-motivated Activities	Industrial survey, information collection, Biographies of
		industrialists, etc.
2.	Recitation Exercises	Articles on industrial scenario and issues
3.	Domain Analysis	Analysis of field / industrial activities
ACCEC	CARENT CONTERIA FOR TERMAN	

ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

## • Term work :

## i) Continuous Assessment of Practical Assignments:

Everypractical assignment shall be assessed for 25 marks as per criteria given in *Workbook on Generic Skills*.

Domain	Particulars	Marks out of 25
Comitivo	Understanding	02
Cognitive	Application	02
Davahamatar	Presentation Skills	04
Psycholiotor	Drafting skills	05
Affastiva	Discipline and punctuality	06
Allective	Decency	06
	TOTAL	25

## ii) Progressive Skill Test:

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given in *Workbook on Generic Skills* 

Final marks of termwork shall be awarded as per Assessment Pro-forma VI

## • Term-end Practical Examination :

*Term-end Practical Examination* shall be conducted by internal examiner (course teacher) and external examiner (course teacher of different class from the Institute) as per the following criteria :

Skills >	Concen- trationSk ills	Language Skills	Learning Skills	Technical Skills	Aesthetic, behavioral and creativity skills	Total	Marks converted out of
Marks >	20	20	20	20	20	100	50

**INSTRUCTIONAL STRATEGIES:** 

## InstructionalMethods:

1. Lectures cum Demonstrations 2. Classroom practices

## Teaching and Learning resources:

1. Chalk board	2. LCD presentations	3. Audio presentations	4. Item Bank
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## **REFERENCE MATERIAL :**

## a) Books / Journals / IS Codes

Sr.					
No.	Author	Title	Publisher		
1.	K. Sudhesh Development of Generic Skills		Nandu Printers & Pub, M'bai		
2.	Kulkarni/Sharma	Independent Study Techniques			
3.	E.H.McGrath	Basic Managerial Skills for all	McGraw Hill Pub., New Delhi		
4.	Sahukar&Bhalla	The book of Etiquette and Manners	PustakMahal, New Delhi		
5.	Jeanne E.O.	Human Learning	Pearson Publishers, Mumbai		
6.	Kenneth/Dubois	Learning to Learn	Pearson Publishers, Mumbai		
7.	Fred Luthans	Organizational Behavior	McGraw-Hill Higher Edu.		

## b) Websites

- i) www.mindtools.com
- ii) www.samcerto.com

iii) www.stress.org.uk

iv) www.yogapoint.com

\* \* \*

#### COURSE ID:

Course Name	: COMMUNICATION SKILLS
Course Code	: CCF202
Course Abbreviation	: FCMS

## **TEACHING AND EVALUATION SCHEME:**

Pre-requisite Course(s) : <nil >

#### **Teaching Scheme:**

Scheme component	Hours / week	Credits
Theory	02	04
Practical	02	

#### **Evaluation Scheme:**

Mode of	Progressive Assess	ogressive Assessment		Term End			
Evaluation	Theory	ry Practical Theory Practical * TW vo tests of ich to be we so that the state of					
Detailsof Evaluation	Average of two tests of 20 marks each to be converted out of 10 marks	One mid- term Skill Test(2 hrs)	Term End Theory Exam (1 <sup>1</sup> ⁄2 hours)	Term End Practical Exam (2 hours)	As per Profor ma II.		
Marks	10		40	25		75	

\* Practical Examination to be conducted by internal examiner (course teacher) and external examiner (course teacher ofdifferentclassfrom the Institute) and marks to be entered as per Proforma II.

#### **RATIONALE:**

Communication being an integral part of every personal and professional human activity, communication skills plays a fundamental role in education as well as technology. As a unanimous feedback from the industry in general, technicians need to be specially strengthened in generic communication skills for their effectiveness in profession and career. Considering the age group and socio-economical background of the students of the Institute, this course has been designed with a skill-oriented content with some necessary theoretical foundation. For mastery and perfection in these skills, consistent practice and integrated application is necessary in all subjects of the Programme.

#### **COMPETENCY** :

Apply principles of communication to communicate in formal and informal scenario as follows:

Cognitive : Understanding and applying principles of communication in various situations

**Psychomotor**: i) Use of correct pronunciation, tone, accent & intonation ii) writing formal letters, drafts, reports etc. iii) Use of correct nonverbal code in formal & informal situations iv)Speaking in formal & informal situations

Affective :Attitude of i) perfection ii) iii) confidence iv) punctuality v) aesthetic presentation

## **COURSE OUTCOMES :**

CCF202-1 Identify his/her communication barriers

CCF202-2converse and convince by speaking, deliver prepared & extempore speech

- CCF202-3 write letters, reports, resume in correct language
- CCF202-4 Make effective use of body language & graphic communication
- CCF202-5 Prepare and present simple media aided presentation
- CCF202-6 Prepare and face mock interview

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[ Note : Correlation levels :1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

		Programme Outcomes POs and PSOs											
Competency and Cos	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long learning	PSO1 Plan and Design	PSO2 Constr uction and Mainte nance	PSO3 Proble m Solving on field
Competency Apply principles of communication to communicate in formal and informal scenario	3	2	3	-	2	2	2	3	3	2	-	1	2
CCF202-1 Identify his/her communication barrier	2	2	2	-	-	-	-	-	2	2	-	1	2
CCF202-2 converse and convince by speaking, deliver prepared & extempore speech	3	2	3	-	2	-	2	2	3	3	1	1	1
CCF202- 3write letters, reports, resume in correct language	2	2	3	-	2	2	1	3	2	3	-	1	1
CCF202-4 Make effective use of body language & graphic communication	2	2	2	-	2	-	2	2	2	2	-	1	1
<b>CCF202-5</b> Prepare and present simple media aided presentation	2	2	2	-	-	-	-	1	2	2	1	1	1
CCF202-6 Prepare and face mock interview	2	2	3	-	2	-	-	3	2	2	1	-	-

## CONTENT:

## G. THEORY :

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)			
	COURSE OUTCOME CCF202-1 Identify his/her communication b	barriers				
1	Fundamentals of Communication	08	12			
	<ol> <li>1.1 Definition of communication by Newman and Peter Little. Importance communication</li> <li>1.2 Modelof communication: Sender-Message-Channel- Receiver-Feedback cycle. Encoding and decoding</li> <li>1.3 Principles of effective communication</li> <li>1.4 Types of communication</li> <li>1.5 Barriers in communication</li> </ol>					
	COURSE OUTCOME CCF202-2 Converse and convince by speaking, deliver prepared &					
	extempore speech					
2	Oral Communication	06	06			
	2.1 Principles and characteristics of oral communication.					
	2.2 Tone, pronunciation and accents. Grammar.					
	2.3 SpokenEnglish:Dialogue, conversation, prepared and					
	extempore speech, discussion, debate, feedback					
	COURSE OUTCOME CCF202-3 Write letters, reports, resume in	correct lang	uage			
3	Written Communication	06	06			
	<ul><li>3.1 Principles and characteristics of written communication.</li><li>3.2 Writing reports, letters, resume and notes.</li></ul>					

	COURSE OUTCOME CCF202-4 Make effective use of body language & graphic						
	communication						
4	Non-verbal communication	04	06				
	4.1 Principles and characteristics of non-verbal						
	Communication.						
	4.2 BodyLanguage:visual, tactile, auditory, cultural.						
	Silence.						
	4.3 GraphicCommunication: Visual illustration, technical						
	graphic communication.						
	COURSE OUTCOME CCE202-5Prepare and present simple media	a aided pres	entation				
5	Media Aided Presentation	04	06				
	<b>F</b> 1 Madia aida far massartation, strongthe and massartions						
	5.1 Media alds for presentation: strengths and precautions						
	5.2 Planning, preparing and making a presentation						
	5.3 Use of presentation media: OHP, computer, MS						
	PowerPoint,LCD, board, charts						
	COURSE OUTCOME CCF202-6Prepare and face mock interview						
6	Interview Techniques	04	04				
	6.1 Preparing for an interview						
	6.2 Taking a mock interview and facing an interview						
	Total	32	40				
Seme	] ster end exam question paper should be such that total marks of g	uestions on e	each topic is one				
and h	alf times the marks allotted above but the candidates are able to at	tempt questi	ons of the above				
allotte	ed marks only.						

Торіс	Name of topic	Distribution o	of marks (Cognitive	Course	Total	
No.		Remember	Understand	Application	outcome	Marks
1	Fundamentals of Communication	02	06	04	CCF202-1	12
2	Oral Communication	02	02	02	CCF202-2	06
3	Written Communication	02	02	02	CCF202-3	06
4	Non-verbal Communication	02	02	02	CCF202-4	06
5	Media aided presentation	02	02	02	CCF202-5	06
6	Interview Techniques	00	02	02	CCF202-6	04
	Total >>	10	16	14		40

#### Specification table for setting question paper for semester end theory examination:

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

#### H. TERM WORK

**Practical Exercises and related skills to be developed:**The following practical exercises shall be conducted as Term Work as detailed in the *Workbook on Communication Skills* developed by the Institute in practical sessions of batches of about 22 students:

Sr	Title of Practical Exercise	Skills / Competencies to be developed	Course	
No.	The of Tractical Exercise	Skins / Competencies to be developed	Outcome	
1.	Characteristics of Communication	Analysis of communication process	CCF202-1	
	Process			
2.	My Communication Barriers	Self analysis	CCF202-1	
3.	Verbal Communication : Vocabulary	Improvement in vocabulary	CCF202-2 &3	
4.	Oral Communication : Prepared	Preparing and delivery	CCF202-2	
	Speech			
5.	Oral Communication : Extempore	Creative thinking and speaking	CCF202-2	
	Speech			
6.	Oral Communication : Conversation	Listening, thinking and speaking	CCF202-2	
7.	Oral Communication : Group	Listening, thinking and convincing	CCF202-2	
	Discussion			
8.	Oral Communication : Group Debate	Listening, thinking and convincing	CCF202-2	
9.	Written Communication : Drafting	Drafting	CCF202-3	
	Skills			
10.	Written Communication : Writing	Drafting	CCF202-3	
	formal and Informal Letters			
11.	Written Communication : Writing	Drafting with comprehension	CCF202-3	
	Reports			
12.	Written Communication : Writing	Drafting	CCF202-3	
	Scripts			
13.	Non-verbal Communication : Graphic	Graphic skills	CCF202-4	
	Communication			
14.	Non-verbal Communication : Body	Body language	CCF202-4	
	Language			
15.	Using Presentation Aids	Using presentation aids	CCF202-5	
16.	Interview Techniques	Facing interview	CCF202-6	

## I. INDUSTRIAL EXPOSURE:

(Included in Workbook on Communication Skills)

SN	Mode of Exposure	Торіс
1.	Oral and Written Communication Exercises	Industrial situations
2.	Recitation Exercises	Articles on industrial scenario and issues
3.	Interview Techniques Exercises	Industrial situations

## ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

## • Assessment Criteria for Term work :

## i) Continuous Assessment of Practical Assignments:

Every practical assignment shall be assessed for 25 marks as per criteria given in *Workbook on Communication Skills*.

Domain	Particulars	Marks out of 25	
Cognitivo	Understanding	02	
Cognitive	Application	02	
Developmenter	Presentation Skills	04	
Psychomotor	Drafting skills	05	
Affective	Discipline and punctuality	06	
Allective	Decency	06	
	TOTAL		

## ii) Progressive Skill Test:

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given in *Workbook on Communication Skills* 

Final marks of termwork shall be awarded as per Assessment Pro-forma II.

## • Assessment Criteria for Term-end Practical Examination:

*Term-end Practical Examination* shall be conducted by internal examiner (course teacher) and external examiner (course teacher of different class from the Institute) as per the following criteria

Item >	Oral	Speech	Body Language	Language Grammar	Letter Writing	Total	Marks out of
Marks >	20	20	20	20	20	100	25

#### **INSTRUCTIONAL STRATEGIES:**

#### Instructional Methods:

- 1. Lectures cum Demonstrations
- 2. Classroom practices

#### **Teaching and Learning resources:**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Item Bank

## **REFERENCE MATERIAL :**

## a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	K. Sudhesh	Development of Generic Skills	Nandu Printers & Pub, M'bai
2.	B.V.Pathak	Communication Skills	NiraliPrakashan
3.	Burgoon Michael	Human Communication	SAGE Publications Inc.
4.	Geofrey Leech and Jansvartvik	A communicative Grammar of English	Pearson Education ESL
5.	Elizabeth Hiemey	101 ways to better communication	PustakMahal
6.	Thomas Huckin and Leslie	Technical Writing and Professional Communication	McGraww Hill College Division

#### b) Websites

- i) www.clrp.cornell.edu/workshops/pdf/communication\_skills-web.pdf
- ii) http://depssa.ignou.ac.in/wiki/images/c/ca/Communication\_skills\_in\_English.pdf www
- iii) http://www.cgg.gov.in/Handbook%20on%20Communication%20Skills.pdf
- iv) http://www.stf-media.com/31-0-Presentations.html

\* \* \*

#### COURSE ID :

Course Name	: PROFESSIONAL PRACTICES
Course Code	: CCF203
Course Abbreviation	: FPRP

#### **TEACHING AND EVALUATION SCHEME:**

Pre-requisite Course(s) : <nil >

**Teaching Scheme:** 

Scheme component	Hours / week	Credits
Theory	01	03
Practical	02	

#### **Evaluation Scheme:**

Mode of	Progre	ssive Assessment	Te	Total		
Evaluation	Theory	Practical	Theory	TW	OR	
Detailsof Evaluation	- Nil -	One mid-semester Skill Test(2 hrs) * of 25 marks	- Nil -	As per proforma V	Oral Exam	
Marks	- Nil -		- Nil -	25	50*	75

\*\* Practical Examination to be conducted by internal examiner (course teacher) and external examiner (course teacher of different classfrom the Institute) and marks to be entered as per Proforma V.

#### **RATIONALE:**

The course *Professional Skills* is in continuation of the courses *Generic Skills* and *Communication Skills* studied in semesterI and II respectively. In order to be a successful technician in industry, a diploma holder is required to acquire certain professional skills. These skills shall be studied in this course. An overview and awareness about the world of industry has been provided in Chapter 1. Professional skills like leadership skills, team building, stress and conflict management, time management have been dealt with. Aptitude tests have been introduced. A study of major technological projects in the respective programme discipline has been included in the syllabus. Term work assignments of the course provide the student on-field activities as well as self-learning activities providing professional exposure in order to help develop professional skills.

#### COMPETENCY :

Apply principles of organizational behavioral science for professional skills as follows:

**Cognitive** :Understanding and applying principles of effective technical communication.

Psychomotor :i) Speaking skills ii) writing skills iii) Body language skills

Affective :Attitude of i) precision ii) accuracy iii) punctuality iv) aesthetic presentation

#### **COURSE OUTCOMES :**

CCF203-1 Develop awareness about industrial scenario of world and India

CCF203-2 Develop professional skills like leadership, stress and conflict management, team

building skills

CCF203-3 Develop awareness about major industrial projects and biographies of great

industrial personalities

#### COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

					Program	me Outco	mes POs a	and PSOs					
Competency and COs	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long learning	PSO1 Plan and Design	PSO2 Constr uction and Mainte nance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply professional skills to learn to achieve refinement in overall development of personality as follows:	2	2	3	-	1	-	2	2	2	3	1	1	3
CCF203-1Develop awareness about industrial scenario of world and India	2	2	1	-	2	-	-	2	2	2	1	:	1
<b>CCF203-2</b> Develop professional skills like leadership, stress and conflict management, team building skills	2	2	2	-	2	1	1	2	2	2	1	1	2

					Duesaus								
	Programme Outcomes POS and PSOS												
Competency and COs	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long learning	PSO1 Plan and Design	PSO2 Constr uction and Mainte nance	PSO3 Proble m Solving on field
<b>CCF203-3</b> Develop awareness about major industrial projects and biographies of great industrial personalities	2	2	2	-	1	1	2	2	2	3	1	1	1

## J.THEORY :

Sr.	Topics / Sub-topics	Lectures					
140.							
Cour	se Outcomes CCF203-1 Industrial Development of India						
1	<ul> <li>Industrial Development of India</li> <li>1.4 Introduction to industrial revolution in the world</li> <li>1.5 Brief history of industry in India</li> <li>1.6 Broad categories of industries : Manufacturing industry, service industry</li> <li>1.7 Present industrial scenario of India : Small scale, medium scale and major industries in the programme discipline</li> <li>1.8 Major issues related to industrialization</li> </ul>	04					
Cour 2	se Outcomes CCF203-2 Profession and Professional Skills Profession and Professional Skills	06					
	2.1 Difference in profession, occupation, business						
	2.2 Leadership : definition, styles and skills						

	2.3 Team Building : Types of teams. Characteristics of good	
	team and effective teamwork	
	2.4 Conflict management : Definition and causes of conflict.	
	Methods of resolution - negotiating, compromising,	
	withdrawal, forcing, engagement	
	2.5 Self SWOT analysis as a professional technician	
	2.6 Aptitude test	
	2.7 Emotion Management and Interpersonal Skills : Use of yogic	
	processes like yogasanas, yognidra, breathing exercises and	
	pranayam, omkar, meditation for effective handling of emotions	
	and interpersonal relations	
Cours	e Outcomes CCF203-3 Industrial Personalities and Major Projects	
3	Industrial Personalities and Major Projects	06
	3.1 Pioneers of Industrial development of India : Brief biography of Sir	
	3.2 Biography and contribution of two great industrial personalities	
	from programme discipline 3.3 Study of 5 major technological projects in the programme discipline	
	TOTAL	16

## **TERM WORK**

## Practical Exercises and related skills to be developed:

The term work shall consist of a journal containing write ups by students on the following assignments conducted in practical sessions of batches of about 22 students :

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcomes
1	Information Search through internet on Industrial Scenario of India	Information search and interpretation skills	CCF203-1
2	Information Search through actual visit to MIDCs on classification of industries	Information search and interpretation skills	CCF203-1
3	Biography and contribution of Sir M. Visverayya and J.R.D.Tata	Information search and presentation skills	CCF203-3
4	Biography and contribution of two eminent	Information search and	CCF203-3

	industrialists from programme discipline	presentation skills	
5	Individual SWOT analysis as a professional	Self-analysis skills	CCF203-2
	technician		
6	Leadership	Leadership skills	CCF203-2
7	Stress and Conflict Management	Stress and conflict management skills	CCF203-2
8	Aptitude test	Self-testing skills	CCF203-2
9	Case study of a major technological project in	Case study skills	CCF203-3
	the programme discipline		
10	Breathing exercises, pranayam, omkar	Attaining calmness of mind and balance of	CCF203-2
	chanting and meditation	emotions	

## C. INDUSTRIAL EXPOSURE:

(Included in he contents of Theory and Term work

SN	Mode of Exposure	Торіс
1.	Theory inputs and practical survey	TW Exercise No. 1 and 2
2.	Study of biographies of industrialists	TW Exercise No. 3 and 4
3.	Case study of major industrial project	TW Exercise No. 9

## ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

## • Assessment Criteria for Term work :

## i) Continuous Assessment of Practical Assignments:

Everypractical assignment shall be assessed for 25 marks

## ii) Progressive Skill Test:

One mid-term *Progressive Skill Test* of 25 marks shall be conducted. Final marks of termwork shall be awarded as per *Assessment Pro-forma V* 

## • Term End Oral Examination :

*Term-end Oral Examination* shall be conducted by internal examiner (course teacher) and external examiner (course teacher of different class from the Institute).

## **INSTRUCTIONAL STRATEGIES:**

#### **Instructional Methods:**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

## Teaching and Learning resources:

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations

## **REFERENCE MATERIAL :**

## a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	EH McGrath, SJ	Basic Managerial Skills for all	McGraw Hill
2.	Prakashlyer	The Secret of Leadership : Stories to Awaken, Inspire and Unleash the Leader Within	

## b) Websites

i) en.wikipedia.org/wiki/Leadership

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# **CURRICULUM CONTENTS OF LEVEL – III**

# **BASIC TECHNOLOGY COURSES**

## COURSE ID :CE

Course Name	: APPLIED MATHEMATICS
Course Code	: CEF301
Course Abbreviation	: FAMT

**TEACHING AND EVALUATION SCHEME :** 

Pre-requisite Course(s) : CCF105, CCF106

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	03	04
Practical	01	

#### **Evaluation Scheme :**

	Progressive Asses	Terr	Total		
Component	Theory	Tutorials	Theory	Practical	
Details and Duration	Average of two tests of 20 marks each	As mentioned in the syllabus	Term End Theory Exam (03 hours)	NIL	
Marks	20		80		100

#### **RATIONALE:**

Mathematics is an important pre-requisite for the development and understanding of engineering and technological concepts. For an engineer and technologist, knowledge of Mathematics is an effective tool to pursue and to master the applications in the engineering and technological fields. Applied mathematics is designed for its applications in engineering and technology. It includes integration, differential equation,. The connection between applied mathematics and its applications in real life can be understood and appreciated. Integral calculus helps in finding the area, mean value R. M. S value etc . Differential equation is used in finding curve, rectilinear motion. Statistics and probability will help a student to analyze data of large volume in their higher studies.The fundamentals of these topics are directly useful in understanding engineering applications in various fields.

## **COMPETENCY**:

The course should be taught and implemented with the aim to develop the course outcomes (CO's) for the student to acquire the competency needed to apply the mathematical techniques for engineering subjects.

1. Cognitive: understanding and applying principles of mathematics to engineering problems

2. Psychomotor: To prepare charts displaying the area of irregular shapes using the concept of integration, prepare charts to displaying grouped and ungrouped data

3. Attitude: discipline, consistency, hard work , to concentrate ,accuracy,punctuality, aesthetics

## COURSE OUTCOMES(CO's)

**CEF301.1** Apply the concept of integration to find the area ,Mean value and Root Mean Square values.

**CEF301.**2 Solve Differential equation of first order and first degree by various methods.

**CEF301.**3 Calculate Mean Deviation and apply the concept of Coefficient of Variance (C.V.) to compare twosets of data.

**CEF301.**4 Solve problems on Probability using addition theorem.

## COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

					Program	me Outco	mes POs a	and PSOs					
Competency and COs	PO 1 Basic knowledg e	PO 2 Discipline knowledge	PO 3 Experime nts and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life-long learning	PSO1 Plan and Design	PSO2 Constructio n and Maintenan ce	PSO3 Probl em Solvi ng on
Competency: to apply the mathematical techniques for engineering	3	2	3	2	-	-	1	2	1	3	2	1	1
CEF301.1 Apply the concept of integration to find the area ,Mean value and Root Mean Square values	3	2	2	-	-	-	1	1	1	3	2	1	1
<b>CEF301.</b> 2 Solve Differential equation of first order and first degree by various methods	3	2	3	-	-	-	1	1	1	3	1	1	1

<b>CEF301.</b> 3													
Calculate Mean													
Deviation and	2	2	2	1	2		1	2	2	2	2	2	1
apply the concept	5	2	5	1	2	-	1	2	5	5	5	2	T
of Coefficient of													
Variance (C.V.) to													
compare two sets													
CEF301.4 Solve													
problems on								-					1
Probability using	3	2	2	1	2	-	1	2	2	3	3	2	
addition theorem													

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

## CONTENT :

1)THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)				
CEF30	<b>01.1</b> Apply the concept of integration to find the area ,Mean va	alue and Roo	ot Mean Square				
value	S		1				
1	Indefinite Integrals	12	20				
	<ol> <li>Definition, Standard formulae</li> <li>Rules of Integration(without proof), Examples</li> <li>Integration by substitution, Integration of Trigonometric functions</li> <li>Integration by parts,</li> <li>Integration by partial fractions</li> </ol>						
CEF30	<b>CEF301.1</b> Apply the concept of integration to find the area ,Mean value and Root Mean Square						
value	S	1	1				
2	Definite Integrals	06	10				
	<ul><li>2.1 Definition, Examples</li><li>2.2 Properties of Definite Integration (without proof), Examples based on properties</li></ul>						
CEF30	<b>01.</b> 1 Apply the concept of integration to find the area ,Mean va	lue and Roo	t Mean Square				
value	S						
3	Application of Integration 3.1 Area under the curve and 3.2 Area between two curves 3.3 Mean value & R.M.S. value of a function	06	10				
	Total	24	40				

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)					
<b>CEF301.1</b> Apply the concept of integration to find the area ,Mean value and Root Mean Square values								
<b>1</b> .Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.								
<b>2</b> . In e	<b>2</b> . In each topic, corresponding applications will be explained.							

## Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
<b>CEF301.</b> 2	Solve Differential equation of first order and first degree by va	rious metho	ods
4	Differential equations	10	16
	4.1 Definition of differential equation		
	4.2 Order & degree of Differential equations		
	4.3 Solutions of Differential equations of first order & first degree of following types		
	<ul><li>4.3.1 Variables separable</li><li>4.3.2 Homogenous Equation</li><li>4.3.3 Exact equations</li></ul>		
	4.3.4 Linear Equations		
CEF301.3 compare	Calculate Mean Deviation and apply the concept of Coeffic two sets of data	ient of Vari	ance (C.V.) to
5	<b>Statistics -Measures of dispersion</b> 5.1 Mean deviation about MEAN 5.2 Standard deviation 5.3 Standard deviation by Step deviation Method 5.4 Coefficient of Variance (C.V.) 5.6 Comparison of two sets by finding C.V.	10	16
<b>CEF301.</b> 4	Solve problems on Probability using addition theorem		
6	<b>Probability</b> 6.1 Mathematical definition of Probability of any Event 6.2 Addition Theorem of Probability 6.3 Examples	04	08

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)						
<b>CEF301.</b> 2	<b>CEF301.2</b> Solve Differential equation of first order and first degree by various methods								
	Total	24	40						
1.Semest one and the above	1.Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.								
<b>2</b> .In each	topic corresponding applications will be explained								

## Specification table for setting question paper for semester end theory examination:

		Distribu	tion of marks (lev	Course	Total	
Topic No.	Name of topic	Distribu				Marks
		Remember	Comprehension	Application		
1	Indefinite Integrals	4	6	10	CEF301.1	20
2	Definite Integrals	2	2	6	CEF301.1	10
3	Application of Integration			10	CEF301.1	10
4	Differential equations	2	4	10	CEF301.2	16
5	Statistics	2	4	10	CEF301.3	16
6	Probability	1	4	3	CEF301.4	8

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

## C) TUTORIALS

Note: Tutorials are to be used to get enough practice [One batch for 20 Students ]

Sr No.	Торіс	Tutorial Content (10 problems in each tutorial)	Course Outcome
1	Indefinite Integrals	To evaluate Integration using standard formulae, To evaluate Integration using Substitution Method	CEF301.1
2	Indefinite Integrals	To evaluate Integration of Various forms.	CEF301.1
3	Indefinite Integrals	To evaluate Integration using by Parts rule and Partial fraction method	CEF301.1
4	Definite Integrals	To evaluate Define Integration for various forms and using properties.	CEF301.1

5	Application of Integration	Apply Integration concepts to find Area ,Mean value, RMS value	CEF301.1
6	Differential equations	To determine Order and Degree of D.E Examples on V.S. form, Homogeneous form	CEF301.2
7	Differential equations	Examples on Linear of D.E and Exact D.E.	CEF301.2
8	Statistics	Examples on Mean Deviation and standard deviation	CEF301.3
9	Statistics	Examples on standard deviation by step deviation method and C.V.	CEF301.3
10	Probability	Examples on Addition theorem	CEF301.4

## **INSTRUCTION STRATEGIES :**

## Instructional Methods:

- 1. Lectures and Demonstrations
- 2. Tutorials

#### **Teaching and Learning resources:**

- 1. Chalk board
- 2. Item Bank
- 3.Charts

## **REFERENCE MATERIAL:**

a) Books:

Sr. No.	Author	Title	Publisher		
1.	G.V. Kumbhojkar	Engineering Mathematics III	PhadakePrakashan, Kolhapur		
2.	Patel, Rawal,	Applied Mathematics	NiraliPrakashan,Pune		
3.	P.M.Patil and others	Applied Mathematics	Vision Publication, Pune		
4.	Sameer Shah	Applied Mathematics	Tech-Max Publication, Pune		
5.	P.N.Wartikar	Applied mathematics	Pune vidyarthiGriha Prakashan , pune		
6	H.K.Dass	Higher engineering mathematics	S .Chand publication		
7	B.S.Grewal	Higher engineering Mathematics	Khanna publication, New Delhi		

b) Website i) <u>www.khanacademy.org</u>

- ii) www.easycalculation.com
- iii) <u>www.math-magic.com</u>

Course Name	: BUILDING CONSTRUCTION
Course Code	: CEF 302
Course Abbreviation	: FBCO

## **TEACHING AND EVALUATION SCHEME :**

## Pre-requisite Course(s) : <nil >

#### **Teaching Scheme :**

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

**Evaluation Scheme:** 

Mode of	Progressive	Assessment	Se	Total		
Evaluation	Theory	Practical	Theory	TW	OR	
Duration	Two tests (1hour each)	One Skill Test of 2 hrs	One paper (3 hours)	As per Pro- forma VI	As per Pro- forma IV	
Marks	20 each		80	50*	25**	175

\* Assessment as per Pro-forma IV for OR, Pro-forma VI for TW

## **RATIONALE :**

Civil Engineering is a discipline that deals with the use of various resources on the earth for the benefit of mankind. As a civil engineer is mainly concerned with the construction of building. It is essential for him to acquire good knowledge of properties of construction materials and construction of various components of a building.

This subject is a very basic to a civil engineer and therefore it is essential to treat this subject in an integrated manner.

#### COMPETENCY

Apply principles of construction engineering to solve construction problems as follows.

**Cognitive** :Understanding and applying principles of construction engineering to engineering problems.

Psychomotor :i) Transfering lay out plan ii) Handling plumb-bob, Tube level and transferring levels.

Affective :Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

vi) hygiene vii) civic sense

#### **COURSE OUTCOMES :**

**CEF302-1**Decide the type of structures and materials required for construction.

**CEF302-2**Drawing and deciding types of foundation.

**CEF302-3**Plan the type of stone and brick masonary.

CEF302-4Decide the type of doors and windows.

**CEF302-5**Deciding and sketching types of stair case.

**CEF302-6** Selecting flooring finishes and roof coverings.

**CEF302-7**Decide finishing materials

CEF302-8Decide type of formwork and special treatment to the buildings

## COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels :1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic kno wled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long learning	PSO1 Plan and Design	PSO2 Construc tion and Mainten ance	PSO3 Probl em Solvi ng on field
Competency:Applyprinciplesofconstructionengineeringtosolveconstructionproblemsas follows.	3	3	3	2	2	3	-	1	1	2	3	3	
<b>CEF302-1</b> Decide the type of structures and materials required for construction.	3	3	-	-	3	3	-	1	1	2	2	2	
<b>CEF302-2</b> Drawing and deciding typesoffoundation.	3	3	3	2	3	2	-	1	1	2	2	2	
<b>CEF302-3</b> Plan the type of stone and brick masonary	3	3	3	3	3	3	-	1	2	2	2	2	
<b>CEF302-4</b> Decide the type of doors and windows.	3	3	3	3	2	3	-	1	1	2	2	2	
<b>CEF302-5</b> Deciding and sketching types of stair case	3	3	1	1	3	3	2	1	1	2	2	2	
<b>CEF302-6</b> Selecting flooring finishes and roofcoverings	2	2	1	3	2	3	3	1	1	3	2		
<b>CEF302-7</b> Decide finishing materials	2	2	2	3	2	2	-	1	2	2	2	3	
<b>CEF302-8</b> Decide type of formwork and special treatment to the buildings	2	2	1	1	2	2	3	1	1	2	2	2	

## **CONTENT : THEORY**

Section – I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Cours	e Outcome- CEF302-1Decide the type of structures and materials	required fo	r construction.
1	Building components and materials	10	10
	<ul> <li>1.1 Types of structures : load bearing structure, framed structure and composite structure</li> <li>1.2 Building components and their functions: a) sub structure: foundation and plinth b) super structure: wall, sill, lintel, chejja, arches, windows, doors, floors, roof, beam and columns, parapet, etc.</li> <li>1.3 Masonry materials : a) building stones : classification of rocks, requirements of good building stone b) bricks : conventional bricks, standard bricks, composition of clay bricks, testing of bricks, fly ash bricks and hollow blocks c) mortars : lime mortar, cement mortar, special mortars, function, properties and tests on mortar d) timber and timber based materials : uses of timber, characteristics of good timber, defects in timber, plywood, partical board, veneer, sun mica, fore mica and artificial timber e) miscellaneous materials : glass, plastic, fibers, aluminum, steel, GI, PVC, CPVC and artificial sand</li> </ul>		
	Course Outcome- CEF302-2 Drawing and deciding types of foun	dation	
2.	<ul> <li>Construction of sub-structure</li> <li>2.1 Job-layout: site clearance, preparation of layout plan, transferring layout plan for framed structure on ground, precautions while making layout on ground.</li> <li>2.2 Earthwork : excavation for foundation, timbering and strutting for foundation trench, tools and plants used for excavation</li> <li>2.3 Foundations : definition, purpose, requirements of good foundation, types of shallow foundations, types of deep foundations : functions and Sketches</li> <li>2.4 Precautions to be taken while constructing foundation in black cotton soils.</li> </ul>	09	12

Course Outcome- CEF302-3Plan the type of stone and brick masonary.							
3	Construction of super-structure	09	12				
	<ul> <li>3.1 Stone masonry: terms used in stone masonry, classification of stone masonry, tools used for stone masonry, requirements of good stone masonry.</li> <li>3.2 Brick masonry : terms used, requirements of good brick-work, bonds in bricks : English bond, Flemish bond, stretcher bond and header bonds, tools used for brick masonry</li> <li>3.3 Comparison between stone masonry and brick masonry</li> <li>3.4 Hollow concrete block masonry and composite masonry</li> <li>3.5 Scaffolding: purpose, component parts and types of scaffolding and their suitability.</li> </ul>	DWS.					
		W3.					
4	<ul> <li>Doors and windows</li> <li>4.1 Different sizes of doors for residential and public buildings. Types of doors – battened doors, paneled doors, flush doors, collapsible doors, rolling, shutters, revolving doors, glazed doors, components of each door and their suitability.</li> <li>4.2 Various types of windows : glazed, steel, aluminum-sliding window, louvered window, ventilators, cement grills and their suitability</li> <li>4.3 Fixtures and fastening for doors, windows and ventilators, protective treatment for doors and windows.</li> </ul>	04	06				
Total	32	40	)				
Semes	ter end exam question paper should be such that total marks	of question	s on each topic				
is one	and half times the marks allotted above but the candidates are	e able to att	empt questions				
of the	above allotted marks only.						

#### Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)					
Cours	e Outcome - CEF302-5 Deciding and sketching types of stair case.							
5	Vertical Communication	06	08					
Cours	<ul> <li>5.1 Means of vertical communication : stairs, lift or elevator, escalator, ramp, sketches and suitability of each</li> <li>5.2 Terms used in staircase, requirements of good staircase, thumb rule for deciding rise, tread combination, types of stairs: straight, dog-legged stair, bifurcated stair, circular stair, suitability of each stairs.</li> <li>5.3 Details of a RCC simply supported stair and fabricated stair</li> <li>e Outcome - CEF302-6 Selecting flooring finishes and roof covering the stair set of the stair set of</li></ul>	ngs.						
6	<ul> <li>Floors And Roofs</li> <li>6.1 Types of floor finishes: Shahabad, kota, marble, granite, kadappa, ceramic, vitrified, marbonite and latest materials available in the market.</li> <li>6.2 Pavement blocks, concrete floors, tremix floors, skirting and dado.</li> <li>6.3 Factors affecting the selection of flooring / materials</li> <li>6.4 Mezzanine floors, location and use</li> <li>6.5 Necessity of roofs: Types: pitched &amp; flat , component parts of pitched roof, requirements of good roof</li> <li>6.6 Roof coverings: Mangalore tiles.GI, AC, Fibre&amp;HDP sheets</li> </ul>	08	08					
Cours	e Outcome – CEF302-7 Decide finishing materials							
7	<ul> <li>Finishing works</li> <li>7.1 Plastering : necessity, preconstruction preparation, internal plaster : Neeru finish and POP, external plaster : sponge finish, rough finish, pebble finish and stucco plaster</li> <li>7.2 Pointing : necessity and procedure of pointing</li> <li>7.3 Painting : necessity and surface preparation for white wash, colour wash, oil bound distemper, plastic emulsion, oil paint, cement paint, selection of suitable material</li> </ul>	06	08					
Course	Course Outcome – CEF302-8 Decide type of formwork and special treatment to the buildings							
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8	<ul> <li>Form work, centering and allied process</li> <li>8.1 Necessity, materials used in form work and centering. Form work sketches for column, beam, chejja and stair, stripping time of formwork and centering for beams, columns and slabs etc. requirements of good form-work</li> <li>8.2 Water proofing – necessity and importance, methods of water proofing for RCC slab and WC</li> <li>8.3 Termite proofing – necessity</li> <li>8.4 Re-barring technique – necessity</li> <li>8.5 Causes of cracks in building, repair of cracks, guniting and grouting.</li> </ul>	12	16					
Total	32	40						
Seme	ster end exam question paper should be such that total marks	of question	s on each topic					

is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

#### Specification table for setting question paper for semester end theory examination :

		Distribution o	f marks (Cognitiv		Total	
Topi c No.	Name of topic	Remember	Understand	Applica- tion	Course Outcome	Marks
1	Building components and materials	02	02	06	CEF 302-1	10
2	Construction of sub-structure	02	04	06	CEF 302-2	12
3	Construction of super-structure	02	04	06	CEF 302-3	12
4	Doors and windows	02	02	02	CEF 302-4	06
5	Vertical Communication	02	02	04	CEF 302-5	08
6	Floors And Roofs	02	02	04	CEF 302-6	08
7	Finishing works	02	02	04	CEF 302-7	08
8	Form work, centering and allied process	02	04	10	CEF 302-8	16
	TOTAL	16	22	42		80

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.)

#### **TERM WORK**

#### Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work practical sessions of batches of about 20 students :

Termwork is devided in three parts as below -

A) Field visits.

- B) Market Survey
- C) Plates
- D) Practicals

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
A	<ul> <li>Field visits - <ol> <li>To study brick kiln / stone-quarry, stone crusher</li> <li>To study building components.</li> <li>To study building plumbing details</li> <li>To study water proofing of WC &amp; roof slab.</li> <li>To study plastering / pointing procedure.</li> <li>To study masonry construction work.</li> <li>To study RCC slab casting.</li> <li>To study RCC footing ,beam ,column , chajjah etc. construction</li> <li>To study pile foundations.</li> <li>To study different types of woods and sawing of wood.</li> </ol> </li> </ul>	<ol> <li>Information collection and presentation in form of report</li> <li>Motivation through field exposure</li> </ol>	CEF302- 1toCEF302-8
В	<ul> <li>Market Survey</li> <li>Market survey for types, cost, sizes, specifications etc of following materials.</li> <li>1. Wall tiles, flooring tiles, natural stones like polished granite, marble, kadappa etc.</li> <li>2. Plumbing materials : GI,PVC, APVC, CPVC etc</li> <li>3. Aluminum / structural steel / gas lines etc</li> <li>4. Fixtures and fastening of doors and windows</li> <li>5. Plywood, sunmica, fore-mica etc.</li> </ul>	<ul> <li>9. Self learning ability using</li> <li>10. Plotting and interpreting graphs</li> <li>11. Presentation skills</li> </ul>	CEF302-1 to CEF302-8

<ol> <li>Types of Foundation : Shallow and deep. (2 plates)</li> <li>Cross section of a load- bearing and l (new foundation)</li> </ol>	TO 2-8
and deep. (2 plates) 2. Cross section of a load- bearing well (seep form dation CEF302-	TO 2-8
2. Cross section of a load- Learning and II (new form dation CEF302-	TO 2-8
Leaving and the form form form	2-8
bearing wall from foundation CEE20	2-0
to parapet wall. Also sketch	
of through stone, coping and	
throating (1 plate)	
3. Types of doors & Windows:	
Battened, ledged and braced,	
Solid core flush door, paneled	
door, Louvered window,	
Fully glazed with	
aluminumframe sliding	
window-	
(2 plates)	
4. Different types of stairs :	
Dog-legged stair	
(R.C.C.),Bifurcated stair,	
Circular stair.(1 plate)	
5. Structural steel sections.	
(1 plate)	
6. Details of RCcolumn	
footing.(1 plate)	
7. Ramp, escalator, lift (1 plate)	
8. Form work for beams and	
columns ( 1 plate )	
Practicals	
1. Practice to hold plumb-bob, tube	
level and transferring the levels eg.	
Lintel level for doors and windows.	
2. Setting out a simple residential	
structure)	

#### **INDUSTRIAL EXPOSURE :**

SN	Mode of Exposure	Торіс
1.	Field Visits and market survey.	Every chapter of theory syllabus
2.	Collecting data for assignment work.	Term-work assignment

#### ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

#### • Assessment Criteria for Term work :

#### i) Continuous Assessment of Term Work:

Every practical assignment shall be assessed for 25 marks as per following criteria :

Domain	Particulars	Marks out of 25
Cognitivo	Understanding	02
Cognitive	Particulars     Mail       Understanding     Image: Application       or     Operating Skills       Drawing / drafting skills     Image: Discipline and punctuality       Decency and presentation     Image: Discipline and punctuality       TOTAL     Image: Discipline and punctuality	03
Cognitive     Unders       Applic     Operat       Psychomotor     Drawin       Affective     Discipi	Operating Skills	05
Psychomotor	Drawing / drafting skills	05
Affactive	Discipline and punctuality	05
Allective	Decency and presentation	05
	25	

#### ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted marks awarded in oral mark sheet as per *Assessment Pro-forma IV*.

#### **INSTRUCTIONAL STRATEGIES :**

#### Instructional Methods :

- 1. Lectures cum Demonstrations
- 2. Classroom practices

#### Teaching and Learning resources :

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Question Bank

#### **REFERENCE MATERIAL :**

Books / Journals / IS Codes / Websites

Sr. No.	Author	Title	Publisher
1.	Sushilkumar	Building Construction	PhadkePrakashan
2.	S. C. Rangwala	Building Construction	Khanna Publishers
3.	BindraArrora	Building Construction	C.Jamanadas& Co
4.	B.C.Punmia	Building Construction	SatyaPrakashan
5.	S.K. Sharma	Building Construction	S.Chand& co.

# a)Reference Books:

### b) Recommended Further Readings:

Sr. No.	Author	Title	Publisher
1	Frederick S Merritt & J T Ricketts	Building design & construction handbook	McGRAW- HILL:NewDelhi
2	R Chudley& R Greeno	Building construction handbook(7 <sup>th</sup> EDN)	ELSEVIER

c)Codes of Practice: IS, BIS and international codes:

- 1. National Building code of India 2016(NBC 2016) SP7:2016
- 2. IS 1893:1984 Criteria for Earthquake Resistance Design of Structures
- 3. IS 1893(Part 1):2002 General Provisions & Buildings
- 4. IS 4326:1993 Earthquake Resistance Design & Constructions of Buildings Code of practice
- 5. IS 13828:1993 Earthquake Resistance of Low Strength Masonry Buildings d) Websites:

1. http://en.m.wikipedia.org/wiki/Bureau

2. .www.standardsbis.in>scoperef>SRSP62

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#### COURSE ID :

Course Name	: BUILDING DRAWING
Course Code	: CEF 303
Course Abbreviation	: FBDR

#### **TEACHING AND EVALUATION SCHEME :**

#### Pre-requisite Course(s) : CCF 107, CCF 108

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	02	06
Practical	04	

#### **Evaluation Scheme :**

Mode of	Progressive	Progressive Assessment Term End Examination					
Evaluation	Theory	Practical	Theory	TW	Oral		
Details of Evaluation	Average of Two tests of 20marks each(1 hour 		One paper (3 hours)	As per Proforma VI	Based on TW as per proforma IV		
Marks	20		80	50*	25**	175	

\*( To be assessed by internal examiner ) \*\* (To be assessed by internal and external examiner)

#### **RATIONALE :**

Drawing is basically universal language of Engineers. An engineer must be well conversant with drawing. It is the language through which communication between Owner, Architect, Engineer and Contractor takes place. Through drawings engineer can also communicate with skilled, semiskilled and unskilled labour.

Civil engineering diploma holders have to supervise various construction processes and execute construction works of civil engineering structure. Civil engineer has to convert design parameters, process details in to pictorial views. Therefore he is required to understand and prepare the drawings. He has to interpret the drawings, so that he can execute the work. Civil engineer should be competent to covert his ideas in to the drawing. This helps him to transfer his ideas, thoughts to his subordinates on the site. Drawing makes his job simple and effective. Drawings are also essential for drafting specifications and tender documents .This subject is a core technology subject. The knowledge of this subject is useful for building construction, estimating and costing, design of structures, surveying, project etc. The student has to use this subject to develop ability to read, understand and prepare drawings, to use it for different subjects during diploma course. He will be taught to draw civil engg. Structures and its various parts using conventions and symbols as per BIS-962-1989

#### COMPETENCY

Apply principles of Building Drawing to solve engineering problems as follows.

**Cognitive** :Understanding and applying principles of Building Drawing to engineering problems.

Psychomotor :i) Designing residential building ii) Applying building planning principles

iii) Planning public building

Affective : Attitude of i) accuracy ii) safety iii) aesthetic presentation

iv) hygiene v) civic sense

#### **COURSE OUTCOMES :**

**CEF303-1** Draw different types of lines.

**CEF303-2** Apply building byelaws for planning of building.

**CEF303**-3apply principles of planning for planning and design of building.

CEF303-4 Planning public buildings.

CEF303-5 Prepare presentation drawings

CEF303-6 Design of residential buildings.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

					Pr	ogramme	Outcome	es POs and	l PSOs				
Competency and COs	PO 1 Basic kno wled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long learning	PSO1 Plan and Design	PSO2 Construc tion and Mainten ance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply principles of Building Drawing to solve engineering problems.	3	1	3	3	1	1	-	2	1	3	3	3	-
<b>CEF303-1</b> Draw different types of lines.	3	3	3	-	1	1	-	2	1	3	3	3	-
<b>CEF303-2</b> Apply building byelaws for planning of building.	3	3	3	-	1	1	-	2	1	3	3	3	-
<b>CEF303-3</b> apply principles of planning for planning and design of building.	3	3	3	-	1	1	-	2	1	3	3	3	-
CEF303-4 Planning public buildings.	3	1	1	-	1	1	-	1	1	1	1	1	-
CEF303-5 Prepare presentation drawings	3	3	3	-	1	1	-	2	1	3	3	3	-
CEF303-6 Design of residential buildings.	3	3	3	-	1	1	-	2	1	3	3	3	-

#### **CONTENT : THEORY**

## Section – I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	<i>Course Outcome</i> - <b>CEF303-1</b> Draw different types of lines.		
1	<ul> <li>Introduction <ol> <li>Purpose of drawing, preliminary requirement of good drawing.</li> </ol> </li> <li>Symbols &amp; notations as per IS 962:1989 in civil engineering drawing.</li> <li>Types of lines-visible line, center line, hidden line, section line, dimension line, extension line, pointers, arrow heads or dots, north point. Scales for various types of drawings.</li> <li>Different types of drawings- preliminary drawing, working drawing, location drawing, lay-out plans, site plans and submission drawings.</li> <li>Concept of working drawing and its applications.</li> </ul>	<b>05</b> ng of buildir	<b>08</b> 1g.
2	<ul> <li>Agencies in Building construction work.</li> <li>2.1 Role of different agencies in building construction work <ul> <li>such as Owner, architects, structural engineer, contractor, promoter, quantity surveyor and supervisor, specialist of air conditioning, acoustics, lifts, interior decoration etc.</li> </ul> </li> <li>2.2 Building bye laws - The Municipalities, Corporations published their rules &amp; bye laws regarding building activities. Student is expected to know the following terminology - floor height, building height, building line, control line, set back line, floor area ratio, plinth, plinth area, covered area, built – up-area, floor area, carpet area and super- built-up-area.</li> <li>2.3 Plan sanctions authorities such as gram panchayat, Municipal Corporation, town planning etc.</li> <li>2.3.1 Procedure for submitting plan for sanctioning.</li> <li>2.3.2 List of documents required and number of copies.</li> </ul>	06	08

	Course Outcome-CEF303-3 apply principles of planning for	planning	and design	of	
	building.				
3	Planning of Residential Building –	06	06		
	3.1 Principles of planning of buildings –aspect, prospect,				
	furniture requirement sanitation, privacy, flexibility,				
	•Orientation of Building				
	3.2 Space requirements and norms for various units of				
	residential buildings and public buildings.				
	3.3 Minimum / standard dimensions of various units such as				
	W.C., Bath, Otta height, Plinth height, Window sill				
	A Drawing line plan for residential building				
	3.5 Planning of staircase in available space				
	3.6 Concept of Vastushastra for building planning. (only				
	introduction )				
	Course Outcome -CEF303-4 Planning public buildings.				
4	Planning of public buildings –	04	08		
	4.1 Planning of public building such as school	04			
	building, primary health centre or bosnital				
	building, post office, banks, hostels, canteen,				
	vegetable markets etc. Units required for each type				
	of building with their approximate sizes. grouping				
	of various units with their functional requirements.				
	Course Outcome -CEF303-5 Prepare presentation drawings				
5	Perspective drawings –	04	10		
	5.1 Definition, necessity and principles of perspective				
	drawing.				
	nlane station point vanishing point angle of vision				
	center of vision measure line etc.				
	5.3 Types of perspective such as one point perspective, two				
	point perspective				
	5.4 Concept of one point and two point perspective and its				
	application. (In examination small objects such as steps				
	block, pedestal may be asked to draw one or two point				
15000	10[0]	25	40	nia	
is on	ester end exam question paper should be such that total marks	or question	hle to atter	nnt	
	ions of the above allotted )	ates are a		πρι	

#### Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)			
	Course Outcome - CEF303-6 Design of residential buildings.					
6	<ul> <li>Drawing of residential Building</li> <li>6.1 Detail development of line plan with orientation.</li> <li>6.2 Elevation</li> <li>6.3 Section</li> <li>6.4 Site plan and North direction.</li> <li>6.5 Preparing schedules of doors / windows</li> <li>6.6 Calculation of areas such as plot area, built-up-area, carpet area, floor area, super built-up area, plinth area, F.S.I./F.A.R.</li> <li>6.7 General construction notes, general specifications etc.</li> <li>Note – In examination a small single storied residential building load bearing/ framed structure for development of line plan should be asked.</li> </ul>	07	40			
	Total	07	40			
Seme is on quest	Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.					

# Specification table for setting question paper for semester end theory examination :

Topic No.	Name of topic	Distribution of marks (Cognitive level- wise)			Course	Total
		Remember	Understand	Applica- tion	Outcome	Marks
1	Introduction	04	02	02	CEF303-1	08
2	Agencies in Building construction work.	04	02	02	CEF303-2	08
3	Planning of Residential Building	04		02	CEF303-3	06
4	Planning of public buildings	02	02	04	CEF303-4	08
5	Perspective drawings	03	03	04	CEF303-5	10
6	Drawing of residential Building	10	10	20	CEF303-6	40
TOTAL		27	19	34		80

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.)

# Note – In Section II, line plan of small residential building shall be given & students are asked to prepare the following

1.	Detailed plan	<b>-</b> 10 marks
2.	Front Elevation	- 06 marks
3.	Section (section line shall be given on	line plan) - 12 marks.
4.	Schedule of doors & windows	- 06 marks.
5.	Area statement	- 05 marks.
	North Line	

#### D) TERM WORK

#### FULL IMPERIAL SIZE SHEET (A1) :

**1. Measured Drawing –** of small residential building (single storey) with minimum two rooms, kitchen, sanitary block consisting of plan, Elevation, section, schedule of opening, site plan, construction notes.

#### 2 Reading and interpreting readymade Architectural building drawing -

(Drawing to be procured by student from consulting Engineer/ Architect)

3. Submission drawing, to the scale 1:100, (Sheet no. 3) of single storied Load Bearing

Residential Building (2BHKD) with Flat Roof and staircase showing developed plan,

Elevation, section passing through Stair or W.C. and Bath, site plan (1:200), area

Statement, schedule of openings, construction notes.

4. Submission drawing, to the scale 1:100, of (G+1) Residential Building Framed

Structure (2 BHKD with attached toilet to 1 bedroom showing the position of European

type WC pan) showing developed plan, elevation, section passing through staircase,

site plan (1:200), foundation plan (1:50), area statement, schedule of openings. (Also

Show the place for Washing machine, WHB, Pooja, store, bed, dining table with

chairs, sofa, wardrobe etc.)

5. One and Two Point Perspective Drawing of small objects - steps, monuments, pedestals (any two) scale 1:50

6 Line Plan - Of any four public building on full imperial graph sheet.

#### **E) INDUSTRIAL EXPOSURE :**

#### ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

#### • Assessment Criteria for Term work :

#### i) Continuous Assessment of Term Work:

Every practical assignment shall be assessed for 25 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	02
Cognitive	Application	03
Davishamatan	Operating Skills	05
Psychomotor	Drawing / drafting skills	05
Affactive	Discipline and punctuality	05
Allective	Decency and presentation	05
	25	

#### ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted. **INSTRUCTIONAL STRATEGIES :** 

#### Instructional Methods :

- 1. Lectures cum Demonstrations
- 2. Classroom practices

#### **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Question Bank

#### **REFERENCE MATERIAL :**

# Books / Journals / IS Codes / Websites

Reference			
Books: Sr	AUTHOR	TITLE	PUBLISHER
No			
1.	Building Drawing	Shah, Kale, Patki	Tata Mgraw Hill, New Delhi
2.	Building planning & drawing	N Kumar Swamy A KameswaraRao	Charotar Publishing House, Anand
3.	Building Drawing	M N Gangrade B S Deshmukh, A K Kanitkar	NiraliPrakashan, Pune
4.	Civil Engg. Drawing	Rangwala	Charotar Publishing House, Anand
5.	Civil Engg. Drawing	M. Chakraborti,	By author 21B,Bhabananda rd. Culcutta. 700026.
6.	Planning &Design of Building	Y.S. Sane	Allied book stall Poona-4 And Engg. Book Publisher Co. Pune- 16
7.	The text book of building drawing	S.V. Deodhar	New vrinda publishing house , M.G. Rd. Jalgaon.
8.	Civil Engg. Drawing	R.S. Malik & G.S. Meo	New Asian publisher, NaiSadak New Delhi
9.	Building rules & Bye-laws		Municipal Corporation/ Town Planning /Municipal Council.
10.	IS code of practice for Architectural and building drawing	BIS, New Delhi.	Govt. Publication.

11.	Principles perspective drawing	of	M. G. Shah, C. M. Kale	McGraw Hill

# **IS, BIS And International Codes:**

- SP-41 (S&T) (1987)ISI Hand book of functional requirements of building other than industrial building.
- SP-35(S&T)(1987) ISI Handbook water supply and drainage with special emphasis on plumbing.
- IS 962-1989 code of practice for architectural and building drawing.
- IS 1742-1972 code of practice for building drainage.
- SP-27 1987 (1987) Handbook of method of measurement of building works.
- Data book National building code, CBRI

# b) Websites:

http://www.greenhome.com/sustainable\_architecture.htm

http://www.egaarchitect.com/upclose/vi/week23/vi\_week23.pdf

\* \* \*

#### COURSE ID:

Course Name	: Computer Aided Drawing.
Course Code	: CEF304
Course Abbreviation	: FCAD

#### **TEACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s) : Nil

#### **Teaching scheme:**

Scheme component	Hours/Week	Credits
Theory	-	04
Practical	04	

#### **Evaluation Scheme :**

	Progressive Assessment		T			
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	PR	Total
Details of Evaluation	-	One PST of 25 marks	-	As per Proforma-VI	As per Proforma-V	
Marks	-		-	25*	50*	75

@. No theory end examination

#### Rationale :

Computers are used in each and every sphere of life. Numbers of civil engineering software packages are available and are used in different organizations. For the utilization of these softwares trained persons are required. Hence, the contents are so designed that students undergoing this course can use these packages.

#### COMPETENCY

Apply and use of various commands of Auto CAD to prepare various drawings.

**Cognitive** :Understanding and applying commands available in software to generate various drawings.

Psychomotor : i) drawing - graphic constructions

Affective :Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

#### **COURSE OUTCOMES :**

**CEF304-1** Know different types of latest of software's.

**CEF304-2** Know contents available in CAD pakage.

**CEF304-3** Understand draw and modify commands.

**CEF304-4** Generate submission drawing of residential building

#### COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

					Progr	amme O	utcomes	POs and	PSOs				
Competency and COs	PO 1 Basic knowle dge	PO 2 Discipli ne knowle dge	PO 3 Experi ments and practice	PO 4 Enginee ring Tools	PO 5 The enginee r and society	PO 6 Environ ment and sustain ability	PO 7 Ethics	PO 8 Individ ual and team work:	PO 9 Commu nicatio n	PO 10 Life- long learnin g	PSO1 Plan and Design	PSO2 Constru ction and Mainte nance	PSO3 Proble m Solving on field
Competency: Apply and use of various commands of Auto CAD to prepare various drawings.	3	3	3	2	2	-	-	1	1	1	3	3	
<b>CEF304-1</b> Know different types of latest of software's.	3	2	2	-	2	-	-	-	-	2	2	2	
CEF304-2 Know contents available in CAD pakage.	3	3	3	3	2	-	-	1	1	2	2	2	
CEF304-3 Understand draw and modify commands.	2	3	3	1	1	-	-	1	1	1	3	3	
<b>CEF304-4</b> Generate submission drawing of residential building	3	3	2	2	3	-	-	1	1	2	2	3	

#### **CONTENT : THEORY**

Sr. no.	Topics
Course	Out come- CEF304-1 Know different types of latest of software's.
1	A brief study of latest softwares in Civil Engineering
	Eg. STADD, STADPRO, AUTO CIVIL, 3D MAX, 3D HOMEARCHITECT, STARDYNE, STRUDD, PROENGINEERS, etc.
Course	Out come- CEF304-2 Know contents available in CAD pakage.
2	A brief knowledge about CAD-packages available
	Eg. Auto CAD, Omega designer, P-CAD, Robo CAD, SD max, Felix CAD, Intelli CAD, etc.
Courses	Out come CEE204.2 Understand draw and modify commands
Course	Out come- CEF304-3 Understand draw and modify commands.
3	Auto-CAD package
	<ul> <li>3.1 WCS icon, UCS icon, Co-ordinates, drawing limits, units etc.</li> <li>3.2 Draw commands : line, ray, poly line, SP-line, construction line, rectangle, polygon, ellipse, hatch, circle, arc, etc.</li> <li>3.3 Modify Commands : match property, erase, copy, mirror, offset, move, rotate, scale, stretch, trim, extend, break, join, chamfer, fillet, explode, divide, lengthen etc</li> <li>3.4 Dimension commands : linear, aligned, arc length, ordinate, radius, diameter, centimeter, angular, style etc.</li> <li>3.5 Layers Adding a new layer, Layer on/off, Freeze/Thaw, Lock/Unlock etc. Insert commands : make block, insert block, roster image etc.</li> </ul>
Course	Out come- CEF304-4 Generate submission drawing of residential building
4	Submission drawings
	4.1 Generation of plan of a building (on layers) Generation of detailed plan, elevation, section, site plan, area statement, schedule of doors and windows of a residential building

#### TERM WORK

#### Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work:

Sr	Title of Practical Exercise	Skills / Competencies to be	Course
No.		developed	Outcome
1	Starting Auto CAD and Demonstration of	1. Presentation,	CEF304-1
	auto-CAD commands as mentioned in topic no. 3	2. Motivation through software exposure	and
			CEF304-2
2	Writing the names of the all commands	1. Self learning ability	CEF304-3
	and short keys	2. Time management	
3	Exercise on establishing limits and units of	1. Planning proper space	CEF304-3
	the proposed drawing	2. Choice of proper scale	
4	Exerciser on Use of ortho, grid, snap, Line weight, and osnap, Polar commands	3. Applying concepts studied	CEF304-3
5	Drawing triangles, rectangles, pentagon,	4. Drawing diagrams	
	circle etc using various commands with	5. Time management	CEF304-3
	dimensions	6. Self learning ability	
6	Layers – Drawing line sketch of three rooms residential building on different layers	7. Presentation skills	CEF304-3
7	Hatching an object say brick work stone		
,	masonry, bed concrete, sand filling, grill work etc.		CEF304-3
8	Reducing and increasing the dimension of a rectangular object / room using 'stretch' command		CEF304-3
9	Increasing or decreasing the size of an object using 'scale' command		CEF304-3
10	Calculating the area of the given figure		CEF304-3
11	Drawing the plan of a building showing		CEF304-3
	living room, bedroom, kitchen, WC and		and
	שמוו, אנמוו נמשב בנכ		CEF304-4
12	Drawing elevation and section for T. W. No.		CEF304-3
			and
			CEF304-4

13	Preparing area statement, site plan, schedule of doors and windows etc for T		CEF304-3 and
	W. No. 12		CEF304-4
14	Demonstration and taking printout of serial		CEF304-3
	no. 13		and
			CEF304-4
15	Writing short notes on topic no. 1, 2 and 3	1. Self learning ability	CEF304-1 to
			CEF304-3

Note - Student will submit print-outs of all the practical's and short notes of topic no. 1,2,3

#### ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

#### a) Assessment Criteria for Term work :

#### i) Continuous Assessment of Practical Assignments :

Every	practical	assignment	shall b	be assessed	for 50	marks as	per following	g criteria :
2	1	0					1 (	J

Domain	Particulars	Marks out of 50
Comitivo	Presence and Understanding	05
Cognitive	Application	05
Davahomotor	Operating Skills	10
Psycholilotor	Asychomotor Operating Skills Drawing / drafting skills Discipling and punctuality	10
	Discipline and punctuality	10
Affective	Regular assessment and	10
	presentation	
	TOTAL	50

#### ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* shall be conducted and Final marks of term work shall be awarded as per *Assessment Pro-forma VI*.

#### b) Assessment Criteria for Practicle/Oral Examination:

For conducting the Practical examination, Minimum of 5 examples on various commands is to beasked to perform. *and PR/OR assessment as per Pro-forma V.* 

#### **INSTRUCTIONAL STRATIGES :**

#### **Instructional Methods :**

- 1. Lectures cum demonstrations
- 2. Laboratory practices
- 3. Assignment

# Learning resources :

- 1. Computer
- 2. Computer based training packages.

# 3. Reference books :

Sr.No	AUTHOR	TITLE	PUBLISHER
1.	George Omura, Brian C. Benton	Mastering Auto CAD	SYBEX, U.S.A.
2.	Prof. Sham Tickoo	Auto CAD 2016 for Engineerns and Designers	Dream tech, USA
3.	David Frey	AutoCAD	
4.	RajendraSolkhe	AutoCAD	Aruta Publishers, Chiplun
5.	TickorMaini	Understanding Autocad	

#### COURSE ID:

Course Name	: SOIL MECHANICS AND FOUNDATION ENGINEERING
Course Code	: CEF305
Course Abbreviation	: FSMF

#### **TEACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s) : <nil >

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

#### **Evaluation Scheme :**

	Progressiv	ve Assessment	Term End I	Examination	
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Total
Details of Evaluation	Average of two tests of 20 marks each	i. 25 marks for each practical ii. One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma-III	
Marks	20		80	25	125

# **RATIONALE :**

As all structures ultimately rest on the earth's surface, study of behavior of soils under mechanical forces is important. Understanding the nature of the basic parameters to be considered in the design is more important in Foundation Engineering. This subject deals with study of engineering behavior of soil and foundation.

#### **COMPETENCY :**

Apply principles of soil mechanics to engineering problems as follows :

Cognitive : Understanding and applying principles of soil mechanics to engineering problems

Psychomotor: i) Experimentation skills ii) graphic skills

Affective : Attitude of i) precision ii) accuracy iii) safety iv) punctuality

#### **COURSE OUTCOMES :**

**CEF305-1** State basic properties of soil, classify soil, solve basic problems.

CEF305-2 Explain and solve simple problems on permeability

CEF305-3 Explain soil shear strength, compaction and stabilization

CEF305-4 Explain site investigation and earth pressure

CEF305-5 Explain shallow and deep foundations

CEF305-6 Explain soil support ,protection for foundation and machine foundation.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation

		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basic knowle dge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Problem Solving on field
<b>Competency:</b> Apply principles of soil mechanics to solve engineering problems.	2	3	3	-	-	-	-	1	1	1	1	2	1
<b>CEF305-1</b> State basic properties of soil and classify soilsolve basic problems	2	3	-	-	-	-	-	1	1	2	1	2	1
<b>CEF305-2</b> Explain and solve simple problems on permeability .	2	3	3	-	-	-	-	1	1	2	1	2	1
CEF305-3 Explain soil shear strength, compaction and stabilization	2	3	3	-	-	-	-	1	1	1	1	2	1
<b>CEF305-4</b> Explain site investigation and earthpressure	2	3	2	-	-	-	-	1	1	2	1	2	1
CEF305-5Explain shallow and deep foundations	2	3	2	-	-	-	-	1	1	2	1	2	1

					Pro	ogramme	Outcome	es POs and	l PSOs				
Competency and COs	PO 1 Basic knowle dge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Problem Solving on field
CEF305-6Explain soil support ,protection for foundation and machine foundation	2	3	1	-	-	-	-	1	1	1	1	2	1

# **CONTENT : A) THEORY**

### Section I

Sr. no. Topics			Theory evaluati on
Co	urse Outcome : CEF305-1 State basic properties of soil and classify soil, solve basic prob	lems	Mortz
1.	<ul> <li>Properties of soil and soil classification</li> <li>1.1 Overview of Soil Mechanics Definition of soil. Formation of soil. Importance of soil in civil engineering as construction material and as foundation bed.Field applications of soil mechanics : for foundation design, pavement design, design of earth retaining structures, design of earthen dams</li></ul>	12	04
	<b>1.2 Basic Properties of Soil</b> Composition of Soil : Three phase system, weight		
	relationships, Volume relationship, Void ratio, Porosity,		10
	Inter-relationships, Water content, Degree of saturation, Specific gravity		
	Experimental determination of water content, unit weight, specific gravity		
	Consistency of clay soils, stages of consistency,		
	Atterberg'slimits of consistency, plasticity index,		
	determination of liquid limit, plastic limit, shrinkage limit		
	1.3 Soil Classification		
	Need for soil classification, Criteria for classification, Grain size classification, Classification based on plasticity, Symbols and graphical representation,		
	Mechanical analysis, Particle size distribution curve,		06
	Effective diameter of soil, Uniformity coefficient, Coefficient of curvature		
CEF	305-2 Explain and solve simple problems on permeability and seepage		
2	Permeability, Seepage and Capillarity	04	08
	<ul> <li>2.1 Soil moisture-modes of occurrence. adsorbed water, capillary water, free water,</li> <li>2.2 Flow of water through soil-permeability, Factors affecting permeability, Darcy's law, Determination of permeability – lab test, Values of permeability for different soils.</li> <li>2.3 Capillary phenomenon in soils</li> <li>2.4 Shrinkage and Swelling in soils.</li> <li>2.5 Seepage through earthen structures, seepage forces, phreatic line, flow lines, equi-potential lines, flow net, characteristics of flow net, quick sand application of flow net (no numerical problems)</li> </ul>		

•	Shear Strength of Soil, Soil Compaction and Stabilization	08	
	<b>3.1 Shear strength of soils</b> Concept of shear in soil. Cohesion and Internal friction, Coulomb's theory and failure envelop. Strength equation		0
	Representation of stresses by Mohr's circle.		
	Cohesive, non-cohesive, saturated, partly saturated soil.		
	Factors affecting shear strength.Study of Direct shear test. List of other methods		
	<ul> <li>3.2 Soil Compaction and Stabilization         Compaction phenomenon, Purpose, field application, standard Proctor test, modified proctor test, Compaction curve, factors affecting compaction, Field methods of compaction.         Soil stabilization : definition, Necessity, Introduction to methods of stabilization, CBR test     </li> </ul>		0€
	Total	24	40

# Section II

Sr.	Topics	Teaching	Theory Evaluation
no.	Subtopics	(Hours)	Marks
Co			
	Site investigation and Earth Pressure	06	
4	4.1 Site Investigation :		
	Necessity of site investigation, Methods such as Trial pit, Borings, Geophysical, Criteria for deciding location and number of pite and bores, Soil sampling, disturbed and undisturbed samples		06
	4.2 Earth Pressure		
	Lateral earth pressure, Rankine's theory, Coulomb's wedge theory Concept of earth pressure. Types of earth retaining		04
	structures, stability considerations.		
C	ourse Outcome : CEF305-5 Explain shallow and deep foundations		
5	Foundations	11	
	5.1 Shallow Foundations		12
	Shallow foundation types – spread, strap, combined, raft.		
	Pressure distribution beneath rigid footing.		
	Concept of bearing capacity, Ultimate, Safe, Allowable bearing capacity.		
	Bearing capacity concept & equation (IS), (No derivation and problems), effect of water table		
	Presumptive bearing capacity values of different types of soils.		
	Plate load test, Standard penetration test.		
	Foundation settlement, permissible settlement		
	Factors deciding depth of foundation, Foundation on sloping ground		
	<b>5.2 Deep Foundations</b> Use and classification of piles, Under-reamed piles, pile cap		06
	Well foundation – type, Caissons		
	Introduction to Pier foundations		
l			
Corr	ngo Outoomo CEE205 6 Evaloin goil gunnout anotostica for formulation 9 itia	formdat	

6 Soil support and Protection for foundation & machine foundation	07				
<ul> <li>6.1 Soil support and Protection for foundation Soil support methods while excavation, sheet piles, Soldiers and Lagging, struts, Rackers, Tiebacks, Diaphragm walls Cofferdam types, Dewatering methods Effect of ground chemicals, sea action on concrete, industrial waste, corrosion of reinforcement, Protection of foundation</li></ul>		08			
6.2 Machine Foundations					
Types of Machine Foundations. Requirements of machine Foundations. Vibration Isolation		04			
Total	24	40			
Semester end exam question paper should be such that total marks of questions on each topic is one and half					

#### Specification table for setting question paper for semester end theory examination

To	Name of tonia	Distribution of marks (cognitive level wise)			Total
No.	Ivanie of topic	Remember	Understand	Apply	Marks
1	Properties of soil ,soil classification	04	08	08	20
2.	Permeability, Seepage and Capillarity	02	02	04	08
3.	Shear Strength of Soil, Soil Compaction and Stabilization	02	04	06	12
4.	Site investigation and Earth Pressure	02	04	04	10
5.	Foundations	02	08	08	18
6.	Soil support ,Protection for foundation & machine foundation	02	04	06	12
	Total	14	30	36	80

#### **B. TERM WORK :**

Laboratory Manual on Soil Mechanics developed by the Institute shall be used for term work.

Term work shall consist of the following laboratory experiments:

a	Laboratory Experiments ( any Eight)		
Sr. No.	Experiment	Skills / Competencies to be developed	Course outcomes
<ol> <li>1.</li> <li>2.</li> <li>3.</li> <li>4.</li> <li>5.</li> </ol>	Determination of water content by oven drying method Determination of specific gravity by pycnometer method. Mechanical analysis of soil Determination of liquid limit and plastic limit. Determination of field unit weight by core cutter method. Determination of field unit weight by sand replacement method.	<ol> <li>Follow Iscode procedure for tests.</li> <li>Studying equipment.</li> <li>Understanding test procedure</li> <li>Accuracy in taking observation.</li> <li>Reinforcement of Concepts.</li> <li>6Performing calculation and plotting graphs from</li> </ol>	CEF305-1
01	Determination of soil permeability by lab test	observation 7.Interpreting test results.	CEF305-2
7. 8.	Determination of OMC and MDD by standard Proctor test	8.Classifying materials as per IS standards.	CEF305-3
	Demonstration through video film of Direct shear test / CBR test / Foundation excavation / Coffer dams.	9.Finding quality of material	CEF305-3 CEF305-6
9.			

b.	Micro Projects	Skills / Competencies to be developed	course outcome
1	Field based activities:	Ability to relete theory that they learnt & applied them practically	CEF305-3
	Preparation of Site visit report on shallow or deep foundation/ earthen dam		CEF305-5
2	Software based exercises : As mentioned in <i>Laboratory Manual on</i> <i>Soil Mechanics</i> developed bythe Institute	Ability to integrate the knowledge & to solve problem	CEF305-1

#### C. INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Topics of theory syllabus
2.	Field examples of course application	Term-work assignments

#### ASSESSMENT CRITERIA FOR TERM WORK :

#### • Assessment Criteria for Term work :

#### i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per criteria given in *Laboratory Manual for Soil Mechanics*.

#### ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given in *Laboratory Manual for Soil Mechanics*.

#### **IMPLEMENTATION STRATEGY:**

#### Instructional Strategies :Lecture cum discussion

- 1. Laboratory experience
- 2. Regular home assignments.
- 3. Field visit

#### **Teaching and Learning Resources :**

- 1. Chalk & Black-board
- 2. Audio-visual aids
- 3. Laboratory manual
- 4. QuestionBank.

#### **Reference Books :**

Sr.	AUTHOR	TITLE	PUBLISHER
No.			
1.	Gopal Ranjan & A.S.R. Rao	Basic and Applied Soil Mechanics	New Age International Publisher
2.	C. Venkatramaiah	Geotechnical Engineering	New Age International Publisher
3.	B.C.Punmia	Soil Mechanics	C.Jamanadas & Co
4.	Dr. S. B. Sehgal	Soil Mechanics	CBS Publisher & Distributor
5.	P. C. Varghese	Foundation Engineering	Prentice –Hall of India
Recom	mendedFurtherReadings		
6.	N. V. Nayak	Foundation Design Manual	Dhanpat Rai Publications
7.	Wayne C. Teng	Foundation Design	
8.	Shashi Gulhati & Manoj Datta	Geotechnical Engineering	Tata Mcgraw-Hill

#### Websites :

*i)* http://www.waterresources.rajasthan.gov.in/6guidelines\_soil\_prop.asp

- ii) http://www.youtube.com/watch?v=8mdSmB3CtZM
- iii) http://www.youtube.com/watch?v=6pjladw\_0a4

\* \* \*

#### **COURSE ID:**

Course Name	: HYDRAULICS	
<b>Course Code</b>	: CEF306	
<b>Course Abbreviation</b>	: FHYD	
TEACHING AND EVALUATIO	N SCHEME :	

Pre-requisite Course(s) : CCF 110

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

#### **Evaluation Scheme :**

Mode of	Progressive Assessment		Term End Examination			Total
Evaluation	Theory	Practical	Theory	TW	Oral	
Details of Evaluation	Average of Two tests of 20marks each(1 hour duration each)	<ul><li>1.25 marks for each practical</li><li>2.One Progressive Skill Test of</li><li>25 marks</li></ul>	One paper (3 hours)	As per Proforma VI	Based on TW as per proforma IV	
Marks	20	25	80	25*	25**	150

\*(To be assessed by internal examiner) \*\* (To be assessed by internal and external examiner)

#### **RATIONALE :**

Hydraulics is a branch of engineering science deals with behavior of fluids at rest as well as in motion. Physical properties of water will play an important role in the water retaining structures like tanks, barrages, dams & water conveyance structures like pipes, open channels, canals. The empirical formulae developed in hydrostatics have found useful application in several problems. The measurement of flow of water in pipes and canals are useful in water supply system and assessment of water in irrigation field.

#### COMPETENCY

Apply principles of Hydraulics to solve engineering problems as follows.

Cognitive :Understanding and applying principles of Hydraulics to engineering problems.

**Psychomotor :**i) Designing the distribution system ii) Fixing the capacity of pumps iii) Designing most economical section of open channels.

Affective :Attitude of i) Calculative aspect ii) accuracy iii) safety iv) aesthetic presentation

v) hygiene vi) civic sense

#### **COURSE OUTCOMES :**

**CEF306-1** Interrelate physical properties of water.

**CEF306-2** Calculate guage pressure & absolute pressure.

CEF306-3 Calculate total pressure & CP on sluice gates & dam bodies

CEF306-4 Apply continuity equation & Bernoulli's theorem for calculations

CEF306-5 Calculate frictional coefficient, diameter, velocity & discharge through pipe

CEF306-6 Calculate discharge using Chezy's& Manning's equation through open channels.

CEF306-7Calculate discharge through notches & weirs, Orifices & Venturimeter.

CEF306-8 Calculate horse power and use the types of pump in different situations.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply principles of Hydraulics to solve engineering problems.	3	1	3	3	1	1	-	2	1	3	3	3	1
<b>CEF306-1</b> Interrelate physical properties of water.	3	3	3	-	1	1	-	2	1	3	3	3	1
CEF306-2 Calculate guage pressure & absolute pressure.	3	3	3	-	1	1	-	2	1	3	3	3	1
<b>CEF306-3</b> Calculate total pressure & CP on sluice gates & dam bodies.	3	3	3	-	1	1	-	2	1	3	3	3	1
CEF306-4 Apply continuity equation & Bernoulli's theorem for calculations	3	1	1	-	1	1	-	1	1	1	1	1	1
CEF306-5 Calculate frictional coefficient,diameter, velocity & discharge through pipe	3	3	3	-	1	1	-	2	1	3	3	3	1
CEF306-6 Calculate discharge using Chezy's& Manning's equation through open	3	3	3	-	1	1	-	2	1	3	3	3	1
<b>CEF306-7</b> Calculate discharge through notches & weirs, Orifices &Venturimeter.	3	3	3	-	1	1	-	2	1	3	3	3	1
<b>CEF306-8</b> Calculate horse power and use the types of pump in different situations.	3	3	3	-	1	1	-	2	1	3	3	3	1

# **CONTENT : THEORY**

Section – I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)						
Cours	Course Outcome- CEF306-1 Interrelate physical properties of water.								
1 Cours	<ul> <li>Properties of fluid</li> <li>1.1 Definition of fluid, Hydraulics. Branches of hydraulics. Importance of Hydraulics with respect to Irrigation and Environmental engineering.</li> <li>1.2 Physical properties of fluid Mass density, Weight density, Specific volume, Specific gravity, Surface tension capillarity, Compressibility, Viscosity, Dynamic and kinematic viscosity. Ideal and Real fluids</li> <li>See Outcome- CEF306-2 Calculate guage pressure &amp; absolute pressure</li> </ul>	04 essure.	06						
2	<ul> <li>Hydrostatic pressure</li> <li>2.1 Liquid pressure, pressure at point in liquid, Pascal's law, Variation of pressure and pressure diagram.</li> <li>2.2 Atmospheric pressure, gauge and absolute pressure</li> </ul>	08	10						
Cours	se Outcome-CEF306-3 Calculate total pressure & CP on sluice g	gates & dam	bodies						
3	Measurement of liquid pressure	10	12						
	<ul> <li>3.1 measurement of pressure, piezometer, simple U-tube manometer, differential manometer, Bourdon's pressure gauge, inverted differential U tube manometer</li> <li>3.2 Total pressure and centre of pressure on horizontal, vertical and inclined surfaces. Pressure acting on sluice gates and dam bodies.</li> </ul>								
Cours	se Outcome – CEF306-4 Apply continuity equation & Bernoulli'	s theorem fo	r calculations						
4	<ul> <li>Fundamentals of fluid flow</li> <li>4.1 Concept of flow, Gravity flow and pressure flow, Types of flow – steady and Unsteady, uniform and non-uniform, Laminar and turbulent, Reynolds number and its application. Streamline and equipotential line, flow net and its uses.</li> <li>4.2 Discharge and its unit, Continuity equation, Bernoulli's theorem, Loss of head and modified Bernoulli's theorem,</li> </ul>	10	12						
	Total	32	40						
(Semone a the at	ester end exam question paper should be such that total marks of and half times the marks allotted above but the candidates are a pove allotted.)	f questions of the formula of the fo	on each topic is opt questions of						

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)					
Cours	Course Outcome -CEF306-5 Calculate frictional coefficient, diameter, velocity & discharge							
	through pipe							
5	<ul> <li>Flow of liquid through pipes</li> <li>5.1 Loss of head due to friction, Darcy – weisbach equation, friction factor, relative roughness, moody's diagram and its use, common range of friction factor for different types of pipe material.</li> <li>5.2 Minor losses in pipe flow, loss of head due to sudden Contraction, sudden expansion, at entrance and exit of pipe in various pipe fittings, pipes in series and parallel, equivalent pipe, Dupuit's equation.</li> <li>5.3 Hydraulic gradient line, Siphon pipe, Water hammer in pipes, causes and its effects and remedial measures. Moody's Chart, Use of Nomograms for design of water distribution system.</li> </ul>	12	12					
Course Outcome -CEF306-6 Calculate discharge using Chezy's& Manning's equation through								
6	<ul> <li>Flow through open channel</li> <li>6.1 Types of channels - artificial &amp; natural, purposes of artificial channel, Geometrical properties – wetted area, wetted Perimeter, hydraulics radius of trapezoidal and rectangular sections, prismatic channel sections</li> <li>6.2 Chezy's and Manning's equation of velocity for calculation of discharge through an open channel. Most economical channel sections.</li> <li>6.3 Hydraulic Jump – Study &amp; Uses</li> </ul>	08	10					
Course Outcome -CEF306-7 Calculate discharge through notches & weirs, Orifices & Venturimeter.								
7	<ul> <li>Flow measuring devices</li> <li>7.1 Velocity measuring devices for open channels. Floats, Pitot tube, current meter and its types.</li> <li>7.2 Weir &amp; Notches, expression for discharge for rectangular and triangular notches, Francis formula, end contraction and velocity of approach, Broad crested weir, cippolletti weir and expression for discharge through it. Venturimeter - Component parts, principle of working, Study and use. Flow through Orifice - Definition and use, Types of orifice based on various criteria. Coefficient of contraction, coefficient of velocity and coefficient of discharge, Relationship between them. Discharge through small sharp-edged circular orifice.</li> </ul>	08	12					

Course Outcome -CEF306-8 Calculate horse power and use the types of pump in different							
situations.							
8	Hydraulic machines	04	06				
	8.1 Pumps - Definition and types, types of heads, types of pumps : centrifugal and reciprocating, component parts, sketches, priming, Calculation of HP of pump for various needs.						
	Total	32	40				
Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.							

# Specification table for setting question paper for semester end theory examination :

		Distribution of				
Topic No.	Name of topic	Remember	Understand	Applica- tion	Course Outcome	l otal Marks
1	Properties of fluid	02	02	02	CCF306-1	06
2	Hydrostatic pressure	02	02	06	CCF306-2	10
3	Measurement of liquid pressure	02	04	06	CCF306-3	12
4	Fundamentals of fluid flow	02	04	06	CCF306-4	12
5	Flow of liquid through pipes	02	04	06	CCF306-5	12
6	Flow through open channel		04	06	CCF306-6	10
7	Flow measuring devices		04	08	CCF306-7	12
8	Hydraulic machines		02	04	CCF306-8	06
TOTAL		10	26	44		80

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.)
# F) TERM WORK

# Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work practical sessions of batches of

20 students :

Termwork is devided in three parts as below -

# 1) Experimental work.

Sr	Title of Prostical Evension	Skills / Competencies to be	Course
No.	The of Fractical Exercise	developed	Outcome
1	Experimental work-	1. Principle of conservation	CEF 306-4
	1. Verification of Bernoulli's theorem	of mass	
	2. Determination of coefficient of	2. Discharge measurement	CEF 306-7
	discharge for a given Venturimeter.	3. Relation of between Cc,	
	3. Determination of hydraulic coefficients	Cv and Cd	CEF 306-7
	for sharp edge orifice.	4. The canal /field channel	
	4. Determination of coefficient of	discharge	CEF 306-6
	discharge for given rectangular or	5. Head loss calculations for	
	triangular notch.	straight length pipe .ie.	CEF 306-5
	5. Determination of Darcy's friction factor	major losses	
	for a given pipe	6. The actual values of	
	6. Determination of Minor losses in pipes	Minor losses	CEF 306-5
	(any two)	7. The procedure of design	
	7. Study and use of Moody's diagram	of distribution pipe	CEF 306-5
	&Nomograms for design of pipelines	networks	
	8. Study of a model of centrifugal and	8. The selection of different	
	reciprocating pump.	pumps for different	CEF 306-8
	9. Study & use of water meter.	purposes	
		9. The quantity measurement	
		for charging	CEF 306-8

# G) INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс
1.	Field Visits	
	1.Existing distribution system water supply scheme	Every theory topic and experiments
	2.Irrigation projects	

# ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

• Assessment Criteria for Term work :

# i) Continuous Assessment of Term Work:

Every practical assignment shall be assessed for 25 marks as per following criteria :

Domain	Particulars	Marks out of 50			
Comitivo	Understanding	02			
Cognitive	Application	03			
Darrahamatan	Operating Skills	05			
Psychomotor	Drawing / drafting skills	05			
Affastiva	Discipline and punctuality	05			
Anecuve	Decency and presentation	05			
TOTAL 25					

## ii) Progressive Skill Test :

One mid-term Progressive Skill Test of 25 marks shall be conducted.

## **INSTRUCTIONAL STRATEGIES :**

## **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

## **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Question Bank

# **REFERENCE MATERIAL :**

# Books / Journals / IS Codes / Websites

Reference Books: Sr No	AUTHOR	TITLE	PUBLISHER
1.	Dr.P.N.Modi& Dr.S.M.Seth	Hydraulics & Fluids Mechanics	Standard Book House, Dehli
2.	S.Ramamrutham	Hydraulics & Fluids Mechanics	DhanpatRai& Sons, Delhi
3.	R.S.Khurmi	A Text Book of Hydraulics, Fluids Mechanics Hydraulics Machines	S.Chand& Company Ltd. New Delhi
4.	R.K.Rajput	A Text Book of Fluids Mechanics Hydraulics Machines	S.Chand& Company Ltd. New Delhi
5.	Dr.JagdishLal	Fluids Mechanics Hydraulics	Metropolitan Book Co.

			Private Ltd. New Delhi
6.	S.K.Likhi	Hydarulics Laboratory Manual	T.T.T.I. Chandhigrah
7.	Panchanadikar and Dahiwadkar	Hydraulics	
8.	Bansal	Hydraulics	
9.	K. N. Rangaraju	Flow through open channels	

# **b) Websites:**

www.icivilengineer.com

www.efunda.com

www.efm.com

\* \* \*

### **COURSE ID:**

Course Name	: MECHANICS OF STRUCTURES
Course Code	: CEF307
<b>Course Abbreviation</b>	: FMOS

## **TEACHING AND EVALUATION SCHEME :**

## Pre-requisite Course(s) : CCF110 Applied Mechanics

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

#### **Evaluation Scheme :**

	Progressiv	ve Assessment	Term	Total		
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Oral Examination (Internal)	
Details of Evaluation	Average of two tests of 20 marks each	<ul><li>iii. 25 marks for each practical</li><li>iv. One PST of 25 marks</li></ul>	Term End Theory Exam (03 hours)	As per Proforma- VI	As per Proforma-V	
Marks	20		80	25	25*	150

### **RATIONALE :**

This course helps the students to understand different types of civil engineering structures and structural behavior of the members under different types of loading. The course includes study of basic structural actions and determination of stresses and deformations due to them. This course is a pre-requisite for Design of RCC and Steel Structures.

## **COMPETENCY :**

Apply principles of structural mechanics to solve engineering problems as follows :

Cognitive : Understanding and applying principles of structural mechanics to engineering problems

Psychomotor: i) Operating testing machines ii) plotting graphs and diagrams

Affective : Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

### **COURSE OUTCOMES :**

**CEF307-1** Enlist and classify structures as per structural actions

- CEF307-2 Solve problems on bodies under axial tension ,compression
- **CEF307-3** Solve problems on shear force and bending moments in beams

CEF307-4 Determine moment of inertia of plane composite sections

CEF307-5 Solve problems on bending and shear stresses in beams

CEF307-6 Solve problems on strain energy and plane frames

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic knowl edge	PO 2 Discipl ine knowl edge	PO 3 Experi ments and practic e	PO 4 Engine ering Tools	PO 5 The engine er and society	PO 6 Enviro nment and sustain ability	PO 7 Ethics	PO 8 Indivi dual and team work:	PO 9 Comm unicati on	PO 10 Life- long learni ng	PSO1 Plan and Design	PSO2 Constr uction and Maint enance	PSO3 Proble m Solvin g on field
<b>Competency:</b> Apply principles of structural mechanics to solve engineering problems.	3	3	2	-	-	-	-	1	1	2	2	1	2
<b>CEF307-1</b> Enlist and classify structures as per structural actions	3	3	-	-	-	-	-	1	1	2	2	1	1
<b>CEF307-2</b> Solve problems on bodies under axial tension ,compression	3	3	3	-	-	-	-	1	1	2	2	-	2
CEF307-3 Solve problems on shear force and bending moments in beams	2	3	3	-	-	-	-	1	1	2	2	-	2
CEF307-4 Determine moment of	3	3	2	-	-	-	-	1	1	2	2	-	-

Programme (					mme Ou	utcomes POs and PSOs							
Competency and COs	PO 1 Basic knowl edge	PO 2 Discipl ine knowl edge	PO 3 Experi ments and practic e	PO 4 Engine ering Tools	PO 5 The engine er and society	PO 6 Enviro nment and sustain ability	PO 7 Ethics	PO 8 Indivi dual and team work:	PO 9 Comm unicati on	PO 10 Life- long learni ng	PSO1 Plan and Design	PSO2 Constr uction and Maint enance	PSO3 Proble m Solvin g on field
inertia of plane composite sections													
<b>CEF307-5</b> Solve problems on bending and shear stresses in beams	3	3	2	-	-	-	-	1	1	2	2	-	2
<b>CEF307-6</b> Solve problems on strain energy and plane frames	2	2	1	-	-	-	-	1	1	2	2	-	2

# **CONTENT :**

# A) THEORY

Sr. No	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	CEF307-1 Enlist and classify structures as per structural actions		L
1	Introduction to Structural Analysis	08	08
	<ol> <li>1.1 Definition of an engineering structure</li> <li>1.2 Basic requirements of a structure : safety, serviceability, durability, economy, aesthetics, practicality</li> <li>1.3 Types of structures and their functions : Buildings, trestles, masts, piers, bridges, aqueducts, pipes, siphons, conduits, tunnels, chimneys, shell roofs, domes, retaining walls, dams, water tanks, silos, bunkers (labeled diagrams of these structures). Structural and non-structural components</li> <li>1.4 Types of structural systems : Discrete system, continuum system, combined system. Field examples</li> <li>1.5 Definition of structural analysis and structural design</li> <li>1.6 Basic structural actions : i) axial tension, ii) axial compres-sion, iii) flexure, iv) shear,v) torsion. Combination of basic structural actions. Example of simple pressing machine (Ref. Book No.1). Simple field examples of each structural action</li> <li>1.7 Types of structural connections : i) Pinned or hinged or simple connection ii) rigid connection</li> <li>1.8 Static determinacy of a structure</li> <li>1.9 Types of structural materials and their suitability: i) concrete ii) steel</li> <li>iii) reinforced concrete iv) pre-stressed concret</li> </ol>		
	CEF307-2 Solve problems on bodies under axial tension compression.		
	2.1Axial Tension and Compression	12	16
2	2.1 Definition of axial and eccentric loading. Definition of uni-axial, bi-axial and tri- axial loading. Diagrams showing these loadings.		
	2.2 Field examples of members in axial tension and compression		
	2.3 Hooke's law.Young's modulus of elasticity.Behavior of ductile and brittle material under axial tension. Load-elongation graph. Numerical problems on elongation of uni- axial members made up of i) single material ii) combination of two or more materials along the length (compound members)		
	<ul> <li>2.3 Composite sections : Stresses and elongation under uni-axial loading Modular ratio.</li> <li>2.4 Lateral strains and deformation. Poisson's ratio</li> <li>2.6 Bi-axial and tri-axial loading. Volumetric stress and strain, bulk modulus. 2.7 Temperature stresses in simple members</li> </ul>		
	2.8Shear stresses and shear strains. Modulus of rigidity		
	2.9 Relation among elastic constant		

Sr. No	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)			
	<b>CEF307-3</b> Solve problems on shear force and bending moments in beams					
	Shear Forces and Bending Moments in Beams					
3	<ul> <li>3.1 Types of beams : simply supported, over-hanging, cantilever, propped cantilever, fixed, continuous. Types of loads : concentrated loads, uniformly distributed loads and uniformly varying loads, couple loads</li> <li>3.2 Definition of shear force and bending moment at a section of beam. Sign convention. Relation between shear force and bending moment ,Point of contra flexure.</li> <li>3.3 Shear force diagrams and bending moment diagrams for cantilever, simply supported and overhanging beams subjected to concentrated loads, uniformly distributed loads , couple .</li> </ul>	12	16			
	Total	32	40			
Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.						

# Section II

Sr. No.	Topics	Teaching Hours	Theory Evaluati on
CE	F307-4 Determine moment of inertia of plane composite section		
4	<ul> <li>Moment of Inertia</li> <li>4.1 Definition of moment of inertia. Moment of inertia of regular plane figures square rectangle triangle circle</li> <li>4.2 Parallel axes theorem and perpendicular axes theorem</li> <li>4.3 Moment of Inertia of composite figures. Radius of gyration</li> </ul>	08	08

Sr. No.	Topics	Teaching Hours	Theory Evaluati on
CE	F307-5 Solve problems on bending and shear stresses in beams		
	5.1Bending Stresses in Beams		
5	5.1.1 Flexural behavior of beams. Pure bending. Assumptions in theory of simple bending. Flexural formula. Stress distribution over the section, moment of resistance section modulus.	06	08
	5.1.2 Numerical problems on symmetrical/ unsymmetrical sections.		
	5.2 Shear Stresses in Beams		
	5.2.1 Assumptions and shear stress formula (no derivation).	04	08
	5.2.2 Shear stress distribution across different cross-sections of beam e.g. rectangular, circular, I section, T section.		
	5.2.3.Relation between maximum and average shear stress		
	CEF307-6 Solve problems on strain energy and simple frames		
	6.1 Strain energy :		
6	6.1.1Definition of strain energy, resilience, proof resilience and modulus of resilience.	04	06
	6.1.2 Strain energy stored and stresses developed due to gradual, sudden and impact loading.		
	6.2Simple Frames :		
	6.2.1 Definition. Assumptions.		
	6.2.2 Perfect, redundant and deficient frames with examples.	10	10
	6.2.3 Problems on determination of forces in members of simply supported and cantilever plane perfect frames by i) method of joints, ii) method of sections, iii) graphical method. (Problems on graphical method only in term work assignments and not in theory examination)	10	10
	Total	32	40
Sem mark	ester end exam question paper should be such that total marks of questions on each topic is as allotted above but the candidates are able to attempt questions of the above allotted marks of	one and half only.	times the

Topic no.	Name of tonic	Distributior	Total		
Topic not	Tunic of topic	Remember	Understand	Apply	Marks
1	Introduction to Structural Analysis	02	02	04	08
2	Axial Tension and Axial Compression	02	04	10	16
3	Shear Forces and Bending Moments in Beams	02	04	10	16
4	Moment of Inertia	02	02	04	08
5	Bending Stresses in Beams	02	04	10	16
6	Strain energy and Simple Frames	02	04	10	16
	Total	12	20	48	80

## Specification table for setting question paper for semester end theory examination :

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above. Candidates can attempt questions of the above allotted marks only.

# **B) TERM WORK :**

Term work shall consist of the following :

# a) Laboratory Experiments :

(Laboratory Manual on Mechanics of Structures developed by the Institute shall be used)

Sr. No	Laboratory experiments (Any Eight)	Competencies to be developed	Course Outcome
1	Study the universal testing machine.		CEF307-1
2	Tension test on mild steel bar.	1. Study of mechanism of machines	CEF307-2
3	Tension test on HYSD steel bar	used for testing of construction material	CEF307-2
4	Compression test on metals	<ol> <li>Study of properties of construction material.</li> <li>Motor skills in performing experiments.</li> <li>Plotting and interpreting graphs.</li> <li>Drawing real view diagrams of machine or apparatus.</li> <li>Self learning ability.</li> <li>Numerical and graphical data</li> </ol>	CEF307-2
5	Flexural test on mild steel		CEF307-1,4,5
6	Water absorption test on bricks		
7	Compressive test on bricks ( dry and wet)		CEF307-2
8	Flexural test on flooring tiles		CEF307-1,4,5
9	Flexural test on roofing tiles	<ul><li>interpretation.</li><li>8. Managing time to complete</li></ul>	CEF307-1,4,5
10	Abrasion test on flooring tiles.	experiment in given period	
11	Hardness test on metals		CEF307-1

12	Shear test on metals	CEF307-5
13	Impact test on metals	CEF307-1

## b) Excercises:

Sr no.	excercises	Competencies to be developed	Course
			outcomes
1	Shear force and bending moment	Draw SFD & BMD of the beam	CEF307-3
2.	Simple frames	Drtermine the forces in members	CEF307-6
3	Identification of structural actions	Identify actions of forces	CEF307-1

# c) Micro Projects :

Sr.		Competencies to be	Course
1	<b>Visit to Structures :</b> Students shall conduct (in a group of 3/5) visit to various types of structures mentioned in the theory syllabus and prepare a report with their photographs as guided in the Laboratory Manual on Mechanicsof Structures developed by the Institute	Identify actions of forces on the components of structures.	CEF307-1
2	<b>Software based exercises :</b> Students shall carry out software based exercises (as guided in the Laboratory Manual on Mechanicsof Structures developed by the Institute) on one or more of the following : study of variation of parameters of phenomena.	Integrate the knowledge & apply this to problems.	CEF307-1 CEF307-2 CEF307-3 CEF307-4 CEF307-5 CEF307-6

# C. INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Topics of theory syllabus
2.	Field examples of course application	Term-work assignment on survey of structures

# ASSESSMENT CRITERIA FOR TERM WORK AND ORAL EXAMINATION:

Assessment Criteria for Term work :

## i) Continuous Assessment of Practical Assignments :

Everypractical assignment shall be assessed for 25 marks as per criteria given in Laboratory Manual for Mechanics of Structures

## ii) Progressive Skill Test :

One mid-term Progressive Skill Test of 25 marks shall be conducted as per criteria given inLaboratory Manual for Mechanics of Structure.

Final marks of term work shall be awarded as per AssessmentPro-forma VI.

## • Assessment Criteria for Term End Oral Examination :

At least two questions, based on term work produced by the candidate, each of knowledge level, comprehension and application level shall be asked by the examiner during the oral examination.

Final marks of term work shall be awarded as per AssessmentProformaV.

# **INSTRUCTIONAL STRATEGIES :**

Instructional Methods :1. Lectures cum Demonstrations

2. Tutorial exercises

## Teaching and Learning resources :1. Chalk board

- 2. Use of charts
- 3. Audio visual presentations
- 4. Item Bank

## **REFERENCE MATERIAL :**

### a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	Timoshenko, S.P. and Young, D.H.	Elements of Strength of Materials	Affiliated East West Press Pvt. Ltd., Delhi
2.	Deo, Sunil	Text book on Mechanics of Structures	Nirali Publications
3.	Bhavikatti, S.S.	Strength of Materials	Vikas Publication House Pvt. Ltd., Noida,
4.	Khurmi, R.S.	Strength of Materials	S.Chand & Co., Delhi
5.	Singer, F.L.	Strength of Materials	Harpe Collins Publishers India Delhi
6.	S.Ramamurtham and R.Narayanan	Strength of Materials	Dhanpat Rai Publication Co. Pvt. Ltd., New Delhi

## b) Websites

- i. en.wikipedia.org/wiki/Structural\_mechanics
- **ii.** http://www.powershow.com/view/15b5baNzRmY/CE\_203Structural\_Mechanics\_powerpoint\_ppt\_presentation

\* \* \*

#### **COURSE ID:**

Course Name	: SURVEYING - I
Course Code	: CEF 308
Course Abbreviation	: FSUR I

## **TEACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s) : NIL

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	03	07
Practical	04	

Note : for practicals number of students in a batch shall be 10.

#### **Evaluation Scheme :**

Mode of	Progressive	Assessment	t Term End Examination		0 <b>n</b>	Total
Evaluation	Theory	Practical	Theory	TW	Oral	1000
Details of Evaluation	Average of Two tests of 20marks each(1 hour duration each)	One Progressive Skill Test of 25 marks	One paper (3 hours)	As Per Proforma TW- VI	As Per Proforma IV	
Marks	20		80	25*	50**	175

\*( To be assessed by internal examiner )\*\* (To be assessed by internal and external examiner)

#### **RATIONALE :**

Surveying is the core Civil Engg. subject. The first stage of every construction project is to survey the area, collect the data, analyze and then prepare the drawings. Because of this, it is the basic requirement of every civil engineer to be well equipped with knowledge and skills of surveying.

The subject involves teaching basic principles, concepts & procedures in surveying and levelling. With this knowledge and skill, civil engineer will be able to select proper equipment and method of surveying depending upon the requirement to execute the survey work for different civil engineering projects such as building construction, transportation engineering , Irrigation engineering , environmental engineering etc. It also enables him to carry out his duties while working as site- in-charge of any construction project.

# COMPETENCY

Apply principles of Surveying to solve engineering problems as follows.

Cognitive :Understanding and applying principles of Surveying to engineering problems.

Psychomotor :i) Measurement of distance and angle ii) Setup the compass iii) Seting up level

Affective :Attitude of i) Calculative aspect ii) accuracy iii) safety vi) civic sense

## **COURSE OUTCOMES :**

CEF308-1 State the importance of survey.
CEF308-2 Determine distances with various linear instruments.
CEF308-3Calculation of area.
CEF308-4 Determine the various types of bearings.
CEF308-5 Determine reduced levels by different methods.

CEF308-6 Draw contour by interpolation & other methods.

CEF308-7 Determine area by polar and digital planimeter.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Prob lem Solvi ng on field
<b>Competency:</b> Apply principles of Surveying to solve engineering problems.	3	1	3	3	1	1	1	2	1	3	1	1	1
<b>CEF308-1</b> State the importance of survey.	3	3	3	1	1	1	1	2	1	3	1	1	1
<b>CEF308-2</b> Determine distances with various linear instruments.	3	3	3	3	1	1	1	2	1	3	1	2	1
CEF308-3Calculation of area.	3	3	3	3	1	1	1	2	2	3	1	3	1
<b>CEF308-4</b> Determine the various types of bearings.	3	1	1	3	1	1	1	2	2	2	1	3	1

	1						0.4	DO	LDCO				
					Pro	ogramme	Outcome	s POs and	1 PSUs				
Competency	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO1	PSO2	PSO3
and COs	Basi c kno wled ge	Discipli ne knowled ge	Experim ents and practice	Enginee ring Tools	The engineer and society	Environ ment and sustaina bility	Ethics	Individu al and team work:	Commu nication	Life- long learning	Plan and Design	Constru ction and Mainten ance	Prob lem Solvi ng on field
<b>CEF308-5</b> Determine reduced levels by different methods.	3	3	3	3	1	1	1	2	2	3	1	3	1
CEF308-6 Draw contour by interpolation & other methods	3	3	3	3	1	1	1	2	2	3	1	3	1
CEF308-7 Determine area by polar and digital planimeter	3	3	3	3	1	1	1	2	1	3	1	3	1

# **CONTENT : THEORY**

# Section - I

<i>Course Outcome-</i> <b>CEF308-1</b> State the importance of survey.	03	
	03	
<ol> <li>Introduction To Surveying.</li> <li>1.1 Definition of surveying</li> <li>1.2 Object of surveying</li> <li>1.3 Classification of surveying primary and secondary classification based on different parameters</li> <li>1.4 Principles of Surveying</li> <li>1.5 Uses of surveying.</li> </ol>	00	04
Course Outcome- CEF308-2Determine distances with various linear ins	struments.	
<ul> <li>2 Linear Measurements <ol> <li>2.1 Linear measurement</li> <li>2.2 Study of metric chain – 20m &amp; 30m, it's components</li> <li>2.3 Study of tape – types of tape – linen ,metallic, steel &amp; Invar</li> <li>2.4 Instruments for marking stations- Pegs, Arrows, Ranging rods.</li> <li>2.5 Ranging- meaning, code of signals, types of ranging, procedure of each type</li> <li>2.6 Chaining – Chaining on plain and sloping ground,</li> <li>2.1 Errors in chaining, - Errors due to incorrect length of chain, Correction in length &amp; area.</li> </ol> </li> <li>Course Outcome-CEF308-3Calculation of area.</li> </ul>	06	10
<ul> <li>Chain and cross staff Survey</li> <li>3.1 Chain triangulation, definition of survey stations, base line, check line, tie line , well and ill conditioned triangle, Selection of survey stations,</li> <li>3.2 Offsets - Perpendicular &amp; Oblique offsets. Instruments used for setting out right angles - Open cross staff, Optical square.</li> <li>3.3 Chain and Cross staff survey, calculation of area from recorded observations.</li> <li>3.4 Obstacles in chaining, methods to overcome the obstacles.</li> <li>3.5 Conventional signs on survey maps for – cutting, embankment, marshy land, road, railway, river, bridge, tunnel, fencing, transmission line, cultivated land, orchard, places of worship.</li> </ul>	08	10

4	Chain and Compass Survey	10	16
	<ul> <li>4.1 Prismatic compass – Principle, components, construction and use.</li> <li>4.2 Bearing of a line- True meridian, magnetic meridian and arbitrary meridian, whole circle &amp;quadrantal system, reduced bearings, fore bearing and back bearing, conversion of bearings, calculation of included angles from bearings.</li> <li>4.3 Local attraction- errors due to local attraction, precautions to be taken to avoid local attraction, correction of bearings affected by local attraction, numerical problems, magnetic declination, dip of the needle.</li> <li>4.4 Traversing with chain and compass, plotting the traverse, by parallel meridians through each station and by included angle methods, closing error, graphical adjustment of closing error by Bowditch's rule.</li> </ul>	10	10
	Total	27	40
(Sem	ester end exam question naper should be such that total marks o	f questions of	on each topic is
	nd half times the marks allotted above but the condidates are a	bla to attam	on cuen topic is
one a	nu nan unles me marks anotted above but the candidates are a	ble to atten	ipi questions of

the above allotted.)

Section I	Ι
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Sr. No	Topics / Sub-topics	Lectures	Theory Evaluation
110.		(Hours)	(Marks)
Cours	e Outcome - CEF308-5 Determine reduced levels by different n	nethods.	
5	<ul> <li>Levelling</li> <li>5.1 Definitions - Level surface , Horizontal line, vertical line, datum surface, reduced level, Bench mark and its typesGTS, Permanent, arbitrary and temporary.</li> <li>5.2 Dumpy Level – Components, Temporary adjustments of level, line of collimation. Axis of bubble tube, fore sight, Back sight, Intermediate sight. Change Point, Height of collimation, fundamental axes and their relationship.</li> <li>5.3 Study and use of Auto level.</li> <li>5.4 Leveling staff - Telescopic and folding type.</li> <li>5.5 Calculation of reduced levels, arithmetic check, examples by plane of collimation method and rise &amp; fall method, computation of missing readings, obstacles in leveling, numerical problems.</li> <li>5.6 Classification of Leveling – Simple leveling, differential leveling, fly leveling, profile leveling and cross - sectioning, check leveling- list of errors, precautions to be taken to eliminate the same.</li> </ul>	14	24
Cours	e Outcome - CEF308-6 Draw contour by interpolation & other	methods	
6	<ul> <li>Contouring</li> <li>6.1 Definitions - contour, contour interval, horizontal equivalent.</li> <li>6.2 Characteristics of contour lines.</li> <li>6.3 Uses of contour map,</li> <li>6.4 Interpolation of contours – Direct and Indirect method of locating contours,</li> <li>6.5 Gradecontour - meaning, establishing grade contours.</li> </ul>	04	10
Cours	e Outcome - CEF308-7 Determine area by polar and digital plan	nimeter.	
7	<ul> <li>Minor Instruments</li> <li>7.1 Polar Planimeter- Construction and use, Numerical problems on calculation of area.</li> <li>7.2 Digital planimeter , Study and use.</li> </ul>	03	06
	Total	21	40
Seme one a the ab	ster end exam question paper should be such that total marks on half times the marks allotted above but the candidates are above allotted marks only.	f questions of the formation of the form	on each topic is pt questions of

Торіс	Nome of tonia	Distribution	n of marks (Cogni wise)	Course	Total	
No.	Name of topic	Remember	Understand	Applica- tion	Outcome	Marks
1	Introduction To Surveying.	02	02		CEF308 - 1	04
2	Linear Measurements	02	04	04	CEF308 - 2	10
3	Chain and cross staff Survey	02	04	04	CEF308 - 3	10
4	Chain and Compass Survey	04	04	08	CEF308 - 4	16
5	Leveling	04	08	12	CEF308 - 5	24
6	Contouring	02	04	04	CEF308 - 6	10
7	Minor Instruments	02	02	02	CEF308 - 7	06
TOTAL		18	28	34		80

<b>Specification</b>	table for setting	question paper	for semester end	theory examination :
promotion		question puper	Tot semicorer ema	

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.)

# **PRACTICALS** :

# List of practicals : Following practicals should be performed :

Sno	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Study & use of chain, (20m, 30m) Metallic & steel tapes, Ranging rods, pegs and arrows.	Determine distances with various instruments	CEF308 - 2
2	Direct & indirect ranging, study and use of line ranger. Measurement of distances with chain and tape.	Trace the straight line for measuring distance with various instruments	CEF308 - 2
3	Study & use of open cross staff & optical square, measurement of area of five sided traverse by chain and cross staff survey.	Setting the perpendicular and oblique offset and calculate area	CEF308 - 3
4	Running a survey line to locate adjacent objects such as building, road, trees, electric poles etc, by taking offsets with open cross staff / optical square. Booking field notes.	Locate all details included and determine the area	CEF308 - 3

5	Study & use of Prismatic compass – components, their functions, adjustments, Observing fore bearings and back bearings of lines, calculation of included angles.	Determine the included angles between two survey lines	CEF308 - 4
6	Observing fore bearings and back bearings of a 5 sided closed traverse, identifying the stations affected by local attraction and calculation of corrected bearings.	Determine the angles included between two survey lines and apply corrections	CEF308 - 4
7	Study & use of Dumpy level, components, temporary adjustments, study of leveling staff.	Handle dumpy level and go for temporary adjustment	CEF308 - 5
8	Carrying out differential levelling, recording the readings in a level field book. Calculation of Reduced Levels, (H.I. Method), applying arithmetic check.	Determine the vertical distance between points	CEF308 - 5
9	Carrying out differential leveling, Calculation of reduced Levels, (rise and fall method), applying arithmetic check.	Determine the vertical distance between points	CEF308 - 5
10	Fly leveling – carrying bench mark from one point to another point.	Carrying BM from distant points	CEF308 - 5
11	Study and use of auto level -, temporary adjustments, taking staff readings.	Handle Auto- level	CEF308 - 5
12	Contouring by direct method.	Prepare contour plans	CEF308 - 6
13	Measurement of area of irregular figure by polar planimeter	Measure area.	CEF308 - 7
14	Measurement of area of irregular figure by Digital planimeter.	Measure area	CEF308 - 7

# **PROJECTS** :

SNo	List of projects	Skills / Competencies to be developed	Course Outcome
1	Chain & compass traverse survey- a closed traverse of minimum 5 sides enclosing a building ,calculation of included angles and corrected bearings, locating details and plotting on A1 size imperial drawing sheet.	Locate all details included and determine the area and plotting the traverse	CEF308 - 4
2	Profile leveling & cross-sectioning - Running a base line 300 m. length with cross section at every 30m. Length of cross section may be 20m on either side with staff readings at 10 m interval. Spot levels should be taken at every 10m along the base line. Plotting of L-section and minimum of 3 cross-sections on A1 size imperial drawing sheet.	Determine nature of ground along longitudinal and cross sections	CEF308 - 5
3	Block contouring – A block of 100m * 100m with spot levels at 10m * 10m, plotting the contours with suitable contour interval by interpolation on A1 size imperial drawing sheet.	Preparing contour plan	CEF308 - 6

## **TERMWORK :**

Termwork shall consist of record of all practicals and projects in field book and drawings (3 Nos) of project work on A1 size imperial drawing sheet.

# ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

## • Assessment Criteria for Term work :

## i) Continuous Assessment of Term Work:

Every practical assignment shall be assessed for 25 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	02
Cognitive	Application	03
Psychomotor	Operating Skills	05
	Drawing / drafting skills	05
A ffe etime	Discipline and punctuality	05
Allective	Decency and presentation	05
	25	

## ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted.

## **INSTRUCTIONAL STRATEGIES :**

## **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices
- 3. Practicals.

## **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Question Bank

# **REFERENCE MATERIAL :**

Books / Journals / IS Codes / Websites

Reference Books: Sr	AUTHOR	TITLE	PUBLISHER
No			
1.	Surveying & Leveling – vol- 1 & 2	T.P.Kanetkar& S.V. Kulkarni	Pune vidyarthiGrihaprakashan , Pune
2.	Surveying & Leveling – vol- 1 & 2	Dr. B.C. Punmia	Laxmi Publications, New Delhi.
3.	Surveying & Leveling	N.N. Basak	Tata McGraw Hill
4.	Surveying & Leveling – vol- 1 & 2	S.K. Duggal ,	Tata McGraw Hill
5.	Text book of surveying	S.K. Husain, M.S. Nagaraj	S.Chand& Co.
6.	Surveying & Leveling – vol- 1 & 2	T.P.Kanetkar& S.V. Kulkarni	Pune vidyarthiGrihaprakashan , Pune

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#### **COURSE ID:**

Course Name	: SURVEYING II
Course Code	: CEF 309
<b>Course Abbreviation</b>	: FSUR2

**TEACHING AND EVALUATION SCHEME :** 

Pre-requisite Course(s) : FSUR1 (CEF308)

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	03	07
Practical	04	

Note : for practicals number of students in a batch shall be 10.

#### **Evaluation Scheme :**

Mode of	Progressive	Assessment	Term	Total		
Evaluation	Theory	Practical	Theory	TW	Oral	
Details of Evaluation	Two tests of 20marks each(1 hour duration each)	One Progressive Skill Test of 25 marks	One paper (3 hours)	As Per Proforma VI	As Per Proforma IV	
Marks	20 each	25	80	25*	50**	175

\*( To be assessed by internal examiner )\*\* (To be assessed by internal and external examiner)

## **RATIONALE :**

Surveying is the core Civil Engg. subject. The first stage of every construction project is to survey the area, collect the data, analyze and then prepare the drawings. Because of this, it is the basic requirement of every civil engineer to be well equipped with knowledge and skills of surveying.

The subject involves teaching basic principles, concepts & procedures in surveying and levelling. With this knowledge and skill, civil engineer will be able to select proper equipment and method of surveying depending upon the requirement to execute the survey work for different civil engineering projects such as building construction, transportation engineering, Irrigation engineering, environmental engineering etc. It also enables him to carry out his duties while working as site-in-charge of any construction project.

## COMPETENCY

Apply principles of Surveying to solve engineering problems as follows.

**Cognitive :**Understanding and applying principles of Surveying to engineering problems.

**Psychomotor :**i) Measurement of distance and angle ii) Setup the Theodolite tachometer & plane table Digital theodolite & Total station. iii) Setingup level iv) setting the curve.

Affective :Attitude of i) Calculative aspect ii) accuracy iii) safety vi) civic sense

#### **COURSE OUTCOMES :**

CEF309-1Measurement of horizontal and vertical angles by theodolite.

CEF309-2Measurement of horizontal and vertical distance by tachometer.

**CEF309-3**Setting up plane table and finding out area and distance.

**CEF309-4**Setting of curves by different methods. **CEF309-5**Find out levels by digital theodolite and total station. **CEF309-6** State the concept of Remote sensing & GPS.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO 3 problem solving on field
<b>Competency:</b> Apply principles of Surveying to solve engineering problems.	3	1	3	3	3	2	1	2	2	2	3	2	3
<b>CEF309-1</b> Measurement of horizontal and vertical angles by theodolite.	3	3	3	3	2	1	1	2	2	2	3	2	3
CEF309-2 Measurement of horizontal and vertical distance by tachometer.	3	3	3	3	2	1	1	2	2	2	3	2	3
<b>CEF309-3</b> Setting up plane table and finding out area and distance.	3	3	3	3	3	1	1	2	2	2	3	2	3

					Pro	ogramme	Outcome	s POs an	d PSOs				
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO 3 problem solving on field
<b>CEF309-4</b> Setting of curves by different methods.	3	2	3	3	3	1	1	2	2	2	1	2	3
<b>CEF309-5</b> Find out levels by digital theodolite and total station.	3	3	3	3	3	1	1	2	2	2	3	2	3
CEF309-6State the concept of Remote sensing & GPS.	3	3	3	3	3	1	1	2	2	2	3	2	3

# **CONTENT : THEORY**

Section – I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)					
Cours	e Outcome- CEF309-1 Measurement of horizontal and vertical	angles by the	eodolite.					
1	<ul> <li>Theodolite Survey</li> <li>1.1 Types of transit theodolite and their functions, technical terms used in theodolite surveying - swinging the telescope, transiting, changing the face. Temporary adjustments of Theodolite. Fundamental axes and their desired relationship</li> <li>1.2 Measurement of horizontal angle by ordinary &amp; repetition method, Errors eliminated by method of repetition</li> <li>1.3 Measurement of vertical angle, Measurement of deflection angle, measurement of magnetic bearing of a line, Prolonging a straight line</li> <li>1.4 Theodolite traversing - method of included angles, checks in closed traverse, calculation of bearings from angles.</li> <li>1.5 Consecutive co-ordinates, latitude, departure, independent co-ordinates, error of closure.</li> <li>1.6 Distribution of angular error, adjustment of bearings, balancing the traverse, Bowditch's rule &amp; transit rule, Gale's traverse table, examples on above topics, sources of errors in theodolite survey,</li> </ul>	16	28					
Cours	e Outcome- CEF309-2Measurement of horizontal and vertical di	istance by ta	chometer.					
2	<ul> <li>Tachometric Survey</li> <li>2.1 Principle of tachometric survey, methods of tacheometry, use of analytic lens (no derivation), use of theodolite as a tachometer by fixed hair system with staff held vertical.(no derivation)</li> <li>2.2 Determination of tachometric constants, errors in tachometric surveying, simple numerical problems on above topic.</li> </ul>	08	12					
	Total	24	40					
(Semo one a the ab	(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted.)							

Section	Π

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Cours	e Outcome - CEF309-3 Setting up plane table and finding out as	rea and dista	ince.
3	<ul> <li>Plane Table Survey</li> <li>3.1 Principles of plane table survey, accessories used in plane table survey,</li> <li>3.2 Setting up of plane table – centering, levelling, orientation by magnetic needle and back sighting.</li> <li>3.3 Methods of plane table surveying- radiation, intersection &amp; Traversing.</li> <li>3.4 Merits &amp; demerits of plane table surveying, situations where plane table survey is preferred.</li> </ul>	06	10
Cours	e Outcome - CEF309-4 Setting of curves by different methods.		
4 Cours	<ul> <li>Simple Curves</li> <li>4.1 Types of curves used in road and railway alignments.</li> <li>4.2 Notations of a simple circular curve,</li> <li>4.3 Method of curve setting - offset from long chord &amp; Rankine's method of tangential angles. Simple numerical problems on above topic.</li> </ul>	06 total station	<b>10</b> 1.
5	<ul> <li>Advanced survey equipments.</li> <li>5.1 Component parts and procedure to set and use digital theodolite for measurement of horizontal and vertical angle,</li> <li>5.2 Component parts and procedure to set and use digital level or finding and recording reduced level.</li> <li>5.3 Component parts of total station, minimum inventory required, set up of total station, setting a back sight,</li> </ul>	08	14

	general setting required for all stations, field book					
	recording, radial shooting, survey station description					
	by codes, instrument station entry, data retrieval,					
Cours	e Outcome - CEF309-6 State the concept of Remote sensing &	GPS.				
		I	I			
6	Remote sensing	04	06			
	6.1 Definition of remote sensing, Concept of remote					
	sensing,					
	6.2 Types of remote sensing system-Passive system,					
	Active system,					
	6.3 Distance of remote sensing, Remote sensing data,					
	Remote sensing process,					
	6.4 Application of remote sensing, Advantages of remote sensing Limitations of remote sensing					
	6.5 GPS- introduction and use					
	Total	24	40			
Semester end exam question paper should be such that total marks of questions on each topic is						
one and half times the marks allotted above but the candidates are able to attempt questions of						
the ab	ove allotted marks only.					

Торіс	Norman effort	Distribution	n of marks (Cog wise)	Course	Total	
No.	Name of topic	Remember	nember Understand tion		Outcome	Marks
1	Theodolite Survey	08	08	12	CEF-309-1	28
2	Tachometric Survey	02	04	06	CEF-309-2	12
3	Plane Table Survey	04	08		CEF-309-3	12
4	Simple Curves	04	04	04	CEF-309-4	12
5	Advanced survey equipments.	04	06	-	CEF-309-5	10
6	Remote sensing	02	04	-	CEF-309-6	06
TOTAL		24	34	22		80

# Specification table for setting question paper for semester end theory examination :

# H) TERM WORK

# LIST OF PRACTICALS (any 14) & PROJECTS :

Sno	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Transit Theodolite - Components and their functions, - performing temporary adjustments, reading the vernier	Setup the theodolite	CEF309 -1
2	Measurement of horizontal angle by ordinary method.	Measurement of horizontal angle	CEF309 - 1
3	Measurement of vertical angle.	Measurement of Vertical angle	CEF309 - 1
4	Measurement of magnetic bearing of a line using theodolite.	Measurement of bearing	CEF309 - 1
5	Measurement of deflection angle by taking open traverse of 4 - 5 sides.	Measurement of Deflection angle	CEF309 - 1
6	Prolonging and ranging line using theodolite.	Ranging a line	CEF309 - 1
7	To find reduced levels and horizontal distances using theodolite as a tachometer.	Find Rl& distance	CEF309 - 2
8	To find constants of a given tachometer	Find constants of tacheometer	CEF309 -2
9	Study and use of plane table & its accessories, temporary adjustments of plane table. Locating points by method of radiation.	Setting up plane table	CEF309 - 3
10	Locating details by the method of intersection . Orientation of plane table by back sighting	Locating details	CEF309 -3

11	Setting out simple circular curve by offsets from long chord.	Setting out curves	CEF309 - 4
12	Setting out simple circular curve by Rankine's method of deflection angle.	Setting out curves	CEF309 - 4
13	Study and use of digital theodolite/ EDM.( Demo)	Find the levels using digital theodolite	CEF309 - 5
14	Use total station for measuring horizontal angle, vertical angle, horizontal distance, sloping distance, vertical distance.	Measure distance & angles by total station	CEF309 –5
15	Demonstration of GPS	Concept of GPS	CEF309 –6

# Projects

SNo	List of projects	Skills / Competencies to be developed	Course Outcome
1	1. Theodolite traverse survey for a closed traverse 5-6 sides for a small area., computation by Gale's traverse table, plotting the traverse with details on A1 size imperial drawing sheet.	Plotting the treverse using theodolite	CEF309 - 1
2	<ol> <li>Plane table traversing – running a minimum 5 sided traverse enclosing a building using method of traversing. Locating details of buildings, poles, etc. by radiation &amp; intersection method. plotting the traverse with details on A1 size imperial drawing sheet.</li> </ol>	Plotting the treverse using Plane table	CEF309 - 3

# Term Work :

Termwork shall consist of record of all practicals& projects in field book & drawing (02nos) of project work on A1 size imperial drawing sheet.

# ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

## • Assessment Criteria for Term work :

# i) Continuous Assessment of Term Work:

Every practical assignment shall be assessed for 25 marks as per following criteria:

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	02
Cognitive	Application	03
Developmenter	Operating Skills	05
Psycholiotor	Drawing / drafting skills	05
Affastiva	Discipline and punctuality	05
Allective	Decency and presentation	05
	25	

# ii) Progressive Skill Test :

One mid-term Progressive Skill Test of 25 marks shall be conducted.

## **INSTRUCTIONAL STRATEGIES :**

# **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices
- 3. Practicals

# **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Question Bank

# **REFERENCE MATERIAL :**

## Books / Journals / IS Codes / Websites

Reference Books: Sr AUTHOR		TITLE	PUBLISHER	
110				
1.	T.P.Kanetkar& S.V. Kulkarni	Surveying &Levelling – vol- 1 & 2	Pune vidyarthiGrihaprakashan , Pune	
2.	Dr. B.C. Punmia	Surveying &Levelling – vol- 1 & 2	Laxmi Publications, New Delhi.	
3.	N.N. Basak	Surveying &Levelling	Tata McGraw Hill	
4.	S.K. Duggal,	Surveying &Levelling – vol- 1 & 2	Tata McGraw Hill	
5.	SatheeshGopi& others	Advanced Surveying	Pearson	

#### \* \* \*

## COURSE ID:

Course Name	: Transportation Engineering.
Course Code	: CEF 310
<b>Course Abbreviation</b>	: FTRE

# TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Nil

## **Teaching Scheme:**

Scheme component	Hours / week	Credits
Theory	4	6
Practical	2	

## **Evaluation Scheme :**

	Progressiv	ve Assessment	Term End I			
Node of Evaluation	Theory	Practical	Theory Examination	Term Work	Total	
Details of Evaluation	Average of two tests of 20 marks each	i. 25 marks for each practical ii. One PST of 25 marks	Term End Theory Exam (03 hours)	As per Performa-III		
Marks 20			80 50*		150	

### **Rationale:**

The course caters to the need of technician engaged in the investigation, planning, construction and maintenance of road, bridge, railway and tunnels. In practical field such a component of transportation is a specialized branch of engineering. This subject aims to imparting basic knowledge about roads, railways, bridges and tunnels in respect of their various types, materials used functions of component parts, method of construction, planning, aspects of supervision and maintenance.

#### COMPETENCY

Applying knowledge of components of Transportation Engineering for development of Infrastructure: **Cognitive :**Understanding and applying knowledge of transportation Engineering.

Psychomotor: i) Conducting practical's on bitumen. ii) Conducting under construction site visits.

Affective :Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

## **COURSE OUTCOMES:**

**CEF310-1** Identify types of roads and alignment.

CEF310-2 Decide the geometric design and construction methods of different types of roads.

CEF310-3 Select the shape of tunnel according to the purpose.

CEF310-4 Identify the methods of tunnel surveying and tunneling.

CEF310-5 Identify different component parts and functions of permanent way.

CEF310-6 Identify the terms related to points and crossings.

**CEF310-7** Select the site for station and yard.

CEF310-8 select proper site, alignment & illustrate component parts of bridge.

**CEF310-9** Identify & select the types of bridge.

## COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Construc tion and Maintena nce	PSO3 Problem solving on field
Competency: Applying knowledge of Transportation Engineering for development of Infrastructure :	3	3	3	2	3	2	-	1	1	3	3	3	2
<b>CEF310-1</b> Identify types of roads and alignment.	3	3	-	-	2	-	-	1	1	2	2	2	2
CEF310-2Decidethegeometricdesignandconstructionmethodsmethodsofdifferenttypesroads.	3	3	3	3	2	-	-	1	1	2	2	2	1

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Construc tion and Maintena nce	PSO3 Problem solving on field
<b>CEF310-3</b> Select the shape of tunnel according to the purpose	3	3	3	1	1	-	-	1	1	1	3	3	1
<b>CEF310-4</b> Identify the methods of tunnel surveying and tunneling.	3	3	2	2	3	-	-	1	1	2	2	3	1
<b>CEF310-5</b> Identify different component parts and functions of permanent way.	3	2	2	2	2	-	-	1	1	3	2	2	1
<b>CEF310-6</b> Identify the terms related to points and crossings.	3	3	2	2	1	2	-	1	2	2	2	2	1
CEF310-7 Select the site for station and yard.	3	3	2	2	3	-	-	1	1	2	2	2	1
CEF310-8Select propersite, alignment & illustrate component parts of bridge.	3	3	2	2	3	-	-	1	1	2	2	2	1
<b>CEF310-9</b> Identify& select the types of bridge.	3	2	1	1	2	-	-	1	1	2	2	2	1

# Section I

Sr. no.	Topics	Teaching (Hours)	Theory evaluation Marks
	A) Roads	<u> </u>	<u> </u>
	Course Outcome CEF310-1 Identify types of roads and al	ignment.	
1	Introduction	04	04
Cours	<ul> <li>1.1 Importance of Transportation Engg.</li> <li>1.2 Classification of Roads</li> <li>1.3 Alignment- selection, requirement &amp; factors affecting</li> <li>1.4 Brief introduction of traffic volume study.</li> </ul> se Outcome CEF310-2 Decide the geometric design and construction representation of the second	nethods of dif	ferent types of
roads.			
2	<ul> <li>Geometric Design</li> <li>2.1 Cross section in embankment &amp; in cutting, right of way, width of carriage way, shoulder, camber – definition and objects. With IRC values.</li> <li>2.2 Gradients – definition - types, IRC values, sight distance – types and various components.</li> <li>2.3 Super elevation- Definition, minimum and maximum values and objects.</li> </ul>	06	10
Cours roads.	se Outcome CEF310-3 Decide the geometric design and construction r	nethods of dif	ferent types of
3	<ul> <li>Construction of road</li> <li>3.1 Introduction to Rigid &amp; Flexible Pavements.</li> <li>3.2 Concept of W.B.M Roads , Construction procedure</li> <li>3.3 Technical terms - Bitumen, Asphalt, Cutback, Tar, Emulsion, Seal coat, Prime coat, Tack coat, surface dressing, grouted macadam, semi and full grout.</li> <li>3.4 Construction procedurebituminous carpet, bituminous concrete, bituminous bound macadam</li> <li>3.5 Concrete Roads - advantages and disadvantages, Construction procedure- Alternate and continuous bay method, Joints- necessity and types</li> </ul>	11	12
	B)Tunnels		
Cours	se Outcome CEF310-4 Select the shape of tunnel according to the purpos	e.	
4	Introduction of tunnels	02	04
	4.1 Necessity of tunnels.		
	4.2 Advantages and disadvantages of tunnels.		
	4.3 Shapes of tunnel & its suitability.		

Sr. no.	Topics	Teaching (Hours)	Theory evaluation Marks
Cours	se Outcome CEF310-5 Identify the methods of tunnel surveying and tunn	eling.	
5	Tunnel surveying	04	04
	5.1 Initial surveys		
	5.2 Setting out the alignment of tunnel on the ground		
	5.3 Transferring the alignment through shafts		
	5.4 Shaft – purpose and construction		
	Course Outcome CEF310-6 Identify the methods of tunnel survey	ing and tunnel	ing.
6	Tunneling and lining	05	06
	6.1 Tunneling in soft rock		
	6.2 Tunneling in hard rock		
	6.3 Methods of tunneling –shield method, full face heading		
	method,		
	6.4 Lining of tunnels – purpose and factors affecting		
	Total	32	40
	i viui	54	υ

# Section II

Sr. no.	Topics	Teaching (Hours)	Theory evaluation
			Marks
	C) Railways		
Cours	se Outcome CEF310-7 Identify different component parts and functions of	of permanent v	vay.
7	Permanent Way	08	14
	7.1 Definition, requirements, component and their functions,		
	coning of wheels.		
	7.2 Gauges – Different types		
	7.3 Rails – Functions, types, dimensions of Flat Footed Rails,		
	Creep of rails, Causes of creep.		
	7.4 Sleepers – Function of sleepers and their requirements, list of		
Sr. no.	Topics	Teaching (Hours)	Theory evaluation
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	Sleepers, sleeper density.		Marks
	7.5 Rail fixture and fastenings – Fish plate, spikes, their types,		
	bolts, chairs, blocks, keys, bearing plates.		
	7.6 Ballast – Functions and requirements, different types, their		
	merits and demerits.		
Cours	<i>The Outcome CEF310-8</i> Identify the terms related to points and crossings.		
8	Points and crossings-	06	06
	8.1 Definition, necessity, important technical terms,		
	8.2 Left hand and Right hand turnouts		
Cours	e Outcome CEF310-9 Select the site for station and yard.		
9	Stations and Yards –	06	06
	9.1 Stations - Definition, site selection, requirements,		
	Classification.		
	9.2 Yards – Definitions, types		
	D) Bridges		
Cours	e Outcome CEF310-8 Select proper site, alignment & illustrate compone	nt parts of brid	lge.
10	General	01	01
	10.1 Factors affecting Site selection and Alignment of Bridges		
Cours	e Outcome CEF310-8 Select proper site, alignment & illustrate compone	nt parts of bric	lge.
11	Component parts of the bridge	06	07
	11.1 Substructure – foundation, pier, abutment, wing walls –		
	Functions and types.		
	11.2 Superstructure – Components Slab, Girder, Box only		
	11.3 Types of Bearings for R C C Bridge		

Sr. no.	Topics	Teaching (Hours)	Theory evaluation Marks
	11.4 Approaches- types		
	11.5 Afflux, span, scour, waterway, freeboard, clearance,		
	economic span		
Cours	e Outcome CEF310-9 Identify & select the types of bridge.		
12	Types of Bridges	05	06
	12.1 Definition and Classification of Bridges		
	12.2 Definition and types of causeway( No sketches} & culvert		
	12.3 Sketches, merits & demerits of RCC girder bridge,		
	Prestressed girder bridge, simple suspension bridge		
	Total	32	40

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

## **Term Work**

## Specification table for setting question paper for semester end theory examination:

Topic No.	NT 64 ·	Distributio	n of marks (Cogn wise)	Course	Total	
	Name of topic	Remember	Understand	Applica- -tion	Outcome	Marks
1	Introduction	02	02	-	CCF310-1	04
2	Geometric Design	04	04	04	CCF310-2	12
3	Construction of road	04	06	04	CCF310-2	14
4	Introduction of tunnels	02	02	-	CCF310-3	04
5	Tunnel surveying	02	02	02	CCF310-4	06

6	Permanent way	04	04	06	CCF310-5	14
7	Points and crossing	02	02	02	CCF310-6	06
8	Stations and yards	02	02	02	CCF310-7	06
9	General	02			CCF310-8	02
10	Component parts of bridge	02	02	02	CCF310-8	06
11	Types of bridges	02	02	02	CCF310-9	06
Total		28	28	24		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

## I) TERM WORK

I

## Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work as detailed in the *Laboratoty for Transportation Engineering* developed by the Institute in practical sessions of batches of about 20students :

Sr	Title of Practical Exercise	Skills / Competencies to be	Course
No.		developed	Outcome
1.	<ul> <li>A)List of Practicals (any four):- <ol> <li>Penetration test on bitumen.</li> <li>Softening point test on bitumen.</li> <li>Ductility test on bitumen</li> <li>Flash and fire point test on bitumen.</li> <li>Viscosity test on bitumen</li> <li>Extraction of bitumen</li> </ol> </li> </ul>	<ol> <li>Self learning ability using laboratory journal</li> <li>Applying concepts stud</li> <li>Drawing real view diagrams of equipments.</li> <li>Time management and team working skills.</li> <li>Presentation skills</li> <li>Information collection regarding grade of bitumen.</li> <li>Understand different properties of bitumen.</li> </ol>	CEF310-3
2.	<ul> <li>J) Visits Repot with detailed Report (any four):-</li> <li>1) Visit to WBM road under construction</li> <li>2) Visit to concrete road under construction</li> <li>3) Visit to Bituminous road under construction</li> <li>4) Visit to Bridge site to study component parts</li> <li>5) Visit to Railway station to study station details and track geometrics</li> </ul>	<ol> <li>Time management, team working.</li> <li>Studying component parts of roads, railways, bridges.</li> <li>Understand, prepare and interpret the drawings related to work.</li> <li>Understand the procedure of construction of different types of road.</li> </ol>	CEF310-3 CEF310-6 CEF 310-10
3.	K) Assignment each one on road ,railway, tunnel, bridge	1. Applying concepts studied.	CEF 310-1 to CEF110-11

#### A) INDUSTRIAL EXPOSURE :

(Included in Laboratory Manual for Transportation Engg)

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Every chapter of theory syllabus
2.	Field examples of course application	Term-work assignment

## ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

## • Assessment Criteria for Term work :

#### i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 25 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	05
Cognitive	Application	10
	Operating Skills	10
Psychomotor	Drawing / drafting	10
	skills/presentation	
Affective	Discipline and punctuality	05
	50	

## ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given in *Laboratory Journal for Transportation Engineering* Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

## **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

#### **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Item Bank

#### **REFERENCE MATERIAL :**

#### a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	N.L.Arrora	Transportation Engg.	IPH New Delhi
2.	Khanna& Justo	Highway Engg.	Nemchand and brothers, Roorki
3.	S. C. Saxena&SatyapalArora	Railway Engg.	DhanpatRai and Sons
4.	S. C. Saxena	Tunnel Engg,	DhanpatRai and Sons
5.	Birdi and Ahuja	Road, railway and bridges	Standard book house

#### **COURSE ID:**

Course Name	: ADVANCE CONSTRUCTION TECH. & EQUIPMENT
Course Code	: CEF311
<b>Course Abbreviation</b>	: FACT

#### **TEACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s) : <nil >

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

**Evaluation Scheme:** 

Mode of	Progressive	Assessment	Total		
Evaluation	Theory	Practical	Theory	TW	Total
Duration	Two tests (1hour each)	One Skill Tests each of 2 hrs	One paper (3 hours)	As per Pro- forma VI	
Marks	20 each		80	50*	150

\* Assessment as per Pro-forma III for TW

## **RATIONALE :**

In the recent years large developments have taken place in the process of construction methods in the Civil Engineering Industry. A large variety of plants and equipments are used on small scale to large scale civil engineering projects to obtain quality construction and productivity. This subject is framed to induce knowledge of advanced construction methods and equipments used on construction sites.

## COMPETENCY

Apply principles of construction equipments to solve construction problems as follows.

**Cognitive** :Understanding and applying principles of construction equipments to engineering problems.

**Psychomotor :**i)Knowing operation of different equipments.ii)Drawing different types of Equipment.

Affective :Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

vi) hygiene vii) civic sense

#### **COURSE OUTCOMES :**

CEF311-1.Decide advance concreting equipments and methods for various civil works.

CEF311-2Decide the grouting equipments and methods for various civil works.

**CEF311-3**Toplan the soil stabilization technique.

**CEF311-4**To plan the method of formwork for heavy structures.

CEF311-5 Decide Hoisting and conveying equipments for various civil engg.projects.

**CEF311-6** Decide the earth moving equipments.

**CEF311-7**To plan types of crushers for different quarry sites.

CEF311-8To decide standard and special equipments for specific civil works.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels :1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Prob lem Solvi ng on field
<b>Competency:</b> Apply principles of construction equipment to solve construction problems as follows.	3	3	3	2	2	3	-	1	1	2	3	3	1
<b>CEF311-1</b> Decide advance concreting equipmentsandmethods for various civilworks	3	3	-	-	3	3	-	1	1	2	2	2	1
<b>CEF311-2</b> Decide the grouting equipments and methods for various civil works.	3	3	3	2	3	2	-	1	1	2	2	2	1
CEF311-3 Toplan the soil stabilization technique.	3	3	3	3	3	3	-	1	2	2	2	2	1
<b>CEF311-4</b> To plan the method of formwork for heavy structures.	3	3	3	3	2	3	-	1	1	2	2	2	1
<b>CEF311-5</b> Decide Hoisting and conveying equipments for various civil engg.projects.	3	3	1	1	3	3	2	1	1	2	2	2	1

		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Prob lem Solvi ng on field
<b>CEF311-6</b> Decide the earth moving equipments.	2	2	1	3	2	3	3	1	1	3	2		1
<b>CEF311- 7</b> To plantypes of crushers for different quarry sites	2	2	2	3	2	2	-	1	2	2	2	3	1
<b>CEF311-8</b> To decide standard and special equipments for specific civil works.	2	2	1	1	2	2	3	1	1	2	2	2	1

## **CONTENT : THEORY**

# Section – I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	various civil works.	urpinents a	la methods for
1	<ul> <li>Advanced Concreting methods</li> <li>1.1 Prestressed concrete: Grades of concrete &amp;prestressing cables, Methods of pre-tensioning and post -tensioning, Equipments and accessories for prestressing operations.</li> <li>1.2 Under water concreting:Under water concreting for bridge piers and bored piles construction, Tremy method of underwater concreting procedure and equipments required.</li> <li>1.3 Ready Mix concrete (RMC) : Necessity and use of Ready Mix Concrete, RMC plant : details of plants and equipments, Transit mixers : working and capacity also time of transportation, workability and time for RMC, Strength of RMC</li> <li>1.4 Tremix Concreting : Definition, application of vacuum dewatering, equipments used, procedure of tremix concreting Special concretes : Properties and uses of : Roller compacted concrete, Fiber reinforced concrete, Aspect Ratio</li> </ul>	10	16

	CourseOutcome-CEF 311-2 Decide the grouting equipments an works.	nd methods t	for various civil
2.	<ul> <li>Grouting</li> <li>2.1 Necessity of grouting</li> <li>2.2 Materialsused for grouting,</li> <li>2.3 Groutingpressure, drilling pattern, Equipment for grouting</li> <li>Typesof grout- cement grouting, clay grouting, chemical grouting Asphalt grouting. Uses of grouts in buildings, dams &amp; tunnels.</li> </ul>	05	08
	Course Outcome- CEF311-3Toplan the soil stabilization techni	que.	1
3	<ul> <li>Soil Reinforcing techniques</li> <li>3.1 Necessity of soil reinforcing</li> <li>3.2 Geo-synthetics (Brief idea)</li> <li>3.3 Slope stabilization in cutting and embankment by soil reinforcing techniques</li> </ul>	04	06
Cours	e Outcome – CEF311-4 To plan the method of formwork for heav	vy structures	8.
4	<ul> <li>Formwork</li> <li>4.1 Slip formwork : process of concreting with slip form</li> <li>4.2 Maivan :Brief idea</li> <li>4.3 Form work for Bridges,</li> <li>4.4 Form work <u>Heavy</u> Structures,</li> </ul>	05	10
Total		24	40
Semestone and the ab	ster end exam question paper should be such that total marks of and half times the marks allotted above but the candidates are a ove allotted marks only.	f questions of the formation of the form	on each topic is npt questions of

Section 1
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Sr.	Topics / Sub-topics	Lectures	Theory Evaluation		
NO.		(Hours)	(Marks)		
	<i>Course Outcome</i> – CEF311-5 Decide Hoisting and conveying equipments for various civil engg.projects.				
5	<ul> <li>Hoisting and conveying equipments</li> <li>5.1 Hoisting equipments : Principles and working of Tower crane, Crawler cranes, Truck mounted cranes, Gantry cranes, Mast cranes and Derricks</li> <li>Conveying equipments :Different types of trucks, dumpers, belt conveyors.</li> </ul>	05	08		
Cours	<i>e Outcome</i> – CEF311-6 Decide the earth moving equipments.	I			
6	<ul> <li>Earth moving equipments</li> <li>6.1 Excavating equipments : Working and output of bulldozers, Scrapers, Graders, Power Showels, Loader with Back Hoe, Draglines</li> <li>Compacting equipments : Uses of rollers, types of rollers : plain rollers, sheep footed rollers, pneumatic rollers, Rammers : use and working</li> </ul>	07	12		
Cours	e Outcome – CEF311-7 To plan types of crushers for different q	uarry sites.			
7	<ul> <li>Stone crushers &amp;Concreting equipments</li> <li>7.1 Stone Crushers: Types of stone crushers, working and capacities, equipment for the production of artificial sand</li> <li>Concreting equipments: Types of concrete mixers, weigh batching equipments, Equipments for transportation of concrete: trolleys, lifts, Transit mixer. Concrete Vibrators: Needle vibrators and Screed vibrators. Automatic concrete plants</li> </ul>	07	12		
	<i>Course Outcome</i> – CEF311-8 To decide standard and special e works.	equipments f	or specific civil		
8	Miscellaneous Equipments and management 8.1 Miscellaneous equipments: working of hot mix bitumen plant, Bitumen paver, TBM Equipment management : Standard equipment, special equipment, selection of equipment, Owning and hiring an equipment, economic life of an equipment maintenance of equipment	05	08		
TOTAL 24 4			40		
Seme one a the at	ester end exam question paper should be such that total marks of and half times the marks allotted above but the candidates are a pove allotted marks only.	f questions of the formation of the form	on each topic is npt questions of		

Toni		Distribution of	of marks (Cogniti			
c No.	Name of topic	Remember	Understand	Applica- tion	Course Outcome	Marks
1	Advance Concreting methods	04	04	08	CEF311-1	16
2	Grouting	02	04	02	CEF311-2	08
3	Soil reinforcing technique		04	02	CEF311-3	06
4	Formwork	02	04	04	CEF311-4	10
5	Hoisting and Conveying equipments	02	04	02	CEF311-5	08
6	Earth Moving equipments	02	06	04	CEF311-6	12
7	Stone crushers & concreting equipments	04	04	04	CEF311-7	12
8	Miscellaneous Equipments and management		04	04	CEF311-8	08
TOT AL		16	34	30		80

## Specification table for setting question paper for semester end theory examination :

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.)

## L) TERM WORK

## Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work practical sessions of batches of about 20 students :

Termwork is devided in two parts as below -

- 1) Field visits.
- 2) Assignment work.

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	<ul> <li>Field visits –</li> <li>Prestressed concrete : Pre-tensioning and Post tensioning methods</li> <li>Tremy method of under water construction</li> <li>Tremix concreting method</li> <li>Short notes on SFRC</li> <li>Formwork : Types and suitability</li> <li>Lifts / belt conveyors</li> <li>Vibratory rollers</li> <li>Excavating equipments</li> <li>Geosynthetics</li> <li>Transit mixers</li> <li>Stone crushers</li> <li>Hot Mix plant</li> </ul>	<ol> <li>5. Information collection and presentation in form of report</li> <li>6. Motivation through field exposure</li> <li>7. Presentation skills</li> </ol>	CEF311-1 to CEF311-8
2	<ul> <li>Assignment work.</li> <li>1.Advance concreting methods</li> <li>2.Grouting</li> <li>3.Soil reinforcing techniques.</li> <li>4. Formwork.</li> <li>5. Hoisting and conveying equipments.</li> <li>6. Earth moving equipments.</li> <li>7. Stone crushers and concreting equip.</li> <li>8.Miscellaneous equipments and Management.</li> </ul>	12. Detailed assignment on each chapter.	CEF311-1 to CEF311-8

## M) INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс
1.	Field Visits	Every chapter of theory syllabus
2.	Collecting data for assignment work.	Term-work assignment

## ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

## • Assessment Criteria for Term work :

## i) Continuous Assessment of Term Work:

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Comitivo	Understanding	05
Cognitive	Application	10
Developmentor	Operating Skills	10
Psychomotor	Drawing / drafting skills	10
A CC	Discipline and punctuality	10
Allective	Decency and presentation	05
	50	

#### ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted marks awarded in term workmark sheet as per *Assessment Pro-formalII*.

## **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

#### **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Question Bank

## **REFERENCE MATERIAL :**

## Books / Journals / IS Codes / Websites

## a)Reference Books:

Sr.	Author	Title	Publisher
No.			
1.	R.L. Peurifoy	Construction planning Equipments& methods	
2.	Sushilkumar	Building construction	PhadkePrakashan.
3.	S.C.Rangwala	Building construction	Khanna Publishers
4.	B.C.Punmia	Building Construction	SatyaPrakashan
5.	S.K.Sharma	Building Construction	S.Chand& co.

## **b) Recommended Further Readings:**

Sr. No.	Author	Title	Publisher
1	Barry	Construction of buildings vol-3	
		Handbook on building construction practices	

#### c)Codes of Practice: IS, BIS and international codes:

- 1. National Building Code of India 2005
  - 2. New National Building Code 2016.
- d) Websites:
  - 1. http://en.m.wikipedia.org/wiki/Bureau
  - 2. WWW.bis.org.in/other/earthquake
  - 3. WWW.standardsbis.in/scoperef/SRSP62

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#### COURSE ID:

Course Name	: Advanced Construction Materials
Course Code	: CEF312
<b>Course Abbreviation</b>	: FACM

## **TEACHING AND EVALUATION SCHEME :**

#### Pre-requisite Course(s) : None

#### **Teaching Scheme:**

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

#### **Evaluation Scheme :**

	Progressive	Assessment	Term End E		
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Total
Details of Evaluation	Average of two tests of 20 marks each	25 marks for each practical One PST of 25 marks	Term End Theory Exam (03 hours)	As per Proforma-III	
Marks	20		80	50	150

## **RATIONALE:**

A great awareness & huge concern towards environmental protection compelled us to discover, develop & make use of eco friendly construction materials. Also a trend of utilizing maximum natural resources like rain water, sunlight, wind etc change the planning & requirement of construction materials. In the recent past, Composite materials, Plastics, Aluminum and ceramics have been the dominant emerging materials. Students of civil engineering should be familiar with all new construction materials.

#### COMPETENCY

Apply facts, concepts, principles in advanced Construction Materials to solve engineering problems as follows :

Cognitive :Understanding and applying principles in construction materials to evolve best

material for various construction projects.

Psychomotor :i) To have an idea of best material ii) Suggest suitable material for

construction purpose.

Affective :Attitude of i) accuracy ii) safety iii) punctuality iv) aesthetic presentation

## **COURSE OUTCOMES :**

CEF312-1 To know History and developments of building materials.

CEF312-2 Know different advanced materials for wall construction.

CEF312-3 Know different materials available for doors, windows and partition walls and

suitability of each.

CEF312-4 Know types of Flooring, cladding, ceiling panels and its suitability.

CEF312-5 Know various roofing materials and its applications.

CEF312-6 To know advanced types of pipes and fixtures in plumbing, To know

Geo-synthetics, painting and water proofing.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation]

Commentaria		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basic knowledge	PO 2 Discipli ne knowle dge	PO 3 Experi ments and practic e	PO 4 Engine ering Tools	PO 5 The enginee r and society	PO 6 Enviro nment and sustain ability	PO 7 Ethics	PO 8 Individ ual and team work:	PO 9 Comm unicati on	PO 10 Life- long learnin g	PSO1 Plan and Design	PSO2 Constr uction and Mainte nance	PSO3 Prob lem Solvi ng on field
Competency: Apply facts , concepts, principles in advanced Construction Materials to solve engineering problems	3	3	1	2	2	2	-	1	1	1	2	3	1
<b>CEF312-1</b> To know History and developments of building materials	3	3	3	-	-	2	2	1	1	1	2	1	1
<b>CEF312-6</b> To know advanced types of pipes and fixtures in plumbing, To know Geo- synthetics, painting and water proofing.	3	3	3	-	-	2	-	-	2	2	2	2	2

<i>a</i>		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basic knowledge	PO 2 Discipli ne knowle dge	PO 3 Experi ments and practic e	PO 4 Engine ering Tools	PO 5 The enginee r and society	PO 6 Enviro nment and sustain ability	PO 7 Ethics	PO 8 Individ ual and team work:	PO 9 Comm unicati on	PO 10 Life- long learnin g	PSO1 Plan and Design	PSO2 Constr uction and Mainte nance	PSO3 Prob lem Solvi ng on field
<b>CEF312-2</b> Know different advanced materials for wall construction.	2	2	3	2	1	1	-	-	2	2	1	2	2
<b>CEF312-3</b> Know different materials available for doors, windows and partition walls and suitability of each.	3	3	3	1	-	3	-	-	2	3	2	2	3
<b>CEF312-4</b> Know types of Flooring, cladding, ceiling <b>panels</b> and its suitability.	3	3	3	-	-	2	-	-	2	2	2	2	2
<b>CEF312-5</b> Know various roofing materials and its applications.	2	2	3	2	1	1	-	-	2	2	1	2	2
CEF312-6 To know advanced types of pipes and fixtures in plumbing, To know Geo-synthetics, painting and water proofing.	3	3	3	1	-	3	-	-	2	3	2	2	3

# **CONTENT: THEORY**

## Section I

Sr.	Topics/ Sub Topics	Teaching	Theory
No.		(Hours)	Evaluation
G		. • •	(Marks)
Cours	e Outcome - CEF312-1 To know History and developments of building r	naterials.	
1	Introduction	05	08
	1.1 Introduction to Innovative building Materials,		
	1.2 History & developments,		
	1.3 Future building materials		
Course	1.4 Scope & Limitation.	traction	
Cours	e Ouicome - CEF312-2 Know different advanced materials for wall cons	truction.	
2	Wall	09	16
	2.1 Stabilized ,compressed Earth Blocks , Fal-G stabilized Mud		
	Blocks,		
	2.2 Bricks-, Fly ash, Sand-Lime, Red Mud burnt		
	2.5 Fly asn – Lime- Gypsum (Fai-G) products :- Lato/ Precast Stone –		
	2.4 Fly ash based light weight Aerated & cellular concrete walling		
	2.5 Bonding System e.g. Rat-Trap Bond		
	2.6 Composite Ferro cement systems		
	2.7 Ready mix plastering material		
	2.8 Plaster of Paris, Gypsum wall Plasters, Gypsum Plaster Boards		
	Adhesives,		
	(Only description, advantages, & application)		
Cours	<b><i>e Outcome</i> - CEF312-3</b> Know different materials available for doors, wit	ndows and par	tition walls and
		luo no una pui	
suitab	ility of each.		
3	Doors, windows and partition panels	10	16
	3.1 UPVC		
	3.3 Resin or Oxi chloride Cement Bonded Saw dust based		
	3.4 Natural Fibre Reinforced Polymer Composite. Ferro cement		
	Shutters.		
	3.5 FRP – Fibre reinforced plastic		
	3.6 Aluminum- plain, powder coated, Anodized		
	3.7 Heat and sound insulating materials		
	(Only description, advantages, & application)		
	Total	24	40
Corre	ton and arom quantion names should be such that (at 1 we should be at	on acch to '	in one and toth
Semes	the marks allotted above but the condidates are able to attempt suspinations	on each topic	is one and half
only	the marks another above but the candidates are able to attempt questions	s of the above	anoued marks
omy.			

Section	Π
Neccion.	

Sr. No.	Topics/ Sub Topics	Teaching (Hours)	Theory Evaluation
Cours	e Outcome - CEF312-4 Know types of Flooring, cladding, ceiling panels	and its suitabi	l ( <b>Marks</b> ) llity
4	Flooring, cladding, ceiling panels:	7	12
	<ul> <li>4.1 Ceramic, Marbonite, Vitrified, Artificial Marble flooring, Pavements Blocks.</li> <li>4.2 Synthetic flooring: PVC, linoleum and rubber floorings, Industrial flooring: epoxy, tremix and glass floorings. Other floorings: cork- tile and asphalt floorings</li> <li>4.3 Ceramic, Cement based artificial cladding tiles, Ready to use Tiles- Porch, Riser, Tread etc.</li> </ul>		
	<ul><li>4.4 False Ceiling boards, Gypsum based paneling &amp; ceiling tiles</li><li>4.5 Study of materials and constructional details of Expansion</li></ul>		
	joints Curtain Walls and Structural Glazing stabilized mud		
	blocks, micro concrete tiles, pre cast roofing elements.		
	(Only description, advantages & application)		
Cours	se Outcome - CEF312-5 Know various roofing materials and its application	ons.	
5	<ul> <li><i>Roofs:</i></li> <li>5.1 Life extended Thatch roofing,</li> <li>5.2 Pyramidal Brick roofing</li> <li>5.3 Cement bonded Fiber Roofing sheets,</li> <li>5.4 Micro concrete tile / stone Patti, Precast brick panels</li> <li>5.5 Ferro cement channel / shell units,</li> <li>5.6 Precast Waffle units/Channel units /cored units/ In-situ Thin Ribbed Slabs.</li> <li>(Only description, advantages &amp; application )</li> </ul>	7	12
Cours	se Outcome - CEF312-6 To know advanced types of pipes and fixtures in	plumbing, To	know
	Geo-synthetics, painting and water proofing.		
6	<ul> <li>Plumbing and other miscellaneous</li> <li>6.1 CPVC, APVC, UPVC, PPR, Composite Copper, plumbing pipes &amp; fixtures.</li> <li>6.2 Thermo Mechanically Treated Steel sections (TMT)</li> <li>6.3 Paints – Water based- Internal &amp; External.</li> <li>6.4 Construction Chemicals used in - Roof slab, plaster, flooring &amp; waterproofing.</li> <li>6.5 Types and properties of acoustic materials.</li> <li>6.6 Geo-synthetics</li> </ul>	10	16
	Total	24	40

Sr. No.	Topics/ Sub Topics	Teaching (Hours)	Theory Evaluation				
			(Marks)				
Semes	Semester end exam question paper should be such that total marks of questions on each topic is one and half						
times	times the marks allotted above but the candidates are able to attempt questions of the above allotted marks						
only.							

## Specification table for setting question paper for semester end theory examination

т •		Distribution of	Distribution of marks (Cognitive level-wise)			Total
no.	Name of topic	Remember	Understand	Applica- -tion	Outcome	marks
1	Introduction	04	04	-	CEF312-1	08
2	Wall	04	04	08	CEF312-2	16
3	Doors windows & partition panels	02	04	10	CEF312-3	16
4	Flooring, cladding and ceilings	04	04	04	CEF312-4	12
5	Roofs	04	04	04	CEF312-5	12
6	Plumbing & other Misc.	04	08	04	CEF312-6	16

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.)

# N) TERM WORK

## Practical Exercises and related skills to be developed :

The following exercises shall be conducted as Term Work in practical sessions of batches of about 20 students :

Sr	Title of Practical Exercise	Skills / Competencies to be	Course
No.		developed	Outcome
1	Term work contains assignments, market survey reports, information brochure, leaf-lets and pamphlets on the following 1) Fly Ash 2) Doors and windows made up of Advanced materials 3) Partition panels	<ol> <li>8. Information collection and presentation</li> <li>9. Motivation through field</li> </ol>	CEF312- 1 to 6

4) Structural Glazing	exposure
5) Flooring	10. Measuring sizes and it's
6) Cladding, ceiling panels	suitability
7) Roofs and pre cast roofing	11. Drawing real view
elements	diagrams
8) Plumbing	12. Time management, team
9) Construction Chemicals	working and presentation
10) Geo-syntheticsHeat and sound	skills
insulating materialsAcoustic	13. Choice of proper
materials	material
	14. Applying concepts
	studied

## **O) INDUSTRIAL EXPOSURE :**

SN	Mode of Exposure	Торіс
1.	Collecting Leaf-lets, Pamphlet	Every chapter of theory syllabus
2.	Observing actual advanced materials	For T.W. 1 to 12

## ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

## • Assessment Criteria for Term work :

#### i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Comitivo	Understanding	05
Cognitive	Application	05
Psychomotor	Operating Skills	10
	Drawing / drafting skills	10
Affactive	Discipline and punctuality	10
Allective	Decency and presentation	10
	TOTAL	50

# ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 50 marks shall be conducted as per criteria given in *Laboratory Manual for Applied Mechanics* 

Final marks of term work shall be awarded as per *Assessment Pro-forma III* **INSTRUCTIONAL STRATEGIES :** 

## **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

# **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Item Bank
- 5. Leaf-lets, Pamphlet's, etc. pertaining to construction materials

## **REFERENCE MATERIAL :**

## a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	Sushilkumar	Building construction	Standard book house
2.	B.C Punmia	Building construction	Standard book house
3.	W.B.Meckay	Building construction	Pearson India
4.	F. Mitchell	Building construction	Batsford Ltd
5.	-	National Building Code	Bearau of Indian Standards

#### **COURSE ID:**

Course Name	: HIGHER MATHEMATICS
Course Code	: CEF 313
Course Abbreviation	: FHMT

#### **TEACHING AND EVALUATION SCHEME:**

Pre-requisite Course(s) : Engineering Mathematics & Applied Mathematics

#### **Teaching Scheme :**

Scheme component	Hours / week	Credits
Theory	03	05
Tutorial	02	_

#### **Evaluation Scheme :**

	Progressive As	sessment	Terr	n End	Total
Com ponent	Theory	Practical	Theory	Practical	Total
Details and Duration	Average of two tests of 20 marks each	Assignments given by teacher	Term End Theory Exam (03 hours)		
Marks	20	50	80		150

## **RATIONALE:**

Mathematics is an important pre-requisite for the development and understanding of engineering and technological concepts. For an engineer and technologist, knowledge of Mathematics is an effective tool to pursue and to master the applications in the engineering and technological fields. The connection between Higher Mathematics and its applications in real life can be understood and appreciated. Finite Differences helps in finding population ,temperature of a city etc. Laplace Transform is used to solve ordinary differential equations .

#### **Competency:**

The course should be taught and implemented with the aim to develop the following qualities

**1.Cognitive:** understanding ,remembering and applying principles of mathematics to engineering problems

2. **Psychomotor**: To prepare difference table ,to compute interpolation ,extrapolation and missing values in engineering data

3. Attitude: discipline, consistency, hard work, to concentrate ,accuracy, punctuality, aesthetics

# **Course Outcomes(CO's)**

The student will be able to:

CEF 313.1 Apply methods of finite differences to Engineering and technical field..

**CEF 313. 2** Apply rules and methods of partial differentiation to solve Engineering and technical Problems

CEF 313.3 To equip student with tools of Laplace transform and Linear Differential equations

with constant coefficients to enable him to use in Engineering and technology. **CEF313.4** To equip students with the techniques of solving Linear differential equations with

constant coefficients

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Comm unicati on	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Decisi on & solvin g probl ems
<b>Competency:</b> to apply the mathematical techniques for engineering subjects.	3	2	3	2	-	-	1	2	1	3	2	1	3
CEF 313.1 Apply methods of finite differences to Engineering and technical field.	3	2	2	-	-	-	1	1	1	3	2	1	3
CEF 313.2 Apply rules and methods of partial differentiation to solve Engineering and technical Problems	3	2	3	-	-	-	1	1	1	3	1	1	3
CEF 313.3 To equip student with tools of Laplace transform and Linear Differential equations with constant coefficients to enable him to use in Engineering and technology	3	2	3	1	2	-	1	2	3	3	3	2	3
CEF 313.4 To equip student with techniques to solve d Linear Differential equations with constant coefficients.	3	2	3	1	2	-	1	2	3	3	3	2	3

# **CONTENT:**

# K. THEORY :

Section I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Cours	se Outcome CCF313-1 : Apply methods of finite differences to	Engineering	and
techn	ical field.		
1	1 FINITE DIFFERENCE		
	Finite differences, forward difference $\Delta$ , Backward differences $\nabla$ , Operator E and Difference tables.		
	<ul> <li>1.1 Inverse of E, Δ,∇,</li> <li>1.2 Factorial notations of polynomials</li> <li>1.3 To find missing terms by using difference table</li> <li>1.4 Newton's forward &amp; backward differences interpolation formulae (Examples )</li> <li>1.5 Lagrange's interpolation formula for unequal intervals.(Examples )</li> </ul>	12	20
Cours	se Outcome CCF313-2 : Apply rules and methods of partial diff	erentiation t	o solve
	Engineering andtechnical Problems		
2	<ul><li>2 PARTIAL DIFFERENTIATION</li><li>2.1 Partial Derivatives of first order (Definition,</li></ul>		
	Examples)		
	2.2 Partial Derivatives of higher Order (Definition, Examples )	12	20
	2.3 Homogeneous functions , Euler's theorem on homogeneous functions (Examples )		
	2.4 Jacobians ( Definition, Examples )		
	Total	24	40
1.Sen is one the ab	hester end exam question paper should be such that total marks and half times the marks allotted above but the candidates are pove allotted marks only.	l s of question able to atten	Is on each topic opt questions of

2.In each topic, corresponding applications will be explained

Section 1	Π
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Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Cours Differ techn	se Outcome CCF313-3 : To equip student with tools of Laprential equations with constant coefficients to enable him ology.	place transfo to use in E	orm and Linear ingineering and
3	LAPLACE TRANSFORM	12	20
	3.1 Definition ,Linearity property		
	3.2 Laplace Transforms of Standard functions		
	3.3 First shifting property		
	3.4 Examples on Multiplication by t <sup>n</sup>		
	3.5 Examples on Division by t		
	3.6 Inverse Laplace Transform, Definition		
	3.7 Standard formulae (Examples )		
	3.8 Inverse L.T.by using First shifting property		
	3.9 Inverse L.T. by using Partial fraction method,		
	3.10 Inverse L.T. by using Convolution theorem		
	3.11Applications of Laplace transforms		
	3.12 To solve differential equation using Laplace		
	Transform		
<i>Cours</i> differ	se Outcome CCF313-4 : To equip students with the tecl ential equations with constant coefficients	nniques of	solving Linear
4	LINEAR DIFFERENTIAL EQUATION WITH CONSTANT COEFFICIENTS	12	20
	4.1 Definition,Operator D, Inverse of D		
	4.2 To find C.F. of L.D.E. When		
	i)roots are real and equal,		
	ii)Roots are real and unequal		
	iii) Roots are Imaginary and a pair of equal imaginary roots		
	4.3 To find P.I.of following cases		
	i)RHS=e <sup>x</sup>		
	ii)RHS=sin ax or cos ax		

Sr. No. Cours Differ techno	<b>Topics / Sub-topics</b> se Outcome CCF313-3 : To equip student with tools of Lap rential equations with constant coefficients to enable him to ology.	<b>Lectures</b> ( <b>Hours</b> ) blace transfe to use in E	Theory Evaluation (Marks) orm and Linear ngineering and				
	iii)RHS=x <sup>n</sup>						
	Total	24	40				
<ol> <li>Semis one the ab</li> <li>In e</li> </ol>	<ul> <li>1.Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.</li> <li>2 In each topic corresponding applications will be explained.</li> </ul>						

Topic	Name of tonic	Distrib	Total		
No.	Name of topic	Knowledge	Comprehension	Application	Marks
1	Finite Differences	4	6	10	20
2	Partial Differentiation	4	6	10	20
3	Laplace Transform	4	6	10	20
4	L.D.E. With constant Coefficients	4	6	10	20

## Specification table for setting question paper for semester end theory examination:

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

## L. PRACTICALS.

Sr	Торіс	<b>Tutorial Content (10 problems in each tutorial)</b>			
No.			OUTCOMES		
1	Finite Differences	To evaluate examples on operators as $E$ , $\Delta,\nabla$ and Factorial notation	CEF313 - 1		
2	Finite Differences	To evaluate Newton's forward & backward differences interpolation formulae	CEF313 - 1		
3	Finite Differences	To evaluate Lagrange's interpolation formulae	CEF313 - 1		
4	Partial Differentials.	To evaluate Partial Derivatives of higher Order Homogeneous functions,	CEF313 - 2		
5	Partial Differentials.	To evaluate examples on Euler's theo. On homogeneous functions,	CEF313 - 2		
6	Laplace transform	Examples on first shifting property ,Multiplication by the Property, Division by t property	CEF313 - 3		
7	Laplace transform	Examples on inverse L.T. by Partial fraction method	CEF313 - 3		
8	L.D.E. With constant coefficient	Examples on Different types of C.F.	CEF313 - 4		
9	L.D.E. With constant coefficient	Examples on Different types of P,I,	CEF313 - 4		
10	L.D.E. With constant coefficient	Examples to solve various types of differential equations	CEF313 - 4		

Note: Practicals are to be used to get enough practice [One batch for 20 Students]

## **INSTRUCTIONAL STRATEGIES:**

## **Instructional Methods:**

- 1. Lectures cum Demonstrations
- 2. Tutorials

## **Teaching and Learning resources:**

- 1. Chalk board
- 2. Item Bank
- 3 Formulae Charts
- 4 Power point presentation

## **REFERENCE MATERIAL:**

## a) Books:

Sr. No.	Author	Title	Publisher
1.	G.V. Kumbhojkar	Engineering Mathematics III	PhadakePrakashan, Kolhapur
2.	P.N. Wartikar	Applied mathematics	Pune vidyarthiGriha Prakashan , pune
3	H.K. Dass	Higher engineering mathematics	S .Chand publication
4	B.S.Grewal	Higher engineering Mathematics	Khanna publication, New Delhi

# b) Websites

i) www.khanacademy.org

ii) www.easycalculation.com iii) www.math-magic.com

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#### **COURSE ID:**

Course Name	: MAINTENANCE AND REHABILITATION OF				
	STRUCTURES				
Course Code	: CEF314				
<b>Course Abbreviation</b>	: FMRS				

## **TEACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s)	: - Nil -
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#### **Teaching Scheme :**

Scheme Component	Hours / week	Credits
Theory	03	05
Practical	02	

#### **Evaluation Scheme :**

	Progressiv	ve Assessment	Term End Examination					
Mode of Evaluation	Theory Practical		Theory Examination		Oral Examination (External)	Total		
Details of Evaluation	Average of two tests of 20 marks each		Term End Theory Exam (04 hours)	As per Proforma- VI				
Marks	Marks 20		80	50		150		

#### **RATIONALE :**

The natural hazards lead to unfit the existing structures for their use by weakening the strength of members. Detailed investigation of failure pattern, evaluating strength of existing structures decides the remedial approach and techniques. For maintenance and rehabilitation, a rational and technical base is essential instead of leaving it to experience of masons. If the cost of maintenance and restoration happens to be intolerable then one has to obsolete the maintenance. Thus the estimate and preparation of tenders requires special attention.

#### **COMPETENCY :**

Apply principles of maintenance and rehabilitation structures as follows :

**Cognitive :** Understanding and applying principles of maintenance and rehabilitation structures **Psychomotor :** i) Calculating skills ii) drafting skills

Affective : Attitude of i) precision ii) accuracy iii) safety iv) punctuality

#### **COURSE OUTCOMES :**

CEF314-1Explain requirements and types of maintenance of buildings

CEF314-2Explain distress diagnostics and carry out inspection of damaged structure

CEF314-3Explain weather effect on concrete structure

CEF314-4 Identify materials for repair and explain repair techniques

CEF314-5Explain repair work of concrete and masonry buildings

CEF314-6Explain demolition techniques for structures

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Problem Solving on field
<b>Competency:</b> Apply principles of maintenance and rehabilitation of structures	-	3	-	2	-	-	-	1	2	1	2	2	1
CEF314-1 Explain requirements and types of maintenance of buildings	-	3	-	2	-	-	-	1	2	1	2	2	1
CEF314-2 Explain distress diagnostics and carry out inspection of damaged structure	-	3	-	2	-	-	-	1	2	1	2	2	1

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Problem Solving on field
CEF314-3 Explain weather effect on concrete structure	-	3	-	2	-	-	-	1	2	1	2	2	1
<b>CEF314-4</b> Identify materials for repair and explain repair techniques	-	3	-	2	-	-	-	1	2	1	2	2	1
CEF314-5 Explain repair work of concrete and masonry buildings	-	3	-	2	-	-	-	1	2	1	2	2	1
CEF314-6 Explain demolition techniques for structures	-	3	-	2	-	-	-	1	2	1	2	2	1

## **CONTENTS** :

## A) THOERY

Section I

Sr.	Topics	Teaching	Theory Evaluation
INO.		(Hours)	(Marks)
	Course Outcome : CEF314-1Explain requirements and types of mainte	enance of build	lings
1.	Maintenance of buildings	04	12
	1.1 Introduction		
	1.2 Importance of maintenance		
	1.3 Types of maintenance		
	1.4 General maintenance : Painting of buildings, home electricity		
	system		
C	ourse Outcome : CEF314-2Explain distress diagnostics and carry out inspec	ction of damag	ed structure
2	Repair strategies	06	14
	2.1 Causes of distress in structures		
	2.2 Construction and design failures		
	2.3 Condition assessment and distress diagnostic technique		
	2.4 Inspection and evaluation of damaged structures		
	<b>Course Outcome : CEF314-3</b> Explain weather effect on concre	te structure	
3	Durability and serviceability of concrete	06	14
	3.1 Quality assurance for concrete construction based on concrete		
	properties like strength, permeability, cracking and thermal		
	properties		
	3.2 Effects due to chimate, temperature, chemicals and corrosion		
	3.4 Effects of covers		
	Total	16	40
C			11 10
Seme	ester end exam question paper should be such that total marks of questions o	n each topic a	re one and half
umes	and marks anotice above. Candidate can attempt questions for the above and	ueu marks	

# Section II

Sr. no.	Topics	Teaching (Hours)	Theory evaluation
		(Hours)	Marks
	Course Outcome : CEF314-4 Identify materials for repair and explain	n repair technic	lues
4	Materials and techniques for repair	06	14
	4.1 Materials for repair : Special concretes and mortar, concrete		
	chemicals, construction chemicals, expansive cement, polymer		
	concrete, sulphur infiltrated concrete, ferrocement, fibre		
	reinforced concrete, rust eliminators and polymer coating for		
	rebars, foamed concrete, dry pack, vacuum concrete, asphalt		
	sheeting		
	4.2 Techniques for repairs : Gunning, grouting and shotcrete,		
	4.3 Methods of corrosion protection : Corrosion inhabitators		
	corrosion resistant steel, coatings and cathodic protection		
	<b>Course Outcome : CEF314-5</b> Explain repair work of concrete and m	asonry buildin	ıgs
5	Repair, retrofitting and rehabilitation	06	16
	5.1 Repairs of stone brick and block masonry (cracks, dampness		
	efflorescence, joint separation), flooring, roofs,		
	5.2 Concrete members (steel corrosion, lack of bond, shear,		
	tension, compression, torsion failure),		
	5.3 Rain water leakage in buildings, basement and toilet area		
	5.4 Control of termites in building		
	5.5 Fungus decay of wood works in buildings		
	5.6 Estimation of repairs and retrofitting		
	Course Outcome : CEF 314-6Explain demolition techniques fo	or structures	
6	Demolition and dismantling techniques	04	10
	6.1 Definition		
	6.2 Demolition techniques : Non-engineering (manual) demolition,		
	engineering demolition $-i$ ) Racking ball method, pusher arm		
	technique, thermic lance technique, non-explosive demolition,		
	concrete sawing method vi) deliberate collapse method, vii)		
	pressure jeuing		
	6.4 Dismantling of buildings and reuse of materials from		
	environmental and financial point of view		
	Total	16	40
Seme	tester end exam question paper should be such that total marks of questions of	n each topic a	re one and half
times	s the marks allotted above. Candidate can attempt questions for the above allo	tted marks	

Topic	Name of Topic	Distributio	Total		
No.	Name of Topic	Remember	Understand	Apply	Marks
1	Maintenance of buildings	02	04	06	12
2	Repair strategies	02	04	08	14
3	Durability and serviceability of concrete	02	04	08	14
4	Materials and techniques for repair	02	04	10	14
5	Repair, retrofitting and rehabilitation	02	04	06	16
6	Demolition and dismantling techniques	02	04	06	10
	Total	12	22	46	80

#### Specification table for setting question paper for semester end theory examination

## **B) TERM WORK**

Term work contains the following

1)To prepare a study report on causes of deterioration and defects in one building. (CEF314-1)

2) To prepare the checklist for inspection of buildings regarding maintenance and demolition(CEF314-2)

3)To prepare a survey report of repair materials and construction chemicals for various

repair and maintenance works. (CEF314-4)

4) To prepare a survey report of repair tools and equipment for various repair and

maintenance works. (CEF314-4)

5) To prepare study report for causes of corrosion of steel reinforcement in RCC structure

and suggest the remedial measures. (CEF314-4)

- 6) To prepare a study report of demolition, safety aspects in demolition of a structure. (CEF314-6)
- Micro project : To prepare and present a case study of above assignments in a seminar type situation

## C) INDUSTRIAL EXPOSURE

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Topics of theory syllabus
2.	Field examples of course application	Term-work assignment on study of professional
		drawings, use of software and field visits
3.	Field visits	Term work

#### **IMPLEMENTATION STRATEGY :**

#### **Instructional strategies:**

- 1. Lectures and discussions
- 2. Time bound regular home assignments
- 3. Industrial visits
- 4. Case study

# **Teaching and Learning Resources:**

- 1. Chalk-board
- 2. Models and Magnetic cut-outs
- 3. Demonstrative charts
- 4. Computer aided presentations

## **INSTRUCTIONAL STRATEGY:**

- 1. Lecture cum discussions.
- 2. Practical work.
- 3. Field Visits.

## **Reference Books.**

Sr No	Author	Title	Publisher
01	P.K. Guha	Maintenance and Repairs of Buildings	New Central Book Agencies
02	Nayak B.S.	Maintenance Engineering For Civil Engineers	Khanna Publication
03	Hutchin Son, BD	Maintenance and Repairs of Buildings	Newnes – Butterworth
04	Ransom. W. H.	Building Failures – Diagnosis and Avoidance	E and F. N. Span
05	P.S. Gaholt, Sanjay Sharma	Building Repair and maintenance management	CBS Publishers and Distributors, N. Delhi
06	Denison Campbell allen and Harold Roper	Concrete Structures Materials, Maintenance and Repairs.	Longman Scientific and Technical UK 1991
07	Allen R.T amd Edwares S.C.	Repair of Concrete Structures	Blakie and Sons UK 1987
08	Raikar R.N.	Learning From failures Deficiencies in Design, Construction and Service	R & D center (SDCPL) Raikar Bhavan Bombay 1987
09	Santhakumar A.R.	Concrete Technology	Oxford University Press Printed in india byy Radha Press New Delhi 2007
10	Peter H Emmons	Concrete Repair and Maintenance IIIustrated	Galgotia Pubilications PVT.Ltd., 2001

\* \* \*
#### **COURSE ID:**

Course Name	: ENERGY CONSERVATION & AUDIT
Course Code	: CEF315
<b>Course Abbreviation</b>	: FECA

# **TEACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s) : <nil >

#### **Teaching Scheme :**

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	_

**Evaluation Scheme:** 

Mode of	Progressive	Assessment	Total		
Evaluation	Theory	Practical	Theory	TW	
Duration	Two tests (1hour each)	One Skill Tests each of 2 hrs	One paper (3 hours)	As per Pro- forma VI	
Marks	20 each		80	50*	150

\* Assessment as per Pro-forma III for TW

# **RATIONALE :**

Technological development in all sectors has caused imbalance in energy generation and it's consumption. Energy conservation is a scientific tool provided to minimize the energy imbalance. This is one of the rapid emerging field in the area of engineering hence this has been included as core technology subject.

The contents on energy conservation techniques in lighting techniques in lighting systems, Induction Motors, Air Compressors, Mixers, Dumpers, Cranes, Sanitary Equipment, will be useful to reduce energy losses and wastage in commercial and industrial sectors.

The topic on energy audit will be useful tool to participate in energy conservation program of the nation.

# COMPETENCY

Apply principles of energy management to solve construction problems as follows.

**Cognitive :**Understanding and applying principles of energy management to solve civil engineering problems.

**Psychomotor :**i)Knowing operation of different equipments.ii)Identifying energy losses and wastage.

Affective :Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

vi) hygiene vii) civic sense

# **COURSE OUTCOMES :**

CEF315-1.Identify the need of Energy Conservation.
CEF315-2 Suggest methods to improve Energy Conservation.
CEF315-3 Identify Energy Conservation opportunities.
CEF315-4 Use Energy Conservation Building Code to build energy efficient buildings.
CEF315-5 Use WBP to build energy efficient buildings.
CEF315-6 Identify the opportunity to reduce the energy bill.
CEF315-7 Use of IGBC to build energy efficient buildings.
CEF315-8 Select proper Energy conservation equipments.
CEF315-9 Select Energy Audit instruments.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels :1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply principles of construction equipment to solve construction problems as follows.	3	3	3	2	2	3	-	1	1	2	3	3	1
CEF315-1.Identify the need of Energy Conservation	3	3	-	-	3	3	-	1	1	2	2	2	1
CEF315-2 Suggest methods to improveEnergyConserva tion.	3	3	3	2	3	2	-	1	1	2	2	2	1
CEF315-3 Identify Energy conservation opportunities	3	3	3	3	3	3	-	1	2	2	2	2	1
CEF315-4 Use Energy Conservation Building Code to build energy efficient buildings.	3	3	3	3	2	3	-	1	1	2	2	2	1
CEF315-5 Use WBP to build energy efficient buildings.	3	3	1	1	3	3	2	1	1	2	2	2	1
CEF315-6 Identify the opportunity to reduce the energy bill	2	2	1	3	2	3	3	1	1	3	2	2	1
CEF315-7Use of IGBC to build energy efficient buildings.	2	2	2	3	2	2	-	1	2	2	2	3	1
CEF315-8 Select proper Energy Conservation equipments	2	2	1	1	2	2	3	1	1	2	2	2	1
CEF315-9 Select Energy Audit instruments.	2	2	1	1	2	2	2	1	1	2	2	2	1

# **CONTENT : THEORY**

Section – I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation
		(1100110)	(Marks)
	Course Outcome- <b>CEF315-1</b> .Identify the need of Energy Cons	ervation.	
1	<ul> <li>Energy Conservation <ol> <li>Present energy scenario of world and India and need of energy conservation.</li> <li>Energy and Conservation : Defination, Importance of energy conservation, Impact on environment and economy</li> <li>Role of renewable energy in energy conservation.</li> <li>Bureau of energy efficiency : Its formation and functions.</li> <li>Function of Government Organisation in the field of energy conservation (NPC, MNRE, BEE, APEDA)</li> </ol> </li> </ul>	02	06
CourseOutcome-CEF 315-2 Suggest methods to improve Energy Conservation			
2.	<ul> <li>Energy Conservation in Lighting system</li> <li>2.1 Basic terms used in Lighting system (Illumination).</li> <li>2.2 Recommended Luminance levels.</li> <li>2.3 Procedure for assessing existing lighting system in facility.</li> <li>2.4 Energy Conservation techniques in lighting system.</li> <li>By replacing lamp sources</li> <li>Using energy efficient luminaries</li> <li>Using light controlled gears</li> <li>By installation of separate transformer / servo stabilizer for lighting</li> <li>Periodic survey and adequate maintenance programs</li> <li>Energy Conservation techniques in fans , electronics regulators .</li> </ul>	08	12

	Course Outcome-CEF315-3 Identify Energy Conservation opp	ortunities.	
3	<ul> <li>Energy Conservation in transformers &amp; distribution</li> <li>3.4 Need of energy conservation in transformers</li> <li>3.5 Energy efficient transformers <ul> <li>-Amorphous transformers</li> <li>-Epoxy resin cast transformers(dry type transformer)</li> </ul> </li> <li>3.6 Periodic maintenance</li> <li>3.7 Types of losses in distribution system(commercial &amp; Technical losses)</li> <li>3.8 Energy Conservation techniques distribution system related to technical losses <ul> <li>By reducing I<sup>2</sup>R losses.</li> <li>By compensating reactive power flow.</li> <li>By optimizing distribution voltage.</li> <li>By using energy efficient transformers.</li> </ul> </li> <li>3.6 Energy conservation techniques related to commercial distribution voltage.</li> <li>By using energy efficient transformers.</li> </ul>	06	08
	Course Outcome – CEF315-4 Use Energy Conservation Build efficient buildings.	ding Code	to build energy
4	<ul> <li>Energy conservation Building Code (ECBC)</li> <li>4.1 Purpose of the code</li> <li>4.2 Scope of its use</li> <li>4.3 Applicable building systems and exceptions</li> <li>4.4 Compliance requirements</li> <li>4.5 National Building Code</li> <li>4.6 Mandatory requirements for new building</li> <li>4.7 Power consumptions, rating of appliances and equipments (star rating)</li> <li>4.8 Climate zones of India used in ECBC</li> <li>4.9 ECBC requirements for different climate zones</li> </ul>	08	14
Total	2	4	40
Seme	ster end exam question paper should be such that total marks	of guestion	s on each topic
is one of the	and half times the marks allotted above but the candidates are above allotted marks only.	able to att	empt questions

#### Section II

Sr. No.	Topics / Sub-topics		Theory Evaluation (Marks)		
	Course Outcome – CEF315-5 Use WBP to build energy efficien	t buildings.			
5	Whole Building Performance (WBP)	02	04		
	5.1 Benefits of WBP				
	5.2 Scope of WBP : No HVAC in the building, alteration, additions to existing buildings, application of code for exclusion for part of existing building				
	5.3 steps for compliance of ECBC for WBP method				
	5.4 Documentation requirements				
	<i>Course Outcome</i> <b>CEF315-6</b> Identify the opportunity to reduce	the energy	bill.		
6	<ul> <li>Relation between tariff and Energy Conservation</li> <li>6.1 Type of tariff structure</li> <li>6.2 Terms involved in tariff</li> <li>6.3 Specific tariff : <ul> <li>Time of day tariff</li> <li>Peak of day tariff</li> <li>Power factor tariff</li> <li>Maximum demand tariff</li> <li>Load factor tariff</li> <li>6.4 Application of tariff system to reduce energy bill</li> <li>6.5 Simple numerical based on power factor and load factor tariff</li> </ul> </li> </ul>	05	08		
	Course Outcome – CEF315-7 Use of IGBC to build energy efficient buildings.				
7	<ul> <li>Leadership in energy and environment design (</li> <li>LEED) and Indian Green Building Council</li> <li>7.1 Meaning of the term LEED</li> <li>7.2 Brief History</li> <li>7.3 Credit categories and distribution of base points for these categories and level of certifications</li> <li>7.4 Indian Green Building Council (IGBC)</li> <li>7.5 IGBC Green new buildings rating systems</li> <li>7.6 Scope and benefits of IGBC</li> <li>7.7 Levels of certification</li> </ul>	05	08		

	Course Outcome CEF315-8 Select proper Energy conservation	equipment	5.
8	<ul> <li>Energy Conservation Methods in Civil and Construction Engineering</li> <li>8.1 What is energy conservation equipment ?</li> <li>8.2 energy conservation equipment related to lighting system : <ul> <li>Centralised control equipment (Microprocessor based)</li> <li>Occupancy sensors / Motion detectors</li> <li>Control gears : Dimmers, Regulators and stabilizers</li> <li>Use of solar and wind energy equipments</li> <li>8.3 Energy conservation techniques related to Civil and Construction Engineering</li> <li>Selection of equipment as per scope of work and knowledge of suitable maintenance strategy of maximum productivity and optimum maintenance cost</li> <li>Cost saving and energy saving techniques /measures and modifications to achieve reduction in O &amp;M expenditures</li> <li>Apply Root Cause Failure Analysis (RCFA) to take corrective steps to avoid repetitive failures</li> <li>Provision for training of support staff to develop their skills</li> </ul> </li> </ul>	07	12
I	Course Outcome CEF315-9 Select Energy Audit instruments.		
9	<ul> <li>Energy Audit</li> <li>9.1 Energy flow diagrams and its significance</li> <li>9.2 Energy audit instruments and their use.</li> <li>9.3 Prepare questionnaire for energy audit projects.</li> <li>9.4 ABC analysis and its advantages referred to energy audit projects.</li> <li>9.5 Energy Audit procedure (walk through audit and detailed audit)</li> <li>9.6 Calculation of simple payback period (simple numerical)</li> </ul>	05	08
TOTAL	24	40	
Semes is one	ster end exam question paper should be such that total marks and half times the marks allotted above but the candid	of question ates are at	s on each topic ble to attempt

questions of the above allotted marks only.

	Distribution of marks (Cognitive level-wise)					Total
Topi c No.	Name of topic	Remember	Understand	Applica- tion	Course Outcome	Marks
1	Energy Conservation	02	02	02	CEF315-1	06
2	Energy Conservation in Lighting system	02	04	06	CEF315-2	12
3	Energy Conservation in Lighting system	02	02	04	CEF315-3	08
4	Energy Conservation Building Code	02	06	06	CEF315-4	14
5	Whole Building Performance (WBP)	02	02		CEF315-5	04
6	Relation Between Tariff & Energy Conservation	02	02	04	CEF315-6	08
7	Leadership in Energy &Environmental Design (LEED)&(IGBC)	02	02	04	CEF315-7	08
8	Energy Conservation methods in Civil & Construction Engineering	02	04	06	CEF315-8	12
9	Energy Audit	02	02	04	CEF315-9	08
TOT AL		18	26	36		80

#### Specification table for setting question paper for semester end theory examination :

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.)

# P) TERM WORK

# Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work practical sessions of batches of about 20 students :

Termwork is devided in three parts as below -

1) Field visits.

2) Assignment work.

3) Market Survey

3) Practicals

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	<ul> <li>Field visits - <ol> <li>collect the information about Energy</li> <li>conservation Building Code.</li> </ol> </li> <li>Visit to any organization Where <ul> <li>Energy Conservation program is</li> <li>implemented.(e.g.Hospitals,Workshops, Commercial Buildings, Residential buildings.)</li> </ul> </li> </ul>	<ul> <li>15. Information collection and presentation in form of report</li> <li>16. Motivation through field exposure</li> </ul>	CEF315- 1toCEF315- 09
2	<ul> <li>B. Market Survey</li> <li>1) Collect information by market survey and prepare report on specifications,cost,list of manufacturers of various types of energy efficient Induction Motors, Air Compressors,MixersDumpers,Cranes,SanitaryEquipment s,Air Conditioners etc.</li> </ul>	<ul><li>17. Self learning ability</li><li>18. Presentation skills</li></ul>	CEF315- 1toCEF315- 09
3	<ul> <li>C Assignments:</li> <li>Prepare write up on role of energy manager and energy auditor.</li> <li>Make a comparative study of energy efficient motors, Air compressors, Mixers, Dumpers, cranes, sanitary equipments, Air conditioners etc. Used in construction industry and service industries on the basis of energy efficient, cost, life, energy saving and saving in energy bill.</li> <li>Using various energy audit instruments used for measurement of electrical , mechanical and thermal energy parameters, carryout energy audit and prepare a report as a case study for Residence, small workshop, public library, hospital etc. (inclusive of Data Collection processes)</li> </ul>	1.Information collection and presentation in form of report 2.Motivation through field exposure	CEF315-6-

D. Practicals		
1. Study design of existing building		
Applying IGBT standards and rate the		
Building.		
19. Study of different passive techniques to reduce Energy	1.Information	
consumption.	collection and	
20. Study of different Electrical fixtures in the building to	presentation in form	
reduce energy consumption.	of report	
21. Study of planning & Designing concepts for energy saving	2. Motivation through	
& thermal comfort in the buildings.	field exposure	

# **Q) INDUSTRIAL EXPOSURE :**

SN	Mode of Exposure	Торіс
1.	Field Visits and market survey.	Every chapter of theory syllabus
2.	Collecting data for assignment work.	Term-work assignment

# ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

# • Assessment Criteria for Term work :

#### i) Continuous Assessment of Term Work:

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Comitivo	Understanding	05
Cognitive	Application	05
Psychomotor	Operating Skills	10
	Drawing / drafting skills	10
A.CC	Discipline and punctuality	10
Allective	Decency and presentation	10
	50	

# ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted marks awarded in oral mark sheet as per *Assessment Pro-forma IV*.

#### **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

#### **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Question Bank

# **REFERENCE MATERIAL :**

#### Books / Journals / IS Codes / Websites

Sr. No.	Author	Title	Publisher
1.	S. Sivanagraju M. Balasubba Reddy D. Srilatha	Generation and Utilization of Electrical Energy	Pearson, New Delhi
2.	P.H. Henderson	India – The Energy Sector	University Press
3.	W.C. Turner	Energy Management Handbook	Wiley Press
4.	B.G Desai J. S. Rana A.V. Dinesh R. Parmar	Efficient Use And Management of Electricity In Industry	DevkiEnegery Consultancy PVT. Ltd
5.			

#### a)Reference Books:

#### d) Websites:

- 1. Website of bureau of energy and efficiency : <u>WWW.bee-india.nic.in</u>
- 2. Website of AkshayUrja News Bulletin : <u>WWW.mnes.nic.in</u>
- **3.** Notes on energy management on
- : <u>WWW.energymanagertraing.com</u>
- 4. WWW. Greenbusiness.com
- 5. WWW. Worldenergy.org
- 6. WWW. Mahaurga.com (For Case Studies)
- 7. ECBE. User Guide 2010

# CURRICULUM CONTENTS OF LEVEL – IV

# **APPLIED TECHNOLOGY COURSES**

# COURSE ID:

Course Name : ANALYSIS OF STRUCTURES

Course Code : CEF401

Course Abbreviation : FAOS

# **TEACHING AND EVALUATION SCHEME :**

**Pre-requisite Course(s)** : CEF307 Mechanics of Structures

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	03	03
Practical	-	

#### **Evaluation Scheme :**

Mode of Evaluation	Progressive Assessment	Term End Examination	Total
Details of Evaluation	Average of two tests of 20 marks each	Term End Theory Exam (03 hours)	
Marks	20	80	100

# **RATIONALE :**

This course is a continuation of the course Mechanics of Structures. It deals mainly with the analysis of statically indeterminate structures. Topic on slope and deflection in beams, long columns and direct and bending stresses are also included. The goal is to develop an insight for the structural behavior of members.

# **COMPETENCY**:

Apply principles of structural mechanics to solve engineering problems as follows :

Cognitive : Understanding and applying principles of structural mechanics to engineering problems

Psychomotor: i) Calculating skills ii) plotting Mohr's circle

Affective : Attitude of i) precision ii) accuracy iii) punctuality

# **COURSE OUTCOMES :**

**CEF401-1** Solve problems on principal stresses analytically and graphically

CEF401-2 Solve problems on members subjected to direct and bending stresses

CEF401-3 Solve problems on columns

CEF401-4 Solve problems onSFD and BMD of fixed beams and continuous beams

CEF401-5Solve problems on moment distribution method

**CEF401-6** Determine slopes and deflections of determinate beams using Macauley's method

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply principles of structural mechanics to solve engineering problems.	3	3	-	-	-	-	-	-	1	2	2	-	-
CEE401-1 Solve problems on principal stresses analytically and graphically	3	3	-	-	-	-	-	-	1	2	2	-	ł
CEE401-2 Solve problems on members subjected to direct and bending stresses	3	3	-	-	-	-	-	-	1	2	2	•	ł
CEE401-3 Solve problems on long columns	2	3	-	-	-	-	-	-	1	1	2	-	-
CEE401-4 Solve problems on SFD and BMD of fixed beams and continuous beams	3	3	-	-	-	-	-	-	1	2	2	ł	ł
CEE401-5Solve problems on moment distribution method	3	3	-	-	-	-	-	-	1	2	2	-	-
CEE401-6 Determine slopes and deflections of determinate beams using Macauley's method	2	2	-	-	-	-	-	-	1	2	2	-	-

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

# **CONTENTS** :

# Section I

Sr. No.	Topics	Teaching (Hours)	Theory evaluation			
Cours	e Outcome : CEF401-1 Solve problems on principal stresses analytically and graphi	cally	(Iviarks)			
1	1       Principal Planes and Principal Stresses       08       12         1       Definition of principal stresses and principal planes. Different states of stresses. Field examples.       08       12         1.1       Definition of principal stresses and principal planes. Different states of stresses. Field examples.       08       12         1.2       Normal and tangential stresses on oblique planes of a body subjected to axial stresses.       1.3       Normal and tangential stresses on oblique planes of a body subjected to stresses acting on two mutually perpendicular planes with or without shear stress. Resultant stress on oblique plane.       1.4       Condition for oblique plane to be principal plane, principal stresses, location of principal planes. Maximum shear stresses and their planes.       1.5       Mohr's circle for stresses on oblique plane of a body subjected to various states of stresses.					
2	D: ( ) D : G		16			
	<ul> <li>2.1 Concept of direct and eccentric loads. Field examples.</li> <li>2.2 Tension members and short compression members subjected to eccentric loads with eccentricity about one principal axis, stress distribution at base, maximum and minimum stresses, condition for no tension middle third rule, core of section.</li> <li>2.3 Stress distribution at base of column ,pillars and Chimneys of uniform section subjected to lateral wind pressure</li> </ul>	08	10			
Cours	e Outcome : CEF401-3 Solve problems on long columns					
3	<ul> <li>Columns</li> <li>3.1 Definition of short and long columns. Classification and end conditions for effective length. radius of gyration, slenderness ratio. Field examples</li> <li>3.2 Euler's formula for long column, buckling load, safe load. Assumptions and limitations</li> <li>3.3 Rankine's formula and its application</li> </ul>	08	12			
	Total	24	40			
Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.						

# Section II

Sr. no.	Topics	Teaching (Hours)	Theory evaluation
	Course Outcome : CEF401-4 Solve problems on fixed beams and contin	uous beams	Marks
4	<ul> <li>Fixed Beams and Continuous Beams</li> <li>4.1 Fixed Beams : Meaning and effect of fixity of support. Field examples. Definition of fixed beam. Advantages and Disadvantages. Principle of superposition. Fixed end moments for beams of uniform section subjected to concentrated loads and uniformly distributed load over entire span. Shear force and bending moment diagrams</li> </ul>	05	08
	<ul> <li>4.2 Continuous Beams Definition.Effect of continuity. Nature of moments induced due to continuity.Advantages and disadvantages. Field examples.</li> <li>Clapeyron's theorem of three moments. Application to various types of continuous beams (supports at the same level) subjected to concentrated and uniformly distributed loads over entire span. Shear force and bending moment diagrams up to two and three spans with or without over hangs</li> </ul>	07	12
-	Menuera D'Arthurt en Matha d		10
5	<ul> <li>5.1 Hardy cross sign convention. Carryover factor. Stiffness factor Distribution factor.</li> <li>5.2 Application of moment distribution to various types of continuous beams subjected to concentrated and uniformly distributed loads over entire span. Shear force and bending moment diagrams</li> </ul>	07	10
	Course Outcome : CEF401-6 Solve problems on slope and deflection	of beams	
6	<ul> <li>Slope and Deflection in Beams</li> <li>6.1 Definition of slope and deflection of beams. Radius of curvature. Relation between slope and deflection. Differential equation</li> <li>6.2 Macauley's method: Application to simply supported, cantilever beam subjected to concentrated and uniformly distributed loads (calculations involving solution of cubic equations are not expected)</li> </ul>	05	10
	Total	24	40
Semes marks	ter end exam question paper should be such that total marks of questions on each t allotted above but the candidates are able to attempt questions of the above allotted m	opic is one an narks only.	d half times the

Topic	Topic Name of topic	Distributio	Total		
no.		Remember	Understand	Apply	Marks
1	Principal Stresses and Strains	02	04	06	12
2	Direct and Bending Stresses	02	04	10	16
3	Columns	02	04	06	12
4	Fixed Beams and Continuous Beams	04	06	10	20
5	Moment Distribution Method	02	04	04	10
6	Slope and Deflection in Beams	02	04	04	10
	Total	14	26	40	80

# Specification table for setting question paper for semester end theory examination

# **INDUSTRIAL EXPOSURE :**

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Topics of theory syllabus

# **IMPLEMENTATION STRATEGY:**

# **Instructional strategies:**

- 1. Lectures
- 2. Home Assignments
- 3. Tutorials

# Teaching and Learning resources, including references:

- 1. Chalk & Black-board
- 2. Item banks

# **Reference Books :**

Sr. No.	AUTHOR	TITLE	PUBLISHER
1.	S. B. Junnurkar	Mechanics of Structures Vol.I and II	
2.	S. Ramamurtham	Theory of Structures	Standard
3.	Sunil Deo	Mechanics of Structures	Nirali, Pune
Reco	mmendedFurtherReadings		
4.	V.N.Vazirani & M.M.Ratwani	Analysis of structure	
5.	Timoshenku and Young	Theory of Structure	TMH INdia

# COURSE ID:

Course Name	: DESIGN AND DRAFTING OF RCC STRUCTURES
Course Code	: CEF402
Course Abbreviation	: FRCC

# **TEACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s)	: CEF307 Mechanics of Structure

**Teaching Scheme :** 

Scheme Component	Hours / week	Credits
Theory	04	06
Practical	02	

#### **Evaluation Scheme :**

	Progressiv	ve Assessment	Term				
Mode of Evaluation	Theory	Term Work	Theory Examination		Oral Examination (External)	Total	
Details of Evaluation	Average of two tests of 20 marks each	25 marks for Continuous Assessment	Term End Theory Exam (04 hours)	As per Proforma- VI	As per Proforma-IV		
Marks	20		80	25	25**	150	

#### **RATIONALE :**

This course covers fundamentals of Limit State Method with reference to IS:456-2000 in order to analyze, design and draft RCC building elements like slabs, beams, columns, footings and dog-legged staircase along with exposure to ductile detailing as per IS:13920-2002.Basic knowledge of pre-stressed concrete is also included in the syllabus.

# **COMPETENCY :**

Apply principles of structural design to RCC structures as follows :

Cognitive : Understanding and applying principles of structural mechanics to RCC structures

Psychomotor: i) Calculating skills ii) drafting skills

Affective : Attitude of i) precision ii) accuracy iii) safety iv) punctuality

# **COURSE OUTCOMES :**

CEF402-1 Draw and state functions of components of common RCC structures and prestressing

CEF402-2 Analyze, design and draft rectangular beams

**CEF402-3** Analyze, design and draft flanged beams

CEF402-4 Analyze, design and draft RCC members for shear, bond and torsion

CEF402-5 Analyze, design and draft slabs

CEF402-6 Analyze, design and draft columns and footings

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply principles of structural design to RCC structures	2	3	2	1	-	-	1	2	2	2	3	3	2
CEE402-1Draw and state functions of components of common RCC structures and prestressing	2	3	2	1	-	-	1	2	2	2	2	2	2
CEE402-2Analyze, design and draft rectangular beams	2	3	2	1	-	-	1	2	2	2	2	2	2
<b>CEE402-3</b> Analyze, design and draft flanged beams	2	3	2	1	-	-	1	2	2	2	2	2	2
CEE402-4Analyze, design and draft RCC members for shear, bond and torsion	2	3	2	1	-	-	1	2	2	2	2	2	2
<b>CEE402-5</b> Analyze, design and draft slabs	2	3	2	1	-	-	1	2	2	2	2	2	2
<b>CEE402-6</b> Analyze, design and draft columns and footings	2	3	2	1	-	-	1	2	2	2	2	2	2

# **CONTENTS :**

# A) THOERY

# Section I

Sr.No.	<b>Topics</b> Outcome : CEF402-1 Draw and state functions of components of common RCC struc	Teaching (Hours) ctures and pr	Theory Evaluati on (Marks) re-stressed
1.	Overview of RCC Structures and Introduction to Limit State Method	10	
	1.1 Introduction to Limit State Method : Definition of RCC, functions of reinforcement, material properties, use of IS:456-2000. Definition and types of limit states, partial safety factors for material strength, characteristic strength. Types of loads, use of IS:875- 1987, characteristic load, design load. Quality control and professional ethics.		04
	<b>1.2 Overview of RCC Structures :</b> Buildings : Structural and nonstructural components		
	Water Tanks : Components and typical reinforcement		
	of GSR (with flexible / rigid base) and Intze tank		04
	Retaining Walls : Types. Typical reinforcement detailing		
	of T-shaped cantilever retaining wall		
	<b>1.3 Seismicity and Ductile Detailing</b> Definition, magnitude and intensity of earthquake. Zones.		
	Damages like bond failure, shear, cracking, slab tearing.		
	Remedies. Ductile Detailing Provisionsin IS:13920-2000		04
	<b>1.4 Introduction to Prestressed Concrete</b> Meaning of prestressed concrete, comparison with RCC. Advantages and disadvantages of prestressed concrete. Methods of prestressing, pretensioning and post-tensioning Losses of prestress : meaning and list of losses.( <i>No problems</i> )		04
			04

Sr.No.	Topics	Teaching (Hours)	Theory Evaluati on (Marks)
Course	e Outcome : CEF402-2 Analyze, design and draft rectangular beams		
2	Flexural Analysis and Design of Rectangular Beams	14	
	<ul> <li>2.5 Singly Reinforced Rectangular Beams</li> <li>2.5.1 Limit State of collapse (flexure) : assumptions, stress-strain relationship for concrete and steel, strain diagram and stress block diagram for singly reinforced section, design parameters and constants, ultimate moment of resistance</li> <li>2.5.2 Under- reinforced, over-reinforced and balanced sections : meaning and comparison</li> <li>2.5.3 Flexural analysis and design : Numerical problems on determination of design constants, ultimate moment of resistance, ultimate load carrying capacity, design of balanced and under-reinforced sections</li> <li>2.5.4 IS specifications regarding spacing, cover, minimum reinforcement, effective span, etc. in beams</li> <li>2.6 Doubly Reinforced Rectangular Beams</li> <li>2.6.1 Meaning and conditions for providing doubly reinforced beams</li> <li>2.6.2 Flexural analysis of doubly reinforced sections : strain and stress diagrams, numerical problems on ultimate moment of resistance</li> <li>2.6.3 Design of doubly reinforced sections : Numerical problems on balanced design</li> </ul>		08
<u> </u>			08
Course 0	Sutcome : CEF402-3 Analyze, design and draft flanged beams	00	08
	<ul> <li>3.1 Meaning and conditions for formation of flanged (T and L) beams, comparison with rectangular beams, effective width of flange</li> <li>3.2 Analysis of singly reinforced flanged beams : Introduction to cases of neutral axis in i) flange and ii) web. Detailed analysis and numerical problems for the case of neutral axis in the flange only</li> <li>3.3 Design of singly reinforced flanged beams : Numerical problems considering loads from supported slabs, walls and secondary beams for simple plans</li> </ul>	Vð	08
	Total	32	40
Semester the mark	end exam question paper should be such that total marks of questions on each topic as allotted above. Candidate can attempt questions for the above allotted marks	are one and	half times

# Section II

Sr. no.	Topics	Teaching (Hours)	Theory evaluation Marks
	Course Outcome : CEF402-4 Analyze, design and draft RCC members for shear	, bond and t	orsion
4	Shear, Bond and Torsion	12	
	<b>4.1 Shear</b> : Behaviour of RCC beams and slabs in shear. IS code specifications. Various forms of shear reinforcement in beams. Use of bent up bars. Zones of minimum shear reinforcement. Numerical problems on design of beams for shear		08
	<b>4.2 Bond :</b> Meaning of bond in RCC. IS code provisions. Definition and calculation development length in tension and compression. Check for bond for simply supported and cantilever beams and slabs		04
	<b>4.3 Torsion</b> : Behaviour of RCC members in torsion with examples. IS:456-2000 provisions for torsion. No numerical problems.		
			04
Co	urse Outcome : CEF402-5Analyze, design and draft slabs		·
5	Design of Slabs	12	12
	<ul> <li>5.7 Definition and classification of slabs as one-way and two-way slabs, support conditions, main and distribution steel, I.S. specifications regarding spacing and cover for reinforcement, effective span, minimum reinforcement</li> <li>5.8 Limit state of serviceability for slabs : check for deflection</li> <li>5.9 Design of slabs : Procedure and numerical problems on design of one-way simply supported slabs, cantilever slabs, two-way simply supported slabs with corners free to lift and waist slab of dog-legged staircase</li> <li>5.10Introduction to continuous one-way and two-way slabs : Meaning, advantages and typical reinforcement detailing diagrams (No numerical problems)</li> </ul>		
Cou	rse Outcome : CEF402-6Analyze, design and draft columns and footings		

<b>Desig</b>	n of Columns and Footings	08	
<b>6.5</b> A 6.5.1	<b>Axially Loaded Short Columns</b> Limit state of collapse in compression : assumptions, minimum eccentricity, slenderness ratio, short and long columns, calculation of ultimate load carrying capacity of axially loaded short rectangular and circular columns		06
6.5.2	Load analysis for a column : calculation of load on an axially loaded column from beams at a floor and at various floor levels in a building		
6.5.3	Design of axially loaded short rectangular and circular columns : problems on design as per IS specifications for minimum and maximum reinforcement, transverse reinforcement, cover, etc.		
6.5.4	Reinforcement detailing at the floor to floor joints		
6.2 A	xially Loaded Footings		
6.2.1I	ntroduction to various types of RCC footings : isolated		
steppe	ed and sloped footings, combined footings, piles		
6.2.2	Design of isolated square sloped footing : Flexural		06
	designwith checks for one-way &two-way shear, bond		
6.2.3	Introduction of piles : Suitability, components and		
	behaviour (no numerical problems)		
	Total	32	40

# Specification table for setting question paper for semester end theory examination

Topic	Name of Topic	Distribution	Total		
No.		Remember	Understand	Apply	Marks
1	Overview of RCC Structures and Introduction to Limit State Method	02	04	10	16
2	Flexural Analysis and Design of Rectangular Beams	02	04	10	16
3	Flexural Analysis and Design of Flanged Beams	02	02	04	08

4	Shear, Bond and Torsion	02	04	10	16
5	Design of Slabs	02	04	06	12
6	Design of Columns and Footings	02	04	06	12
	Total	12	22	46	80

# **B) TERM WORK**

The term work shall consist of the following :

Sr.		Competancies	Course
no		tobe developed	outcome
a	<ul> <li>Mini-project on structural design of a G + 2 framed residential building</li> <li>Design of slabs, beams, columns and footings for a simple plan of a</li> <li>G + 2 residential building based on the contents taught in the theory. Students should encouraged to prepare their own architectural plan otherwise teacher will provide separa data of plan, dimensions and material grades separate for separate groups or batches students; maximum batch size not exceeding 20.</li> <li>The students shall submit the design details in the following form : Design calculations included in <i>Manual for Design of RCC Structures</i> developed by the Institute</li> <li>1. Two full imperial size drawing sheets finished in pencils containing key-plan ii) reinforcement detailing for sample slabs and beam column, column footing of each type and staircase iii) schedules slabs, beams, columns and footings iv) Ductile Detailing v) design notes.</li> </ul>	<ul> <li>be ate of structural Component as per loading.</li> <li>ii)Supervise construction at site as per structural drawing.</li> </ul>	CEF402-1 CEF402-2 CEF402-3 CEF402-4 CEF402-5 CEF402-6
b	<ul> <li>Micro-projects : Micro-projects in groups of 3/5 students on any two of the following topic</li> <li>i) Study and Interpretation of Professional Structural Drawings : Professional structural drawings including reinforcement detailing of the components slabs, beams, columns, footings and stair-case shall be collected from nearby consultants. Teacher shall set at least 10 objective questions on each of the five components based on the drawing sheets obtained. Student shall write the answers in the corresponding exercise in the <i>Manual for Design of RCC Structures</i> developed by the Institute</li> <li>ii) Field Visits : Field Visits i) construction sites to study reinforcement details and concreting of slabs, beams, columns and footings ii) construction site of pile foundation iii) construction site of prestressed concrete. The reports of the field visits shall be submitted as assignments in <i>Manual for Design of RCC Structures</i> developed by the Institute</li> <li>iii) Study of Software Packages : a)Assignments on design and preparation of structural drawing of i) Footing, ii) Column, iii) Beam and iv) Slab using software on RCC Designing and Draftingas included in <i>Manual for Design of RCC Structures</i> developed by the Institute.</li> <li>b)Study of variation of parameters of phenomena using Microsoft Excel.</li> <li>c)Information collection &amp; presentation.</li> </ul>	Ability to understand the design conclusions of structural drawing in order to facililitate construction process of the structure Ability to relete theory that they learnt & applied them practically Ability to integrate the knowledge,skill to solve problem.	CEF402-1 CEF402-2 CEF402-3 CEF402-4 CEF402-5 CEF402-6

# C) INDUSTRIAL EXPOSURE

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Topics of theory syllabus
2.	Field examples of course application	Term-work assignment on study of professional drawings use of software and field visits
		drawings, use of software and field visits
3.	Field visits	Term work

# **IMPLEMENTATION STRATEGY:**

#### **Instructional strategies:**

- 5. Lectures and discussions
- 6. Time bound regular home assignments
- 7. Industrial / field visits
- 8. Case study

# **Teaching and Learning Resources:**

- 1. Chalk-board
- 2. Models and Magnetic cut-outs
- 3. Demonstrative charts
- 4. Computer aided presentations

# **REFERENCE MATERIAL :**

Books / Journals / IS Codes

Sr.	Author	Title	Publishe
No.			
1.	Dr.V.L.Shah & Dr.S.R.Karve	Limit State Theory and Design of Reinforced Concrete Structures	Structures Publications, Pune
2.	N.C.Sinha & S.K.Roy	Fundamentals of Reinforced Concrete	S.Chand & Co., New Delhi
3.	N.Krishna Raju & R.N.Pranesh	Reinforced Concrete Design Principles and Practice	New Age International, Mumbai
4.	S.U.Pillai & Devdas Menon	Reinforced concrete Design	Tata Mcgraw Hill
5.	P. C.Varghase	LimitState Design of Reinforced Concrete	Prentice Hall of India,
6.	N.Krishna Raju	Prestressed Concrete	Tata McGraw Hill, Mumbai
7.	T.Y.Lin	Design of Prestressed Concrete Structures	Wiley India
8.	David Dowrick	Earthquake Resistant Design and Risk Reduction	Wiley India Pvt.Ltd., New Delhi

9.	Steven L. Kramer	Geotechnical Earthquake Engg	Pearson Education

#### I.S. Codes

- 1. IS 456:2000 Plain and Reinforced concrete code of Practice
- 2. SP16- Design Aids for reinforced concrete to IS 456
- 3. I.S. 875 (Part 1-5) 1987 code of practice of design loads for Buildings and structures.
- 4. SP 24 Explanatory Handbook on IS 456
- 5. IS 1343-1980 Indian Standard code of (Reaffirmed 1990) Practice for Prestressed concrete.
- 6. SP34 : 1987 Handbook on concrete reinforcement and Detailing.
- 7. IS 13920-1993 Ductile Detailing of R. C. Building subjected to Seismic forces.

# c) Websites :

- 1. www.iitk.ac.in/nicee/IITK-GSDMA/EQ22.pdf
- 2. en.wikipedia.org/wiki/Intze\_Principle
- 3. en.wikipedia.org/wiki/Reinforced\_concrete

\* \* \*

# COURSE ID:

Course Name	: DESIGN AND DRAFTING OF STEEL STRUCTURES
Course Code	: CEF403

Course Abbreviation : FDSS

# **TEACHING AND EVALUATION SCHEME :**

# Pre-requisite Course(s) : CEF307 Mechanics of Structures

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

#### **Evaluation Scheme :**

	Progressiv	ve Assessment	Term	End Examination			
Mode of Evaluation	Theory	Term work	Theory Examination	Term Work	Total		
Details of Evaluation	Average of two tests of 20 marks each	25 marks for Continuous Assessment	Term End Theory Exam (03 hours)	As per Proforma-III			
Marks	20		80	25	125		

# **RATIONALE :**

Steel structures are one of the important engineering structures. This subject deals with the study of basic principles involved in the design of steel structures. The study is to done with reference to IS:800-2007 and other relevant IS codes.

# **COMPETENCY :**

Apply principles of structural design to steel structures as follows :

Cognitive : Understanding and applying principles of structural mechanics to engineering problems

Psychomotor: i) Calculating skills ii) drafting

Affective : Attitude of i) precision ii) accuracy iii) safety iv) punctuality

#### **COURSE OUTCOMES :**

CEF403-1 State types and loads on steel structures and relevant IS Codes provisions

CEF403-2 Design and draft simple bolted and welded connections

CEF403-3 Analyze and design axially loaded tension members and compression members

**CEF403-4** Analyze and design beams

CEF403-5 Analyze and design column bases

CEF403-6 Design and draft a roof truss system

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Problem Solving on field
<b>Competency:</b> Apply principles of structural design to solve engineering problems	2	3	2	-	-	-	1	2	1	2	2	2	1
CEF403-1 State types and loads on steel structures and relevant IS Codes provisions	2	3	-	-	-	-	1	2	1	2	2	2	1
CEF403-2 Design and draft simple bolted and welded connections	2	3	2	-	-	-	1	2	1	2	2	2	1
CEF403-3 Analyze anddesign axially loaded tension members and compression members	2	3	2	-	-	-	1	2	1	1	3	3	1
<b>CEF403-4</b> Analyze anddesign beams	2	3	2	-	-	-	1	2	1	2	2	3	1
CEF403-5 Analyze and design column bases	2	3	2	-	\-	-	1	2	1	2	2	2	1
CEF404-6 Design and draft a roof truss system	2	3	2	-	-	-	1	2	1	2	2	2	1

# **CONTENTS** :

# A) THEORY

Section I

Sr no	Topics	Teaching (Hours)	Theory Evaluation (Marks)
Cou	rse Outcome : CEF403-1 State types and loads on steel structures and relevant IS	Codes prov	isions
1	<ul> <li>Introduction and Load Analysis</li> <li>1.1 Introduction to various types of steel structures like transmission towers, gantry girder, storage tanks, steel bridges etc.</li> <li>1.2 Advantages and disadvantages of steel structures.</li> <li>1.3 Physical and mechanical properties of structural steel. Stress-strain curve and its salient features</li> <li>1.4 Properties of steel structures and different type of standard steel sections available like angle, channel, I sections. Use of Steel Tables for sectional properties.</li> <li>1.5 Dead loads - estimation of dead loads of different components of structures like Roofing materials, purlins, trusses, floors etc.</li> <li>1.6 Live loads for roof trusses, floors of building</li> <li>1.7 Wind load analysis for roof trusses. (As per IS:875–1987 or the latest version )</li> <li>1.8Limit State Method : Definition, meaning and types of limitstates. Classification of cross sections as plastic, compact, semi compact and slender as per IS:800-2007</li> <li>1.9 Quality control and professional ethic</li> </ul>	07	10
Cou	rse Outcome : CEF403-2 Design and draft simple bolted and welded connections		
2	<ul> <li>Connections</li> <li>2.1Types of connections : Hinged, rigid and semi-rigid connections. Riveted, bolted and welded connections and their comparison. Lap and butt joints.</li> <li>2.2Bolted connections : gross and net cross-sectional area, pitch, spacing, end and edge distances, hole diameter, nominal diameter. IS specifications. Modes of failure and capacity in single and double shear, tension and bearing. Design strength.Design of bolted connection for single or double angle members in axial tension or compression</li> <li>2.3Welded connections : Fillet and butt welds. End returns, size, throat thickness, effective length of weld. Design of fillet weldedconnection for single or double angle tension and compression</li> <li>2.4Drawing of Beam to beam, beam to column, roof truss joints connections (No problems)</li> </ul>	05	10

Sr no	Topics	Teaching (Hours)	Theory Evaluation (Marks)

Course Outcome : CEF403-3 Analyze and design axially loaded tension members and compression members

3	<ul> <li>Tension Members and Compression Members</li> <li>3.1 Tension Members :Types of sections used. Design strength governed by yielding of section, rupture of net cross-section and block shear. Analysis and design of axially loaded single angle and double angle tension members with bolted and welded connections</li> <li>3.2 Compression Members : Standard cases of end conditions, effective length, slenderness ratio. Design compressive stress. Analysis and design of axially loaded continuous angle struts connected by bolted and welded connections with gusset plate. Limits of width to thickness ratios to prevent local buckling</li> </ul>	06 06	10 10			
	<ul> <li>Compound Columns : Meaning and diagrams of simple and built-up sections two angles, two I-sections, two channels placed back to back and toe to toe). No numerical problems.</li> <li>Lacing and battening for column : Meaning and purpose. Diagrams of single and double lacing and battening system. No design</li> </ul>					
Seme the m	Total     24     40       Semester end exam question paper should be such that total marks of questions on each topic are one and half times the marks allotted above. Candidate can attempt questions for the above allotted marks     24     40					

# Section II

Sr. no.	Topics	Teaching (Hours)	Theory evaluatio n Marks
Cour	rse Outcome : CEF403-4 Analyze and design beams		<u> </u>
4	<ul> <li>Beams</li> <li>4.1 Types of steel beams. Arrangement of main and secondary beams. Common sections used for simple and compound beams</li> <li>4.2 Laterally supported beam:Flexural analysis and design of laterally supported simple beams subjected to uniformly distributed load. Check for shear and deflection</li> <li>4.3 Plate Girder : Meaning and purpose. Diagrams of typical cross sections of bolted and welded plate girder. Diagrams showing components of plate girder. No numerical problems.</li> </ul>	10	16
Cour	rse Outcome : CEF403-5 Analyze and design column bases		1
5	Column Bases 5.1 Purpose and types of foundation. 5.2 Design of slab base for axially loaded columns 5.3 Concept and diagram of Gusseted base (No design)	05	08
Cour	rse Outcome : CEF404-6 Design and draft a roof truss system		
6	<ul> <li>Roof Trusses</li> <li>6.1 Types of roof trusses and their suitability</li> <li>6.2 Load analysis for roof truss : Dead load, Live load, Wind load analysis as per IS:875-1987 or the latest</li> <li>6.3 Graphical method for determination of forces in members of truss (no problems in theory examination)</li> </ul>	09	16
	<ul><li>6.4 Design of purlins</li><li>6.5 Design of roof truss members</li><li>6.6 Tubular Structures : Advantages and disadvantages</li></ul>		
	Total	24	40
Seme mark	ester end exam question paper should be such that total marks of questions on each topic are one a as allotted above. Candidate can attempt questions for the above allotted marks	ind half t	imes the

Торі	Name of Tonic	Distribution of Marks (Cognitive level wise)			Total
c No.	Tunie of Topic	RememberUnderstandApply		Apply	Marks
1	Introduction and Load Analysis	02	02	04	08
2	Connections	02	02	06	10
3	Tension Members and Compression Members	04	06	10	20
4	Beams	02	02	06	10
5	Column Bases	02	04	10	16
6	Roof Trusses	02	04	10	16
	Total	14	20	46	80

# Specification table for setting question paper for semester end theory examination

# **B) TERM WORK**

The term work shall consist of the following :

	Laboratory Exercises	Competencies to be developed	Course Outcomes
a	<b>Design of a roof truss :</b> design of a roof truss as per the data given by teacher. Calculations shall be submitted in the form of <i>Manual for Design of Steel Structures</i> developed by the Institute.	Apply the principles of structural design to solve engineering problems.	CEF403-3 CEF403-6
	<b>Working drawings :</b> Two full imperial drawing sheets showing details of graphical calculation of member forces of roof truss, sectional details, Joint details and purlin details as designed above	Interpretation of design calculation in the form of drawing.	CEF403-6

b	<ul> <li>Micro projects : Micro project (in the format mentioned in Manual for Design of Steel Structures developed by the Institute) on each of the following topics</li> <li>Study of professional working drawings : Studyof two professional working drawings as per guidelines provided in Manual for Design of Steel Structures developed by the Institute.</li> <li>Study of professional software packages : Studyof professional software packages as per guidelines provided in Manual for Design of Steel Structures developed by the Institute.</li> </ul>	Ability to understand the design conclusions of structural drawing in order to facililitate construction process of the structure. Integrate the knowledge & skills and apply them to complex problems.	CEF403-3, CEF403-6
С	<b>Field Visits :</b> Field visits to i)steel yard in the city to study various steel sections available in market, ii) variety of steel structures in and around the city. Report of visits shall be written in the Manual for Design of Steel Structures developed by the Institute. iii) steel construction site to study erection of a steel structure	Ability to plan the activities on field to erect a steel strucrure.	CEF403-1 CEF403-6

# C) INDUSTRIAL EXPOSURE

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Topics of theory syllabus
2.	Field examples of course application	Term-work assignment on study of professional
		drawings, use of software and field visits
3.	Field visits	Term work

# **IMPLEMENTATION STRATEGY :**

# Instructional strategies:

- 1. Lectures and discussions
- 2. Time bound regular home assignments
- 3. Industrial visits
- 4. Case study

# **Teaching and Learning Resources:**

- 5. Chalk-board
- 6. Models and Magnetic cut-outs
- 7. Demonstrative charts
- 8. Computer aided presentations

# **REFERENCE MATERIAL :**

# a) Reference Books :

Sr. No.	Author	Title	Publisher
1	Dr.V.L.Shah and Mrs. Veena Gore	Limit State Design of Steel Structures	Structures Publications, Pune
2	Dr. M. R. Shiyekar	Limit state design of steel structures	PHI Learning
3	P Dayarathnam	Design of steel structures	S. Chand and Company
4	Ghose	Analysis and Design practices of Steel Structures	PHI Learning
5	Sairam	Design of steel structures	Pearson publication.

# **b)** Websites :

- i) <u>http://www.youtube.com/watch?v=A-bSXOdyPXs</u>
- ii) http://www.youtube.com/watch?v=MRPzqvptQeQ
- iii) http://www.youtube.com/watch?v=61xR\_KQa8tk&list=PLEFVu8KtgUdSVDyOzE
   Wk\_eVBIHV8Us7Ua

\* \* \*

#### COURSE ID:

Course Name	: Estimating and Costing.
Course Code	: CEF404
Course Abbreviation	: FEAC

# **TEACHING AND EVALUATION SCHEME :**

<b>Pre-requisite Course(s)</b>	: CEF303 FBDR
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#### **Teaching Scheme:**

Scheme component	Hours / week	Credits	Total Hours
Theory	4	8	64
Practical	4		64

# **Evaluation Scheme:**

Component	Progressive A	Assessment	Semester end				
	Theory	Practical	Theory	Oral **	Term work		
Duration	Two tests (1½ hour each)	Skill test	One paper (4 hours)	Based on term work	As per curriculum		
Marks	20	25	80	25**	25*		

\* Assessment as per Pro-forma TW- VI OR- IV

#### **Rationale:**

Calculation of quantities and cost estimates for civil engineering works is one of the major functions for the civil engineer and he has to acquire the knowledge of calculating the quantities of each item of work from available drawings & to prepare the estimate of the work which is necessary for allocation of funds for the required purpose and further continue to execute the work as per the drawings and estimates. The ability of recording measurements for various items of work from drawings, finding rates for different items using schedule of rates and preparing the abstract constitutes the important step in the preparation of estimate.

This subject also has a strong linkage with proper supervision of construction work mainly because of its relation to work specifications and planning and execution of site activities like stacking of materials, ordering of equipment and materials, arranging for skilled and semiskilled labourers needed on site, preparing bills for payment of work already completed etc. For proper competence in this subject, one has to be skilled in reading and interpretation of drawings and also taking measurements of completed items. The subject of Estimating and costing is therefore very important as far as its strong relevance to the actual job of a site supervisor/engineer is concerned.

#### COMPETENCY

Apply principles of estimating and costing to prepare estimates of civil engineering works.

**Cognitive** :Understanding and applying principles of estimating and costing to civil engineering problems.

**Psychomotor :**i) Reading drawings and designs of civil engineering works. ii) Preparing measurement sheets and abstract sheets.

Affective :Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

vi) sense of social responsibility vii) organization.

# **COURSE OUTCOMES:**

CEF404-1.Understand P.W.D. procedures & mode of measurements as per IS-1200.

CEF404-2.Understand the methods and procedures of approximate estimates

CEF404-3. Understand the methods and procedures of detailed estimates.

CEF404-4.Calculate quantities of various items of buildings and prepare the abstract.

CEF404-5.Draft detailed specifications for the items of civil engineering works.

CEF404-6.Prepare Rate Analysis for the items of civil engineering works.

CEF404-7.Calculate quantities of earthwork and prepare detailed estimate of road.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply principles of estimating and costing to prepare estimates of civil engineering works.	3	3	3	2	2	2	2	3	2	2	3	3	1
Curriculum MPECS-2016	Diploma in CIVIL ENGI	NEERING											
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	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
CEF404- 1.UnderstandP.W.D. procedures and mode of measurements as per IS- 1200.	3	3	2	2	3	2	3	3	2	2	2	2	1
<b>CEF404</b> -2Understand the methods and procedures of approximate estimates.	3	3	3	3	3	3	3	3	3	3	2	2	1
<b>CEF404-3.</b> Understand the methods and procedures of detailed estimates.	3	3	3	3	3	3	3	3	3	3	3	3	1
<b>CEF404-4.</b> Calculate quantities of various items of buildings and prepare the abstract.	3	3	3	3	3	3	3	3	3	3	3	3	1
<b>CEF405-5.</b> Draft detailed specifications for the items of civil engineering works.	3	3	3	3	3	3	3	3	3	3	3	3	1
<b>CEF404-6.</b> Prepare Rate Analysis for the items of civil engineering works.	3	3	3	3	3	3	3	3	3	3	3		1
<b>CEF404-7.</b> Calculate quantities of earthwork and prepare detailed estimate of road.	3	3	3	3	3	3	3	2	2	2	2	3	1

## **CONTENTS:**

## **THEORY:**

Section I

Sr. no.	Topics	Teaching (Hours)	Theory evaluation Marks
COL	IRSE OUTCOME CEF404-1. Understand P.W.D. procedures and mo IS-1200	de of measur	ements as per
1	Introduction	06	08
	<ol> <li>Meaning of the terms estimating and costing</li> <li>Purpose of estimating and costing</li> <li>Types of estimates (Only names)</li> <li>Meaning of check list. Purpose of check list and Check list of items of civil engineering structures</li> <li>Modes of measurements of items of work as per P.W.D and IS: 1200. Desired accuracy in taking measurements.</li> <li>District schedule of rates (D.S.R.), definition and use.</li> </ol> RSE OUTCOME CEF404-2. Understand the methods and procedure Approximate Estimates	s of approxin 06	nate estimates.
CO	<ul> <li>2.1 Definition and purpose of approximate estimates</li> <li>2.2 Methods of approximate estimates used for buildings, Plinth area or Square meter method, Cubic meter method, Approximatequantity method, Service unit method and Bay method.</li> <li>2.3 Methods of approximate estimates used for Roads, Bridges, Railways, Water Supply and Irrigation projects.</li> </ul>	res of detaile	d estimates.
3	Detailed Estimates	06	08
	3.1Definition and purpose of detailed estimates		
	3.2 Types of detailed estimates – Fresh / New estimate, Revised estimate, Supplementary estimate, Maintenance estimate, Repair and Special repair estimates.		
	3.3 Data required for preparing detailed estimates		
	3.4 Factors to be considered during preparation of detailed estimate.		

	installations, Centage charges, Tools and Plants, Prime Cost and Daywork.		
0	URSE OUTCOME CEF404-4. Calculate quantities of various items of b abstract.	ouildings and	prepare
ļ	Preparing Detailed Estimates of Building	14	16
	4.1 Unit quantity method and total quantity method		
	4.2 Steps in preparing detailed estimate- Tacking out quantities, Abstracting. Measurement sheet, Abstract sheet and Face sheet		
	4.3 Procedure for taking out quantities for building work items such as Earth work in foundation , Foundation concrete, Stone/ Brick masonry work in foundation, plinth and superstructure by Long wall and short wall method and Centre line method		
	4.4 Procedure of detailed estimate for One room, Two room and complete 1B.H.K. load bearing structure		
	4.5 Procedure for R.C.C work by using		
	<ul> <li>Thumb rule for reinforcement quantity calculation for Slab , Beam, Column, Footing</li> <li>Preparing Bar bending Schedule for Lintel, Beam, Slab, Column and Footing</li> <li>Detailed estimate of small R.C.C. structure such as Hall with column, footing, beams and slab including preparing schedule of reinforcement</li> </ul>		
	Total	32	40

Sr. no.	Topics	Teaching (Hours)	Theory evaluation
C	OURSE OUTCOME CEF404-5. Draft detailed specifications for th	e items of civ	Marks vil engineering
w	orks.		
5	Specifications	08	10
	<ul> <li>5.1 Definition of specification and its necessity</li> <li>5.2 Purpose and legal aspect of specifications.</li> <li>5.3 Types of specifications – General, Detailed, Manufacturers and Standard specifications.</li> <li>5.4 Points to be considered in framing the specification of an item.</li> <li>5.5 Drafting detailed specification for common items of civil engineering works such as P.C.C. ,R.C.C., Brick, Stone Masonry, Door, windows, specifications for plumbing, and Plastering</li> <li>5.6 Standard again product.</li> </ul>		
C	OURSE OUTCOME CEF404-6. Prepare Rate Analysis for the items	of civil engine	ering works.
6	Rate Analysis	16	18
	<ul> <li>6.1 Definition, Necessity of Rate Analysis.</li> <li>6.2 Factors affecting Rate Analysis</li> <li>6.3 Data required for rate analysis</li> <li>6.4 Market rates for materials and labours</li> <li>6.5 Task work- definition and factors affecting the task work, Task works for various items of work</li> <li>6.6 Transportation of construction materials – Capacities of Truck, Dumpers and carts and their costs.</li> <li>6.7 Labour – Categories of labours</li> <li>6.8 Overheads- General and job overheads, Contractors profit and water charges.</li> <li>6.9 Calculation of quantities of materials required for various items of work such as B.B. Masonry, Half brick work, Stone masonry, Cement concrete, P.C.C. Flooring, Tiled flooring, Cement plaster</li> <li>6.10 Analysis of rates of civil engineering items such as P.C.C., R.C.C., Brick masonry in cement mortar in superstructure, U.C.R. masonry in cement mortar, P.C.C flooring and Ceramic flooring</li> </ul>		

Sr. no.	Topics	Teaching (Hours)	Theory evaluation
C es	COURSE OUTCOME CEF404-7. Calculate quantities of earthwo stimate of road.	ork and pre	pare detaile
7	<ul> <li>Calculation of Quantities of Earth work for different civil engineering works</li> <li>7.1 Methods of Mean area, Mid sectional area, Trapezoidal and Prismoidal formula (No derivations) for calculation of earth work.</li> <li>7.2 Earth work calculation for Roads, Dam, Canals, Railway Embankment</li> <li>7.3 Detailed estimate of a new road including computation of earth work</li> </ul>	08	12
	Total	32	40

## **TERM WORK**

# Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work practical sessions of batches of about 20 students :

Sr	Title of Proctical	Skills / Competencies to be	Course
No.	The of Fractical	developed	Outcome
1	<ul> <li>Preparing checklist of Items of following civil engineering works (Any three).</li> <li>Load bearing building</li> <li>Framed structure building</li> <li>Water bound Macadam road</li> <li>Septic tank</li> <li>Community well</li> </ul>	<ol> <li>Information collection and presentation in form of report</li> </ol>	CEF404-1
2	<ul> <li>Writing the rules of deduction for below mentioned items of work as per IS: 1200</li> <li>Brick/ Stone Masonry</li> <li>Plastering/ Pointing</li> </ul>	<ol> <li>Self learning ability using IS-1200.</li> <li>Presentation skills</li> </ol>	CEF404-1
3	<ul><li>Writing detailed specification for one important item of work for each of the following fields.</li><li>Building construction</li></ul>	<ol> <li>Self learning ability using reference books and P.W.D. handbook.</li> <li>Presentation skills</li> </ol>	CEF404-5

	<ul> <li>Irrigation engineering</li> <li>Transportation engineering</li> <li>Environmental engineering</li> </ul>		
4	<ul> <li>Rate Analysis for the following</li> <li>Building - any Two items</li> <li>Roads - any one item</li> <li>Water Supply/Drainage work - any one item</li> </ul>	<ul> <li>1.Information collection and presentation</li> <li>2.Motivation through field exposure</li> <li>3.Self learning ability using laboratory manual</li> <li>4.Applying concepts studied</li> </ul>	CEF404-6
5	<ul> <li>Taking of quantities of following items for small R.C.C. Hall</li> <li>Concreting for Footing, Column, Beam, Slab</li> <li>Reinforcement for above items by preparing schedule of bars</li> <li>Form work for all above items</li> </ul>	<ul> <li>1.Information collection and presentation</li> <li>2.Self learning ability using D.S.R. prepared by P.W.D.</li> <li>3.Applying concepts studied</li> <li>4.Presentation skills</li> </ul>	CEF404-4
6	Preparing detailed Estimate of a R.C.C. residential building for all Items of work of Ground floor only (Quantity of reinforcement shall be calculated by percentage)	<ol> <li>Information collection and presentation</li> <li>Self learning ability using D.S.R. prepared by P.W.D.</li> <li>Applying concepts studied</li> <li>Presentation skills</li> </ol>	CEF404-4
7	Taking Measurements on site and Preparing Bill of Quantities	<ol> <li>Information collection and presentation</li> <li>Self learning ability using D.S.R. prepared by P.W.D.</li> <li>Applying concepts studied</li> <li>Presentation skills</li> </ol>	CEF404-4
8	<ul> <li>Detailed Estimate of any two of the following</li> <li>Septic tank.</li> <li>Community well.</li> <li>Pipe or slab culvert.</li> <li>Canal earth work.</li> <li>Water-supply from overhead tank to bath, W.C., basin, sink, geyser.</li> <li>Estimate of Plumbing work from W.C., Bath connection to Public Sewer/ Septic Tank</li> </ul>	<ul> <li>1.Information collection and presentation</li> <li>2.Self learning ability using D.S.R. prepared by P.W.D.</li> <li>3.Applying concepts studied</li> <li>4.Presentation skills</li> </ul>	CEF404-4
9	Detailed estimate of a new road including computation of earth work.	1.Information collection and presentation	CEF404-7

A]Introduction to software, related to quantity calculation, rate analysis and estimation. (Optional)	<ul> <li>2.Self learning ability</li> <li>using D.S.R. prepared by</li> <li>P.W.D.</li> <li>3.Applying concepts</li> <li>studied</li> </ul>
	4. Presentation skills

## **R) INDUSTRIAL EXPOSURE :**

SN	Mode of Exposure	Торіс
1.	Field Visits	Chapter 2,3,4,5,6 of theory syllabus
2.	Collecting data for assignment work	Term-work assignment

## ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

#### **Progressive Skill Test :**

One mid-term *Progressive Skill Test* of 25 marks shall be conducted marks awarded in oral mark sheet as per *Assessment Pro-forma IV*.

### **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices
- 3.Assignments.
- 4.Reading the drawings.

#### **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Question Bank

#### Specification table for setting question paper for semester end theory examination :

		Distribution	G	Total		
No.	Name of topic	Remember	Understand	Applica- tion	Course Outcome	Mark
1	Introduction	02	02	04	CEF404-1	08
2	Approximate Estimates	02	02	04	CEF404-2	08
3	Detailed Estimates	02	02	04	CEF404-3	08

4	Preparing Detailed Estimates of Buildings	02	02	12	CEF404-4	16
5	Specifications	02	02	06	CEF404-5	10
6	Rate Analysis	04	06	08	CEF404-6	18
7	Calculation of Quantities of work for different civil engineering works	02	02	08	CEF404-7	12
TOTA L		16	18	46		80

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.)

## ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

## • Assessment Criteria for Term work :

### **Continuous Assessment of Practical Assignments :**

Every practical assignment shall be assessed for 25 marks as per following crite
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Domain	Particulars	Marks out of 10
Cognitivo	Understanding	02
Cogintive	Application	03
Davahomotor	Operating Skills	05
Psychomotor	Drawing / drafting skills	05
Affactive	Discipline and punctuality	05
Allective	Decency and presentation	05
	25	

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above, but the candidates are able to attempt questions of the above allotted marks only.

# **Reference Books:**

Sr. No.	Author	Title	Publisher			
1.	B.N. Datta	Estimating and costing	U B S Publishers Distributers Pvt. Ltd., New Delhi			
2.	M. Chakraborti	Estimating and costing, Specification and Valuation	M. Chakraborti, Calcutta			

3.	S.C. Rangwala	Elements of Estimating and costing	Charator Publication, Anand
4.	B.S. Patil	Civil Engg.Contracts& estimates	Orient Longman, Mumbai
5.	G.S. Birdi	Test Book of Estimating & costing	DhanpatRai& Sons, Delhi
6	R.H. Nanavati	Valuation	
7	S.C. Rangwala	Valuation	Charator Publication, Anand
8	Bureau of Indian Standards	Standard mode of Measurement for Buillding - I.S.1200	Bureau of Indian Standards
9	Bureau of Indian Standards	S.P. 13 I.S. 7272 Part – I	Bureau of Indian Standards
10	Govt. of Maharashtra	P.W. and Housing Department, Govt.of Maharashtra, Vol.I (1979), Vol.II (1981)	Govt. of Maharashtra

## c) I.S. Codes :

- 8. IS 456:2000 Plain and Reinforced concrete code of Practice
- 9. SP16- Design Aids for reinforced concrete to IS 456
- 10. I.S. 875 (Part 1-5) 1987 code of practice of design loads for Buildings and structures.
- 11. SP 24 Explanatory Handbook on IS 456
- 12. IS 1343-1980 Indian Standard code of (Reaffirmed 1990) Practice for Prestressedconcrete.
- 13. SP34 : 1987 Handbook on concrete reinforcement and Detailing.
- 14. IS 13920-1993 Ductile Detailing of R. C. Building subjected to Seismic forces.

## d) Websites :

- 4. www.iitk.ac.in/nicee/IITK-GSDMA/EQ22.pdf
- 5. en.wikipedia.org/wiki/Intze\_Principle
- 6. en.wikipedia.org/wiki/Reinforced\_concrete

#### COURSE ID:

Course Name	: PROFESSIONAL PRACTICES- CIVIL
Course Code	: CEF405
Course Abbreviation	: FPPR

## **TEACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s)	: <nil></nil>
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#### **Teaching Scheme :**

Scheme component	Hours / week	Credits
Theory	01	03
Practical	02	

#### **Evaluation Scheme :**

Mode of	Progressiv	ve Assessment	Term End I	Total	
Evaluation	Theory	Practical	Theory	Term Work	
Details of Evaluation			ORAL	As per Proforma-VI	
Marks			25*	50*	75

## \*Assesment as per proforma for oral – V \*\*Assesmentas per proforma for Termwork - VI

#### **RATIONALE :**

In present Scenario the outgoing Diploma holders need to start self employed unit. For the purpose he faces a number of problems such as preparing the project report, Govt. procedures, financial requirements, Labor Laws, Land acquisition laws etc. The student requires to be equipped with the competencies to take benefit of the opportunities and also the strength to meet the challenges. This course is designed to make the student aware about his own professional career and provide exposure to the world of entrepreneurship. Whether or not he starts his own enterprise, it is necessary for every student to have a bird's eye view of the whole industrial scenario and the related issues as that is going to be his future professional world. The two earlier courses in the series of Personality Related Courses will work as foundation for this terminal course of the series. The fact that there is only a practical/oral examination for the course clearly emphasises the practical orientation of the course. The practical assignments/term work has also been designed in order to make the student apply the concepts to his own personality.

## **COMPETENCY:**

Apply principles of behavioural science to solve human related problems in career planning, entrepreneurship and industry as follows :

Cognitive :Understanding and applying principles of behavioural science to human factors at work.

**Psychomotor :**i) Developing spirit of career planning and entreprenureship.

Affective:Attitude of i) precision ii) decision making iii) safety iv) punctuality v) aesthetic presentation

#### **COURSE OUTCOMES :**

CEF405-1 Develop career plan.

CEF405-2 Identify motivation parameters.

CEF405-3 Develop spirit of entrepreneurship.

CEF405-4 Develop spirit of decision making.

#### COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

					Prog	ramme O	utcomes	POs and ]	PSOs				
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply principles of behavioural science to solve human related problems in career planning, entrepreneurship and industry as follows :	-	1	-	-	3	3	2	2	2	2	3	3	1
<b>CEF405-1</b> Develop career plan.	-	2	-	-	2	2	1	2	2	3	1	1	1
CEF405-2 Identify motivation parameters.	-	1	-	-	2	2	3	2	3	1	3	3	1
CEF405-3 Develop spirit of entreprenureship.	-	2	2	-	2	2	2	2	2	1	2	2	1
CEF405-4 Develop spirit of decision making.	-	1	1	-	1	1	2	1	1	2	2	2	1

					Prog	ramme O	utcomes	POs and l	PSOs				
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field

# **CONTENT : THEORY :**

Sr. No.	Topics / Sub-topics	Lectures (Hours)
	Course Outcome CEF405-1 Develop career plan.	
1	<ul> <li>Career Planning</li> <li>1.1 Professional Career : Concept and definition. Occupation, profession and business.</li> <li>1.2 Importance of career planning, goal setting.</li> <li>1.3 Various career options for a diploma technician</li> <li>1.4 Factors affecting choice of career : Personal factors – personality and competencies, family background, individual strengths and constrains, etc. External factors – Market situation and future trends, etc.</li> <li>1.5 Preparing a career plan : Concreteness and flexibility of a career plan</li> </ul>	04
-	Course Outcome CEF405-2Identify motivationparameters.	
2	Motivation         2.1Meaning of motivation         2.2 Improtance of motivation.         2.3 Types of motivation         2.4 Maslow's theory of motivation         2.5 Tips for self motivation	04
	Course Outcome CEF405-3Develop spirit of entrepreneurship.	
3	<ul> <li>Entreprenureship</li> <li>3.1 Concept, classification and characteristics of an entrepreneur</li> <li>3.2 Advantages and risks for an entrepreneur</li> <li>3.3 Resources required for an enterprise</li> </ul>	04

	3.5 Professionalism	
	3.6 Biography of your ideal great entrepreneur	
	3.7 Globalization and world market: Concept and phenomenon	
	Course Outcome CEF405-4 Develop spirit of decision making.	
4	Decision Making	04
	4.1 Definition	
	4.2 Importance of decision making	
	4.3 Characteristics of a good decision	
	4.4 Types of decision	
	4.5 Steps in decision making	
	Total	16

## S) TERM WORK

## Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work:

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Goal setting and career planning for myself	Prepare career plan	CEF405-1
2	Exercise on motivation	Plan for development of self- motivation	CEF405-2
3	Leadership exercise	Develop leadership skill.	CEF405-3
4	Group discussion on issues related to globalization	Develop data collection skill, group working skill, time management skill and debating skill.	CEF405-3
5	Survey of industrial environment of Kolhapur with reference to particular engineering discipline	Data collection skill, communication skill, interpersonal skill.	CEF405-3
6.	Internet based information search and presentation of biography of your ideal great entrepreneur in particular engineering discipline	Skill for using internet and presentation skill.	CEF405-3
7.	"Me", as a future entrepreneur : self SWOT analysis	Develop self assessment strategy	CEF405-3
8.	Sample exerciseon decision making	Develop communication skill, problem solving skill leading to decision making skill.	CEF405-4

## ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

#### • Assessment Criteria for Term work :

i) Continuous Assessment of Practical Assignments : Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	05
Cognitive	Application	05
Psychomotor	Carrying field data collection	05
Affactive	Understanding05Application05Carrying field data collection05Discipline and punctuality05Decency and presentation05TOTAL25	05
Allective		05
	TOTAL	25

## ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* shall be conducted as per Proforma III Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

#### **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

## **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Item Bank

#### **REFERENCE MATERIAL :**

#### a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	J.S.Saini and	Entrepreneurship - Theory and Practices	Wheeler Publisher, New
	B.S.Rathore		Delhi
2.	TTTI Chandigarh	Entrepreneurship Development	Himalaya Publishing,
			Mumbai
3.	J.B.Patel and	A manual for business opportunity	
	S.S.Modi	identification and selection	
4	S.B.Sareen and H.	National Directory of entrepreneur	
	Anil Kumar	Motivator and Resource Persons	
5	P.C.Jain	A handbook of new entrepreneurs	

• Websites : www.ediindia.org

#### COURSE ID:

Course	Name	:	CONCRETE TECHNOLOGY
~			

Course Code : CEF406

Course Abbreviation : FCTE

## **TEACHING AND EVALUATION SCHEME:**

**Pre-requisite** Course(s) : <*nil* >

**Teaching Scheme :** 

Scheme Component	Hours / week	Credits
Theory	03	05
Practical	02	

#### **Evaluation Scheme :**

	Progressive	Assessment	Term H	End Examination	ation	
Mode of Evaluation	Theory	Practical	Theory	Term work	Oral (External)	Total
Details of Evaluation	Average of two tests of 20 marks each	<ul> <li>i. 25 marks for each practical</li> <li>ii.One PST of 25 marks</li> </ul>	Term End Theory Exam (03 hours)	As per Prforma- VI	As per Prforma- V	
Marks	20		80	25	25**	150

#### **RATIONALE :**

Concrete is one of the most versatile materials used in civil engineering construction. Properties of concrete depend on the properties of its ingredients and construction practices. This course covers study of basic properties and testing methods of fresh and hardened concrete as well as its ingredients. The study of formwork, admixtures, special concretes has also been included. Concrete mix design has also been introduced. **COMPETENCY :** 

Apply principles of concrete technology as follows :

Cognitive : Understanding and applying principles of concrete technology to concrete structures

Psychomotor: i) Calculating skills ii) plotting of graphs & diagrams

iii) Testing of ingredients of concrete

Affective : Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) quality

#### **COURSE OUTCOMES :**

**CEF406-1** Explain and implement procedure of production of concrete **CEF406-2**Explain, testand interpret properties of cement and aggregates **CEF406-3** Explain, test and interpret properties of fresh and hardened concrete

CEF406-4 Explain procedure of concrete mix design.

CEF406-5 Explain and implement quality norms for formwork.

CEF406-6 Select special concretes for the purpose.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

					Prog	ramme O	utcomes	POs and 1	PSOs				
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply study and apply principles of concrete technology as follows	1	3	3	2	1	1	1	3	2	2	1	2	2
CEF407-1Explain and implement procedure of production of concrete	1	3	3	2	-	-	-	2	2	2	1	2	2
<b>CEF407-2</b> Explain, test and interpret properties of cement and aggregates	1	3	3	2	-	-	-	3	2	2	1	2	2
<b>CEF407-3</b> Explain, test and interpret properties of fresh and hardened concrete	1	3	3	2	-	-	-	3	2	2	1	2	2
<b>CEF407-4</b> Explain procedure of	1	3	3	2	-	-	-	3	2	2	1	2	2

Curriculum MPECS-2016 Diploma in CIVIL ENGINEERING

					Prog	ramme O	utcomes	POs and l	PSOs				
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
concrete mix design.													
<b>CEF407-5</b> Explain and implement quality norms for formwork.	1	3	3	2	1	1	1	3	2	2	1	2	2
<b>CEF407-6</b> Select special concretes for the purpose	1	3	3	2	-	-	-	2	2	2	1	2	2

## **CONTENT :**

# A) THEORY :

#### Theory Lectures Sr. Evaluation **Topics / Sub-topics** No. (Hours) (Mark) Course Outcome : CEF406-1 Explain and implement procedure of production of concrete. **Introduction to Concrete and Production of Concrete** 08 1 **1.1 Introduction to concrete** Definition of Concrete. Ingredients of Concrete. 08 Importance of concrete as construction material. Historical background. Process diagram of concrete. Role of each ingredient. Admixtures : Definition and function. Accelerator, Retarder, Plasticizer, Super plasticizer. Pozzolanic fly ash, silica fume, slag, metakaoline. **1.2 Production of Concrete** Process diagram of manufacture of concrete. 08 Batching of ingredients of concrete. Mixing of concrete and concrete mixers. Transportation of concrete : Modes and precautions Placing of concrete. Precautions. Compaction of concrete : Definition, importance & methods.

Section I

	Finishing of concrete surface							
	Curing of concrete : Definition, importance and method							
Cour	Course Outcome : CEF406-2 Explain, test and interpret properties of cement and aggregates							
2	Properties and testing of cement and aggregates 2.1 Properties and testing of cement	12	00					
	Definition of cement. Chemical composition of Portland cement		08					
	Raw material and manufacturing process of Portland cement							
	Hydration of cement. Setting and Hardening of cement.							
	Physical properties of cement & standard specifications for Ordinary Portland Cement. Grades of OPC.							
	Types of cement and their applications : Rapid hardening cement, low heat cement, Portland pozzolana cement, sulphate resisting cement, blast furnace slag cement, white cement.							
	Storage of cement							
	2.2 Properties and testing of aggregates							
	Definition of coarse and fine aggregate. Classification of aggregate, Properties of coarse and fine aggregates: Size, Shape, Texture, Strength, Specific gravity, Bulk Density, Water absorption, Bulking of sand, Soundness.		08					
	Determination of aggregate grading, Sieve analysis, Fineness modulus, Crushing value, Impact Value, Abrasion Value, Flakiness index, Elongation Index							
	Effect of aggregate properties on strength of concrete.							
	Course Outcome : CEF406-3 Explain, test and interpret properties of fresh and harden	ned concret	е.					
	<b>Properties of fresh concrete</b> Definition of workability and affecting factors.	04	08					
3	Measurement of workability. Slump cone test, Compaction factor Test.							
	Range of values of workability							
	Segregation : Definition, effects and precautions							
	Bleeding.: Definition, effects and precautions							
	TOTAL	24	40					

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

# Section-II

Sr. no.	Topics	Teachin g (Hours)	Theory Evaluati on
Cours	e Outcome : CEF406-4 Explain procedure of concrete mix design.		
4	Introduction to Concrete Mix Design and Formwork 4.1 Introduction to Concrete Mix Design	06	
	Definition and importance of mix design		06
	Methods used for mix design		
	Procedure of mix design by IS code method (no problems)		
	4.2 Formwork		
	Definition and purpose of formwork. Requirement of good		06
	Formwork, Materials used for formwork, Stripping period of forms		
	Diagrams Forms for beam, slab, column.		
Cours	e Outcome : CEF406-5 Explain and implement quality norms for formwork.		
	Properties of Hardened Concrete and Quality Control	09	
5	5.1 Properties of Hardened Concrete		08
	Compressive strength of concrete. Factors affecting strength Characteristic strength. Grades of concrete		
	Water-cement ratio law. Significance.		
	Durability and impermeability of concrete		
	<b>5.2 Inspection, testing and quality control</b> Aim of inspection and testing of fresh concrete.		08
	Concrete cube testing		
	Non-destructive testing of concrete : Definition and methods.		
	Rebound Hammer test. Ultrasonic pulse velocity test method.		
	Core test method.		
	Factors causing variation in the quality of concrete.		
	Quality control, professional ethics and environmental issues		

Cours	e Outcome : CEF406-6 Select special concretes for the purpose.		
6	Special Concretes	09	
	6.1 Concreting under special circumstances		06
	Hot weather concreting : Field situations. Effects of hot weather, precautions required		
	Cold weather concreting : Field situations. Effect of cold weather, precautions required		
	Underwater concreting : Field situations. Tremie method, Deep dump bucket method, grouting method, pumping, using bags. Precautions		
	6.2 Special concretes		
	Ready Mixed Concrete (RMC) : Definition, advantages and precautions		06
	Mass concrete : Definition. Field situations. Precautions.		
	Fiber Reinforced Concrete : Definition. Properties. Field applications.		
	Polymer concrete : Definition. Types. Properties. Applications.		
	Light weight concrete : Definition. Applications.		
	Ferro-cement : Definition. Materials used. Applications.		
	Shotcreting or Guniting : Definition and applications		
	Total	24	40

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

## Specification table for setting question paper for semester end theory examination

Topic	Nama of tonic	Distributi	Total		
No.	Traine of topic	Remember	Understand	Apply	Marks
1.	Introduction to Concrete and Production of Concrete	06	06	04	16
2.	Properties and testing of cement and aggregates	04	04	08	16
3.	Properties of fresh concrete	02	04	02	08
4.	Introduction to Concrete Mix Design and formwork	02	04	06	12
5.	Properties of Hardened Concrete and Quality Control	06	06	04	16
6.	Special Concretes	06	04	02	12
	Total	26	28	26	80

# **B) TERM WORK**

Term work shall be performed and submitted according to the *Laboratory Manual on Concrete Technology* developed by the Institute. Term work shall consist of the following :

a	Laboratory Experiments ( Any Eight)		
Sr. No	Experiments	Skills / Competencies to be developed	Course Outcom e.
1.	Determination of fineness of cement		
2.	Determination of consistency of cement		
3.	Determination of initial and final setting time of cement		
	Determination of the Soundness of cement		
4.	Determination of 3, 7 and 28 days strength of cement		
5.	Determination of silt content of fine aggregate	1 Studying equipment	CEF406
6.	Determination of bulking of fine aggregate	2. Understanding test procedure	-2
7. 8	Determination of specific gravity of fine aggregate and coarse aggregate	<ul> <li>3. Accuracy in taking observation.</li> <li>4. Deinforcement of concerts</li> </ul>	
0.	Determination of grading of aggregate by sieve Analysis.	<ol> <li>Kennorcement of concepts.</li> <li>Performing calculation and</li> </ol>	
9.	Determination of bulk density of fine aggregate and coarse aggregate	<ul><li>plotting Graphs from observation.</li><li>6. Interpreting test results.</li></ul>	
10.	Determination of aggregate crushing value	<ol> <li>Classifying materials as per IS standards.</li> <li>Finding quality of material.</li> </ol>	
11	Determination of workability of concrete by slump cone and/or compaction factor method	9. Achive quality in construction	CEF406 -3
11.	Determination of 7 and 28 days' compressive strength of concrete		CEF406 -5
b	Field Visits :		
	<ol> <li>Field visit to construction site of RCC to study various concreting activities</li> <li>3.Field visit to quarry and crusher for manufacture of coarse aggregate (stone metal)</li> </ol>	Ability to relate theory that they learnt & applied them practically	CEF406 -1 CEF406 -1
	4. Field visit to a ready mix concreting plant		CEF406

	Report of field visit shall be written in <i>Laboratory Manual</i> for Concrete Technology developed by the Institute		-2 CEF406 -6
С	<ul> <li>Micro Project: Students shall carry out exercises as guided by teacher on one or more of the following but not limited :</li> <li>i)Study of variation of parameters of phenomena</li> <li>ii) Market survey for study of admixtures available in market</li> <li>iii)Self-study of a topic</li> </ul>	Ability to relate theory that they learnt & applied them practically	CEF406 -1

## C) INDUSTRIAL EXPOSURE

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Topics of theory syllabus
2.	Market survey (Term work)	Admixtures available in market
3.	Field visits (Term work)	Concreting procedure, RMC plant,
		stone crusher/quarry

## **EVALUATION OF TERM WORK**

## a) Continuous Assessment of each experiment :

Every practical experiment shall be assessed for 25 marks as per criteria given in *Laboratory Manual for concrete technology*.

## **b) Progressive Skills Test :**

One mid-term *Progressive Skill Test* of 25 marks shall be conducted as per criteria given in *Laboratory Manual for concrete technology*.

## **IMPLEMENTATION STRATEGY:**

## **Instructional Strategies :**

- 1. Lecture cum discussion
- 2. Laboratory experiences
- 3. Regular home assignments
- 4. Field visit

#### **Teaching and Learning Resources :**

- 1. Chalk & board
- 2. Audio-visual material
- 3. Laboratory manual
- 4. Question Bank

## **Reference Books :**

SNo.	AUTHOR	TITLE	PUBLISHER
1.	M.S.Shetty	Concrete Technology	S.Chand & Co ltd., New Delhi
2.	M. L. Gambhir	Concrete Technology	Tata Mc Graw Hill
3	Neville	Properties of Concrete	Pearson Education India
4	Santhakumar	Concrete Technology	Oxford Press

## Websites :

i) http://www.youtube.com/watch?v=n-Pr1KTVSXo

http://www.youtube.com/watch?v=oM7SVIeoODs

## COURSE ID:

Course Name	: BUILDING SERVICES
Course Code	: CEF407
Course Abbreviation	: FBSR

## **EACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s) : NIL

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

**Evaluation Scheme :** 

Mode of	Progressive	Assessment	Term	Total		
Evaluation	Theory	Practical	Theory	TW	Oral	1000
Details of Evaluation	Average of Two tests of 20marks each(1 hour duration each)	One Progressive Skill Test of 25 marks	One paper (3 hours)	As Per Proforma TW- III		
Marks	20	25	80	25*		125

\*( To be assessed by internal examiner )\*\* (To be assessed by internal and external examiner)

## **RATIONALE :**

Building cannot be used for occupancy unless various services required for effective working of building is provided. It creates healthy and working environment in the building. By considering design aspects and recent materials, student will develop the skill and ability to become and entrepreneur for this services.

## COMPETENCY

Apply principles of Building Services to solve engineering problems as follows.

Cognitive :Understanding and applying principles of Building Services to engineering problems.

**Psychomotor :** i) Designing Building services components ii) Fixing the parameters of building services iii) Designing most economical material for building services

Affective :Attitude of i) Calculative aspect ii) accuracy iii) safety iv) aesthetic presentation

v) hygiene vi) civic sense

#### **COURSE OUTCOMES :**

CEF407-1Planning plumbing fixtures for different types of buildings.

CEF407-2 Technique of water proofing in building.

CEF407-3Methods of dam proofing in building

CEF407-4technique of antitermite treatment in buildings

CEF407-5 Deciding the suitability of lift and escalators in buildings

CEF407-6Prepairing electrical layout for buildings

CEF407-7Drawing layout plans of air conditioning in buildings

CEF407-8Planning rainwater harvesting for buildings

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

					Pro	ogramme	Outcome	s POs and	l PSOs				
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply principles of Building services to solve engineering problems.	3	1	3	3	1	1	-	2	1	3	3	3	1
<b>CEF407-1</b> Planning plumbing fixtures for different types of buildings.	3	3	3	-	1	1	-	2	1	3	3	3	1
<b>CEF407-2</b> Technique of water proofing in building.	3	3	3	-	1	1	-	2	1	3	3	3	1
<b>CEF407-3</b> Methods of dam proofing in building	3	3	3	-	1	1	-	2	1	3	3	3	1
<b>CEF407-4</b> technique of antitermite treatment in buildings	3	1	1	-	1	1	-	1	1	1	1	1	1
<b>CEF407-5</b> Deciding the suitability of lift and escalators in buildings	3	3	3	-	1	1	-	2	1	3	3	3	1

# $Curriculum \ MPECS-2016 \ \ \text{Diploma} \ \text{in CIVIL ENGINEERING}$

					Pro	ogramme	Outcome	s POs and	l PSOs				
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
CEF407-6 Preparing electrical layout for buildings	3	3	3	-	1	1	-	2	1	3	3	3	1
<b>CEF407-7</b> Drawing layout plans of air conditioning in buildings	3	3	3	-	1	1	-	2	1	3	3	3	1
CEF407-8 Planning rainwater harvesting for buildings	3	3	3	-	1	1	-	2	1	3	3	3	1

## **CONTENT : THEORY**

Section – I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Cours	<i>e Outcome-</i> <b>CEF407-1</b> Planning plumbing fixtures for different t	types of buil	ldings.
1	<ul> <li>Plumbing</li> <li>1.1 Elements of plumbing – Objective of Plumbing, Purpose of Plumbing, Role of Plumber, Licensing of Plumber, their function, Sewer air supply pipes, drainage and vent pipes, Application for obtaining water supply connection.</li> <li>1.2 Pipes, Joints and Fittings – Introduction, types of pipes, GI Pipes, PVC Pipes, Copper Pipes, CI Pipes, AC Pipes, Pre-stressed Concrete Pipes, Method of Fixing Pipes such as GI Fittings, CI Fitting etc.</li> <li>1.3 Valves and terminal fitting – type of valves and its purpose, sluice valve, reflux valve, scour valve, air relief valve, pressure relief valve, gate valve, Bio-taps and stop valve, self closing valve, flush valve, mixing valve.</li> <li>1.4 Sanitary fixtures and building drainage system – Building sanitary fittings such as water closet, flushing appliances, urinals, wash basins, flushing cisterns, principles of building drainage, symphonic action, traps and its types, capacity and sizing of pipes, soil pipe, waste pipe, rain water pipe, system of plumbing, installation of pipes, testing of pipes.</li> </ul>	11	18
Cours	<i>e Outcome-</i> CEF407-2 Technique of water proofing in building.		1
2	<ul> <li>Water proofing treatment</li> <li>2.2 Introduction, Material required for water proofing and its specification</li> <li>2.3 Water proofing of water closet and bathroom, procedure and cross section.</li> <li>2.4 Terrace water proofing.</li> <li>2.5 Basement water proofing.</li> <li>2.6 Precautions to be taken while water proofing.</li> </ul>	07	12

	Course Outcome-CEF407-3Methods of dam proofing in building							
3	Damp proofing	04	06					
	<ul><li>3.1 Sources of dampness and its effect.</li><li>3.2 Materials used for damp proofing</li><li>3.3 Mathed of damp proofing</li></ul>							
	<ul><li>3.4 Damp proofing treatment in building such as basement, floors, walls.</li></ul>							
Cours	Course Outcome – CEF407-4 technique of antitermite treatment in buildings							
4	Antitermite treatment	02	04					
	4.1 Types of treatments							
	4.2 Antitermite chemicals							
	4.3 Treatment process for building							
	Total	24	40					
(Sem	ester end exam question paper should be such that total marks o	f questions	on each topic is					
one a	nd half times the marks allotted above but the candidates are a	ble to attem	pt questions of					
the ab	pove allotted.)							

# Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Cours	se Outcome - CEF407-5 Deciding the suitability of lift and escal	ators in buil	dings
5	Lifts and escalators           5.1 Basic parts and definition	04	08
	<ul><li>5.2 Types of lifts and design consideration</li><li>5.3 Arrangement of lift in building, Lift entrance and their types</li></ul>		
	<ul><li>5.4 Type of lift operations</li><li>5.5 Escalators and their suitability's</li></ul>		
Cours	<i>the Outcome</i> - <b>CEF407-6</b> Prepairing electrical layout for buildings	5	

6	Building electrification	10	16
	6.1 Preparing layout and conventions used to indicate lights,	-	-
	fans, telephones and other communication systems		
	6.2 Type of lamps, Reflection lamps, Fluorescent lamps,		
	Tubular fluorescent lamps, Fluorescent mercury lamps.		
	6.3 Power requirement of building, Open and Concealed		
	wiring systems.		
	6.4 Concept of earthing, Emergency power supply		
	6.5 Precautions to avoid electrical accidents, fire caused by electricity and safety measures,		
Cours	se Oucome - CEF407-7Drawing layout plans of all conditioning	, in buildings	•
7	Air conditioning	08	12
	7.1 Drawing of layout of plants for air conditioning	00	
	7.2 Basic principles of air changes, ventilation and air conditioning		
	7.3 General principle of ducting and distribution, package		
	unite, window unite, air cooling and their normal		
	distribution		
Cours	se Outcome - CEF407-8Planning rainwater harvesting for building	ngs	
8	Rain water Harvesting	02	04
	8.1 Rain water collection		•••
	8.2 Water harvesting and ground water recharging		
	Total	24	40
Seme	ster end exam question paper should be such that total marks o	f questions of	on each topic is
one a	and half times the marks allotted above but the candidates are a	ble to attem	pt questions of

# Specification table for setting question paper for semester end theory examination :

		Distribution	of marks (Cognitiv	ve level-wise)	G	Total	
No.	Name of topic	Remember	Understand	Applica- tion	Outcome	Marks	
1	Plumbing	08	06	04		18	
2	Water proofing treatment	06	04	02		12	
3	Damp proofing	04	02			06	
4	Antitermite treatment	02		02		04	

5	Lifts and escalators	04	04		08
6	Building electrification	06	06	04	16
7	Air conditioning	04	04	04	12
8	Rain water Harvesting	02	02		04
TOTAL		36	28	16	80

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.)

## T) TERM WORK

## Term work consist of following assignment (Any five):

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Practical on joining PVC / GI pipes and fittings and writing report on the process	Studying of plumbing in piping	CEF407-1.1
2	Practical based on sanitary fittings like trap, wash basins and water closet.	Introduction and studying of sanitary fittings	CEF407-1.3
3	Layout plan showing water supply details of service pipes, communication pipes, consumer pipe, water meter etc.	Planning and studying of all water supply pipes in buildings	CEF407-1.4
4	Layout plan for drainage line showing inspection chamber, sewage pipes, traps, manhols.	Planning and studying of drainage system in buildings	CEF407-1.4
5	Toilet plan showing details of ideal connections.	Study of toilet connections	CEF407-2.1
6	Electrical layout, signs and symbols in residential or commercial building.	Introduction and studying building electrification system	CEF407-5.1
7	Market survey for different materials available in markets with their trade names and rates used for water proofing, dam proofing treatment.	Study of market survey	CEF407-2 CEF407-3

#### A) INDUSTRIAL EXPOSURE :

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
	Field Visits of newly constructed buildings	Introduction and study of building	CEF407
1		services	Section I &
			II

## ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

# • Assessment Criteria for Term work :

### i) Continuous Assessment of Term Work:

Every practical assignment shall be assessed for 25 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	02
Cognitive	Application	03
Davahamatan	Operating Skills	05
Psychomotor	Drawing / drafting skills	05
Affactive	Discipline and punctuality	05
Affective	Decency and presentation	05
	25	

## ii) Progressive Skill Test :

One mid-term Progressive Skill Test of 25 marks shall be conducted.

#### **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

## **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Question Bank

## **REFERENCE MATERIAL :**

## Books / Journals / IS Codes / Websites

Reference Books: Sr No	AUTHOR	TITLE	PUBLISHER		
1.	S. Deolalikar	Plumbing design and practice	TATAMcGrawHillpublishing co., New Delhi		
2.	S. M. Patil	Building services	Patil publications, Goregaon, Mumbai		
3.	SandeepMantri	A to Z of practical building and its management	Mantri institute of development, Pune		
4.	Bindra and Arora	Building construction	DhanpatRai publishing co.,		
5.	S. L. Uppal	Electrical wiring – estimating and costing.	Khanna publication, New Delhi		
6.	S. Arthanari	Building Technology and valuation	TATAMcGrawHillpublishing co., New Delhi		

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#### COURSE ID:

Course Code : CEF408

Course Abbreviation : FPSR

**TEACHING AND EVALUATION SCHEME :** 

Pre-requisite Course(s) : <nil >

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

**Evaluation Scheme :** 

	Progressiv	ve Assessment	Term End H		
Mode of Evaluation	Theory	Practical	Theory Examination	T.W.	Total
Details of Evaluation	Average of Two tests of 20marks each(1 hour duration each)		Term End Theory Exam (03 hours)	As per Proforma-III	
Marks	20		80	25*	125

\* Assessment of TW as per Pro-forma -III

#### **RATIONALE :**

A properly systematic course in Plumbing is not available in India. Plumbing though crucial but remained as neglected subject. As a result, there is a great demand to well trained Plumbing Professionals in the building industry.

Plumbing service is necessary for proper water supply & efficient drainage facility in a building. As buildings are becoming more complex and more modern plumbing materials and systems are available in India, it is necessary to include the same in the Civil Engineering curriculum.

Plumbing services are important component of Civil Engineering. Internal plumbing contributes to around 15% of the construction cost. Indian Plumbing Association (IPA) has adopted, reviewed and revised the Uniform Plumbing Code of International association of Plumbing and Mechanical officials to suit Indian practices, customs and Laws. The code is published as Uniform Plumbing Code – 2008 India (UPC1).

Need of proper use of Plumbing code must be code based education and training in Plumbing will have better job opportunities and improved income. The formal education in Plumbing will improve the plumbing system design and installation standards, thereby ensuring health and safety of people, structure and environment.

### COMPETENCY

Apply principles of sanitation and knowledge of plumbing to solve engineering problems. **Cognitive :**Understanding and applying principles of sanitation and knowledge of plumbing to solve engineering problems.

**Psychomotor :**i) Handling all types of sanitary fittings .ii) Interpretation of drawings. iii) preparinglatoutplan of water supply and drainage arrangement .

Affective : Attitude of i) precision ii) Hygiene iii) safety iv) Sanitation v) aesthetic presentation

vi) civic sense

#### **COURSE OUTCOMES :**

CEF408-1Know the terminology in plumbing .

CEF408-2Know the different types of plumbing fixtures and fittings.

CEF408-3Know various types of traps and plumbing systems.

CEF408-4Know theprinciples of sanitation and objects of sewage disposal.construction of

sanitary drainage and storm water systems and Select the proper plumbing materials .

CEF408-5 Understand system of water supply, gray water, reclaimed water and methods to

conserve water and energy.

**CEF408-6**The students Understand proper coordination of plumbing work with Architects and structural engineers and Interpret plumbing drawings.

CEF408-7Supervise plumbing installation as per UPC-2008, Follow safety measures at

site. and Follow standards for installation as per code practice.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowle dge	PO 3 Experi ments and practic e	PO 4 Engine ering Tools	PO 5 The enginee r and society	PO 6 Enviro nment and sustain ability	PO 7 Ethics	PO 8 Individ ual and team work:	PO 9 Comm unicati on	PO 10 Life- long learnin g	PSO1 Plan and Design	PSO2 Constr uction and Mainte nance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply principles of sanitation and knowledge of plumbing to solve engineering problems.	3	3	3	2	2	3	-	1	1	2	3	3	1
<b>CEF408-1</b> Know the terminology in plumbing	3	3	-	-	3	3	-	1	1	2	2	2	1
<b>CEF408-2</b> Know the different types of plumbing fixtures and fittings.	3	3	3	2	3	2	-	1	1	2	2	2	1
<b>CEF408-3</b> Know various types of traps and plumbing systems.	3	3	3	3	3	3	-	1	2	2	2	2	1
<b>CEF408-4</b> Know the principles of sanitation and objects of sewage disposal. construction of sanitary drainage and storm water systems and Select the proper plumbing materials.	3	3	3	3	2	3	-	1	1	2	2	2	1
<b>CEF408-5</b> Understand system of water supply,gray water, reclaimed water and methods to conserve water and energy.	3	3	1	1	3	3	2	1	1	2	2	2	1
<b>CEF408-6</b> The students Understand proper coordination of plumbing work with Architects and structural engineers and Interpret plumbing drawings.	2	2	1	3	2	3	3	1	1	3	2	2	1

	Programme Outcomes POs and PSOs													
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowle dge	PO 3 Experi ments and practic e	PO 4 Engine ering Tools	PO 5 The enginee r and society	PO 6 Enviro nment and sustain ability	PO 7 Ethics	PO 8 Individ ual and team work:	PO 9 Comm unicati on	PO 10 Life- long learnin g	PSO1 Plan and Design	PSO2 Constr uction and Mainte nance	PSO3 Proble m Solving on field	
<b>CEF408-7</b> Supervise plumbing installation as per UPC–2008, Follow safety measures at site. and Follow standards for installation as per code practice.	2	2	2	3	2	2	_	1	2	2	2	3	1	

# **CONTENT : THEORY**

# Section – I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)			
Cours	e Outcome- CEF408-1 Know the terminology in plumbing.					
1	<ul> <li>Plumbing Terminology.</li> <li>Definition, use/ Location purpose and sketches of the following</li> <li>1.1:Plumber;Plumbing fixture:- accessible /readily accessible ,aerated fitting , bathroom group, carrier, flood level rim, floor sink, flush tanks, lavatories, macerating toilet system, plumbing appliances ,flushometer valve</li> <li>1.2:Traps, indirect waste ,vent blow off ,development length, parts of vent system – stack vent , branch vent , continuous vent , individual vent , dirty arm ,FOG (Fat,Oil and Grease) disposal system receptors, slip joint.</li> <li>1.3:Drainage- adapter fitting , adjusted roof area, AAV(Air Admittance Valve), air break ,air gap ,area drain ,bell and spigot joint, building drain, branch, DFU, grease interceptor, roof drain , smoke test , stack, joints .</li> <li>1.4:Water supply : angle valve, anti- scald valve, check valve , gate valve , PRE (Pressure Relief Valve ) , back flow, bypass, , cross connection, ferrule , gray water, joints,</li> </ul>	06	12			
<i>Course Outcome-</i> <b>CEF408-2</b> Know the different types of plumbing fixtures and fittings.						
2.	<b>Plumbing fixtures and fixture fittings.</b> Different types of plumbing fixtures, shapes/ sizes,	08	14			
	<ul> <li>2.1 Ablution fixtures –Wash basin, sinks (kitchen sinks cleaner sinks) bath tub, flushing cistern, drinking fountain.</li> <li>2.2 Soil fixtures - water closets, urinal, mop sink, bidets, slop sinks plumbing fittings for Ablution fixtures and Soil fixtures</li> <li>2.3 water conserving fixtures- Water cooler, cloth washer, hot and cold water system, display fountain. Installation standard for plumbing fixtures , dimension in plan and elevation</li> </ul>					
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Cour:	<ul> <li><i>Traps, interceptors, indirect waste and vents.</i></li> <li>3.1 Traps- Definition, function, Requirement of good trap, trap arms, Development length, trap seals, venting to traps, trap primers, Classification of traps. prohibited traps,</li> <li>3.2 System of plumbing for building drainage-Two pipe system, one pipe system, waste receptors, dish washers, drinking fountain.</li> <li>3.3 Vent- purpose of venting, trap seal protection, materials, vent connection, flood rim level, , vent stacks, water curtain and hydraulic jump, cleanouts, venting of interceptors, vent sizing</li> </ul>	ems. 10	14			
(Sem one a the al	<b>Total</b> ester end exam question paper should be such that total marks of and half times the marks allotted above but the candidates are above allotted.)	24 Equestions ble to attem	40 on each topic opt questions			

## Section II

\_\_\_\_\_

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)		
Course Outcome - CEF408-4 Know the principles of sanitation and objects of sewage disposal.					
constru	action of sanitary drainage and storm water systems and Select the pro-	per plumbing	materials .		

4	Sanitary drainage and storm drain.	12	20
-	4.1 Preamble on single and two pipe systems, different pipe		
	materials and jointing methods, special joints, hangers, and		
	supports, protection of pipes and structures, alternative		
	materials, workmanship, prohibited fittings and practices,		
	hydraulic jump, change in direction of flow, T and Y		
	fittings, cleanouts, pipe grading, fixtures below inverted		
	level, suds relief, building sewers, trenching, testing sumps		
	and pumps, sizing of horizontal and vertical pipes.		
	4.2 Storms drain required, prohibited connections, subsoil		
	drains, sub drain, gutters/ channels/scuppers, roof drains,		
	strainers, leaders, conductors and connections, collect/		
	capture storm water, discharging storm water, safety, traps		
	required, prohibited installations.		
Cours	a Quita ama CEE408 5 Understand system of water symply and	-	
00	e Oucome – CEF400-5 Onderstand system of water supply, gray	water, recla	aimed water and
metho	ds to conserve water and energy.	v water, recla	aimed water and
metho	ds to conserve water and energy. Water Supply, Gray and Reclaimed Water.	water, recland	aimed water and <b>20</b>
metho	ds to conserve water and energy. Water Supply, Gray and Reclaimed Water. 5.1 Preamble on municipal water, sources of water, potable	water, recla	aimed water and 20
metho	<ul> <li>ds to conserve water and energy.</li> <li>Water Supply, Gray and Reclaimed Water.</li> <li>5.1 Preamble on municipal water, sources of water, potable and non potable water, reclaimed water, water storage , hot</li> </ul>	water, recla	aimed water and 20
metho 5	ds to conserve water and energy. Water Supply, Gray and Reclaimed Water. 5.1 Preamble on municipal water, sources of water, potable and non potable water, reclaimed water, water storage, hot and cold water distribution system, backflow protection, air	water, recla	aimed water and 20
metho 5	ds to conserve water and energy. Water Supply, Gray and Reclaimed Water. 5.1 Preamble on municipal water, sources of water, potable and non potable water, reclaimed water, water storage, hot and cold water distribution system, backflow protection, air gap, cross connection control, pipe materials and jointing	water, recla	aimed water and 20
metho 5	<ul> <li>ds to conserve water and energy.</li> <li>Water Supply, Gray and Reclaimed Water.</li> <li>5.1 Preamble on municipal water, sources of water, potable and non potable water, reclaimed water, water storage, hot and cold water distribution system, backflow protection, air gap, cross connection control, pipe materials and jointing method, alternative materials, hangers, and supports,</li> </ul>	v water, recla	aimed water and 20
metho 5	<ul> <li>ds to conserve water and energy.</li> <li>Water Supply, Gray and Reclaimed Water.</li> <li>5.1 Preamble on municipal water, sources of water, potable and non potable water, reclaimed water, water storage, hot and cold water distribution system, backflow protection, air gap, cross connection control, pipe materials and jointing method, alternative materials, hangers, and supports, workmanship, prohibited fittings and practices, protection of protection of protection.</li> </ul>	v water, recla	aimed water and
metho 5	<ul> <li>ds to conserve water and energy.</li> <li>Water Supply, Gray and Reclaimed Water.</li> <li>5.1 Preamble on municipal water, sources of water, potable and non potable water, reclaimed water, water storage , hot and cold water distribution system, backflow protection, air gap, cross connection control, pipe materials and jointing method, alternative materials, hangers, and supports, workmanship, prohibited fittings and practices, protection of pipes and structures, pressure control, unions, thermal</li> </ul>	v water, recla	aimed water and 20
metho 5	<ul> <li>Water Supply, Gray and Reclaimed Water.</li> <li>5.1 Preamble on municipal water, sources of water, potable and non potable water, reclaimed water, water storage, hot and cold water distribution system, backflow protection, air gap, cross connection control, pipe materials and jointing method, alternative materials, hangers, and supports, workmanship, prohibited fittings and practices, protection of pipes and structures, pressure control, unions, thermal expansion, types of valves, installation and testing, disinfaction protection of underground pipes.</li> </ul>	v water, recl:	aimed water and 20
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Seme seme one a the ab	<ul> <li>Water Supply, Gray and Reclaimed Water.</li> <li>5.1 Preamble on municipal water, sources of water, potable and non potable water, reclaimed water, water storage , hot and cold water distribution system, backflow protection, air gap, cross connection control, pipe materials and jointing method, alternative materials, hangers, and supports, workmanship, prohibited fittings and practices, protection of pipes and structures, pressure control, unions, thermal expansion, types of valves, installation and testing, disinfection, protection of underground pipes, color codes and arrow marking, introduction to wsfu.</li> <li>5.2: Definition of gray water, approvals, specification, and drawing, safety, total gray water discharge, holding tanks, valves and piping, reclaimed water system, definition of reclaimed water, pipe identification, installation, safety signs, valves, cross connection, approved uses, Rain water harvesting in plumbing systems</li> <li>Total</li> </ul>	12 12 24 f questions outer	20 20 40 on each topic is apt questions of

		Distribution of marks (Cognitive level-wise)				Total
Topic No.	Name of topic	Remember	Understand	Applica- tion	Course Outcome	Marks
1	Plumbing Terminology.	5	4	3	CEF408-1	12
2	Plumbing fixtures and fixture fittings.	4	5	5	CEF408-2	14
3	Traps, interceptors, indirect waste and vents.	3	4	7	CEF408-3	14
4	Sanitary drainage and storm drain.	6	6	8	CEF408-4	20
5	Water Supply, Gray and Reclaimed Water.	5	6	9	CEF408-5	20
TOTAL		23	25	32		80

#### Specification table for setting question paper for semester end theory examination :

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.)

#### Practical (T.W.) Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work practical sessions of batches of about 20 students :

Termwork is devided in three parts as below -

1) Assignment work.

2) Seminar.

3) Site visits.

I	Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
	1	<ul> <li>Assignment work:</li> <li>1. Draw sketches of installation details of plumbing fixtures and fittings in plan , Elevation and section ; with standard dimensions (minimum 4)</li> <li>2. Interpretation of sample plumbing drawings for multistoried building.</li> <li>3. Draw toilet layouts , plans, elevations and sections of selected case .Give dimensions.</li> <li>4. Prepare layout of internal and external (outside the toilet) DWV pipes and fittings of a selected case. If possible , write pipe diameters.</li> </ul>	<ol> <li>Developing Self learning ability .</li> <li>Developing Presentation skills.</li> <li>Information collection and presentation in the form of report.</li> </ol>	CEF408-6
	2	. Seminar: Students can select any topic from contents by referring codes , text book , professional magazines , technical papers published and websites of manufacturers and make a seminar presentation in 10 minutes using power point .Weightage is assigned for contents and presentation skills.(Students can work in a group of two.)	<ol> <li>Developing Self learning ability .</li> <li>Developing Presentation skills.</li> </ol>	CEF408-6 CEF408-7
3		• Site visit: Visit any plumbing site and submit a report on observation on plumbing system, architectural and structural provisions, pipe materials work method, safety and recommendations based on the provisions of UPC-I and IT	<ol> <li>Information collection and presentation in the form of report.</li> <li>Motivation through field exposure.</li> <li>Developing Self learning</li> </ol>	CEF408-6 CEF408-7

## **INDUSTRIAL EXPOSURE :**

SN	Mode of Exposure	Торіс
1.	Field Visits	Every chapter of theory syllabus
2.	Collecting data for assignment work	Term-work assignment

#### ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

#### • Assessment Criteria for Term work : i) Continuous Assessment of Term Work:

Every practical assignment shall be assessed for 25 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	02
Cognitive	Application	03
Developmenter	Operating Skills	05
Psychomotor	Drawing / drafting skills	05

Affective	Discipline and punctuality	05
Allective	Decency and presentation	05
	TOTAL	25

#### ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 50 marks shall be conducted marks awarded in term work mark sheet as per *Assessment Pro-forma III*.

## **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

#### **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. VDO presentations
- 4. Question Bank

#### **REFERENCE MATERIAL :**

# Books / Journals / IS Codes / Websites a)Reference Books:

Sr. No.	Author	Title	Publisher
1.	S. M. Patil	Plumbing Engineering	SeemaPublication , Mumbai.
2.	S. G. Deolalikar	Plumbing Design and Practice	Tata McGraw-Hill
3.	Lee Smith	Plumbing Technology Design and Practice	Delmar Publication
4.	James C. Church	Practical Plumbing Design Guide	Mgraw-Hill (T)
5.	Michal Casey, DuglasHannes , Redwood Kardon	Plumbing and Illustrated Guide to the Plumbing codes.	

#### b) Codes of Practice: IS, BIS and international codes:

- 1. 2008 Uniform plumbing code India (UPC-I)
- 2. 20080Illustrated training manual (ITM).
- **3.** Extracts from IAPMO India

#### c) Websites: 1)www.plumbing services.com.

- 2) www.cookandlees.com
- 3) www.mepdesignservices.com
- 4) www.plumbing.1800anytyme.com
- 5) www.dyno.com/plumbing

\* \* \*

#### COURSE ID:

Course Name	: Quality Control
Course Code	: CEF409
Course Abbreviation	: FQCO

#### **TEACHING AND EVALUATION SCHEME:**

#### Pre-requisite Course(s) : Nil

#### **Teaching Scheme:**

Scheme component	Hours / week	Credits
Theory	3	5
Practical	2	

#### **Evaluation Scheme :**

Madaaf	Progressive Assessment		Term End Examination			
Evaluation	Theory	Practical	Theory Examination	Term Work	Total	
Details of Evaluation	Average of two tests of 20 marks each	<ol> <li>25 marks for each practical</li> <li>One PST of 25 marks</li> </ol>	Term End Theory Exam (03 hours)	As per Performa-III		
Marks	20		80	25	125	

#### **Rationale:**

The entire construction activities are ultimately judged by the achievement of specified quality standards. Hence clear understanding of the concepts, principles and practices of Quality Control are necessary.

It has now become evident that, in common with other majority management functions, successful conduct of the Quality function demands much specialized knowledge and many specialized tools and apply the knowledge. This subject is planned to enable the students to acquire this specialized knowledge and to develop proficiency in use of the tools and methods to make the knowledge effective.

#### COMPETENCY

Applying knowledge of components of Quality Controlfor development of Infrastructure

Cognitive :Understanding and applying knowledge of Quality Control

Psychomotor :i) Conducting under construction site visits.

Affective :Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

#### **COURSE OUTCOMES:**

Course Outcome CEF409-1 Decide the steps in quality control program

Course Outcome CEF409-2 Design and plan the quality circles

Course Outcome CEF409-3Classify the data and present the data in different manners

Course Outcome CEF409-4 Decide theOrganization For Quality Control

Course Outcome CEF409-5 Decide the ISO standards in general for a construction firm

Course Outcome CEF409-6 Prepare the plan for inspection of construction works

Course Outcome CEF409-7 Design of sampling plans for inspection of materials Course OutcomeCEF409-8 Decide factors controlling Quality of conformance Course Outcome CEF409-9 Decide the applicability of Total quality management system in construction projet

#### COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

					Prog	ramme O	utcomes 1	POs and l	PSOs				
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
Competency: Applying knowledge ofQuality Control for development of Infrastructure :	3	3	3	2	3	2	-	1	1	3	3	3	1

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					Prog	gramme O	utcomes	POs and l	PSOs				
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
CEF409-1 Decide the steps inquality control program.	3	3	-	_	2	-	-	1	1	2	2	2	1
CEF409-2 Design and plan the quality circles	3	3	3	3	2	-	-	1	1	2	2	2	1
CEF409-3 classifythe data and present the datain different manners.	3	3	3	1	1	-	-	1	1	1	3	3	1
CEF409-5 Deecide the ISO standards in general for a construction firm.	3	2	2	2	2	-	-	1	1	3	2	2	1
CEF409-6 Prepare the plan for inspection of construction works	3	3	2	2	3	-	-	1	1	2	2	2	1
CEF409-7 Design of sampling plans for inspection of materials.	3	3	2	2	3	-	-	1	1	2	2	2	1
CEF409-8 Decide factors controlling Quality of conformance	3	2	1	1	2	-	-	1	1	2	2	2	1

## $Curriculum \ MPECS\text{-}2016 \ \text{ Diploma in CIVIL ENGINEERING}$

		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>CEF409-</b> <b>9Decide the</b> <b>applicability of</b> <b>Total quality</b> <b>management</b> <b>system in</b> <b>construction</b> <b>project</b>	3	2	2	2	2	-	-	1	1	2	2	2	1

## Section I

Sr. no.	Topics	Teaching (Hours)	Theory evaluation
	Course Outcome CEF409-1 Decide the steps in quality contr	ol program.	Marks
1	<ul> <li>Basic Concepts Definition, Terminology</li> <li>1.1 Meaning of Quality - Meaning of quality control</li> <li>1.2 Steps in quality control programm.</li> <li>1.3 Objectives of quality control ,quality characteristics</li> <li>1.4 Quality of design, factors controlling Quality of design.</li> </ul>	05	08
Cours	e Outcome CEP403-2 Design and plan the quality circles	0.6	10
2	<ul> <li>Quality Circle.</li> <li>2.1 Definition ,</li> <li>2.2 Scope of quality circles ,advantages and limitations of</li> </ul>	06	10
	Quality choices		
	2.3 Basic organizational structure of quality circles ,		
	2.4 Basic problem solving techniques (Brain storming)		
	2.5 Diagram cause&effect analysis,data collections ,data		
	analysis		

Sr. no.	Topics	Teaching (Hours)	Theory evaluation
Cours	se Outcome CEF409-3 classify the data and present the data in different	manners	Marks
		07	10
3	<ul> <li>Fundamentals of statistical concepts.</li> <li>3.1Frequency, Frequencydistribution, frequency plot, use of frequency plot-case study, classification of data.</li> <li>3.2 Graphic presentation of frequency distribution, i.e.</li> </ul>		
	histogram, polygon, cumulative frequency graph etc,		
	presenting the data.		
	3.3Concept of universe and sample statistics normal		
	distribution curve, its construction, actual and ideal normal		
	distribution curve.		
	3.4Measures of central tendency i.e.Arithmetic mean,		
	The median, the mode comparison of mean mode		
	and median.		
Cours	se Outcome CEF409-4 Decide theOrganization For Quality Control		
4	<ul> <li>Organization For Quality Control</li> <li>4.1 Quality control Department, Structure of the Department,</li> <li>4.2 Staffing and job specifications,</li> </ul>	3	6
	Course Outcome CEF409-5Deecide the ISO standards in general for	a construction	n firm
5	<ul> <li>Introduction To ISO 9000.</li> <li>5.1 Introduction to ISO series ,History of ISO 9000 series standards,</li> <li>5.2 ISO 9000 standards in general ,Outstanding features of ISO 9000</li> <li>5.3 Series of standards ,</li> <li>5.4 Benefits by becoming an ISO 9000 company.</li> </ul>	3	6
	Total	24	40

## Section II

Sr. no.	Topics	Teaching (Hours)	Theory evaluation Marks
Cours	the Outcome CEF409-6 Prepare the plan for inspection of construction w	works	
6	<ul> <li>Inspection</li> <li>6.1 Importance of inspection &amp; types, inspection of works in construction,</li> <li>6.2 Inspection planning, accuracy of inspection &amp; importance in accuracy,</li> <li>6.3 Budgeting for inspection &amp; approaches to reduce the inspection cost.</li> </ul>	6	10
Cours	e Outcome CEF409-7 Design of sampling plans for inspection of mater	ials	
7	<ul> <li>Sampling by Attributes</li> <li>7.1 Importance of sampling inspection</li> <li>7.2 Inspection and sampling inspection, acceptance sampling</li> <li>7.3 Lot formation, terminology of sampling plans - single, double, multiple, sequential, inspection levels,</li> <li>7.4 Procedure of lot acceptability normal, reduced</li> <li>&amp; tightened inspection &amp; shifting from one to another,</li> <li>7.5 Design of sampling plans</li> </ul>	6	10
Cours	se Outcome CEF409-8 Decide factors controlling Quality of conforman	ce	10
8	Quality Assurance8.1 Concept of quality assurance8.2 Responsibilities of quality assurance8.3 Quality audit8.4 Quality of conformance ,factors controlling Qualityof conformance .	6	10
Cours projec	se Outcome CEF409-9Decide the applicability of Total quality managet	gement system	in construction
9	<ul> <li>Total quality management</li> <li>9.1 Historical review and evolution of TQM</li> <li>9.2 Deming and Juran approaches to TQM</li> <li>9.3 Seven tools of TQM</li> <li>9.4 Total quality culture</li> <li>9.5 Benchmarking, quality function deployment, Kaizen, six sigma</li> </ul>	6	10
	Total	24	40

		Distributio	n of marks (Cogn	itive level-		
Topic			wise)		Course	Total
No.	Name of topic	Remember	<b>Remember</b> Understand		Outcome	Marks
1	Basicconcept,Definitionterminology	4	4	-	CCF409-1	08
2	Quality Circles	4	2	4	CCF409-2	10
3	Fundamentals of statistical concepts	4	2	4	CCF409-3	10
4	Organization for quality control	4	2	-	CCF409-4	06
5	Introduction to ISO - 9000	2	4	-	CCF409-5	06
6	Inspection	4	4	2	CCF409-6	10
7	Sampling by Attributes	4	4	2	CCF409-7	10
8	Quality assurance	4	4	2	CCF409-8	10
9	Total quality management	4	4	2	CCF409-9	10
Total		34	30	16		80

## Specification table for setting question paper for semester end theory examination:

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

## U) TERM WORK

## Practical Exercises and related skills to be developed :

The following exercises and visits shall be conducted as Term Work in practical sessions of batches of about 20students :

Sr No.	Title of Assignment / Practical Exercise	Skills / Competencies to be developed	Course Outcome
1.	<ul> <li>A)List of assignments.</li> <li>1. The study of steps in quality control programme, objectives and quality characteristics.</li> <li>2. The study of quality circle, advantages and limitations of basic organization structure of any one construction organization</li> <li>3. To study various functions of quality control department and study job specifications regarding quality.</li> <li>4. To study the different features of ISO 9000</li> <li>5. To study various tools of TQM.</li> </ul>	<ol> <li>Self learning ability</li> <li>Understand quality objectives and quality characteristics</li> <li>Applying concepts studied For Preparing organization structure quality control programme</li> <li>Time management and team working skills.</li> <li>Presentation skills</li> <li>Information collection regarding. ISO standards.</li> </ol>	CCF409-1 CCF409-2 CCF409-4 CCF409-5 CCF409-9
2.	<ul> <li>V) Visits and detailed Report</li> <li>1.To collect data of construction work and plot frequency distribution, histogram, polygon and cumulative frequency.</li> <li>2.To inspect different items of construction work.</li> <li>3.To study the sampling plan of any one Civil Engg. Item.</li> </ul>	<ol> <li>Time management, team working.</li> <li>Understand, prepare and interpret the drawings related to work.</li> <li>Understand the procedure for inspection of different items of construction work.</li> </ol>	CCF409-3 CCF409-6

## **B) INDUSTRIAL EXPOSURE :**

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Every chapter of theory syllabus
2.	Field examples of course application	Term-work assignment

#### ASSESSMENT CRITERIA FOR TERM WORK

#### • Assessment Criteria for Term work :

#### i) Continuous Assessment of Assignments :

Every assignment shall be assessed for 25 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	05
Cognitive	Application	05
	Operating Skills	05
Psychomotor	Drawing / drafting	05
	skills/presentation	
Affective	Discipline and punctuality	05
	TOTAL	25

#### ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted and Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

#### **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

**Teaching and Learning resources :** 

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations

#### **REFERENCE MATERIAL :**

#### a) Books / Journals / IS Codes

Sr.	Author	Title	Publisher
No.			
1	J .M .Juras&Frank M .GrynaJr	Quality planning and Analysis	
2	T.T.T.I.Madras	Quality control	T.T.T.I.Madras
5	S .Dalesa .&Saurabh .	ISO 9000 Quality systems .	
6	T.R.Banga , S.C.Sharma	Industrial organization and industrial economics	Khanna Publishers

#### COURSE ID:

Course Name	: TOWN AND COUNTRY PLANNING
Course Code	: CEF410
Course Abbreviation	: FTCP

## **TEACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s)	:	<nil></nil>
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#### **Teaching Scheme :**

Scheme component	Hours / week	Credits
Theory	03	05
Practical	02	

**Evaluation Scheme :** 

	Progressiv	ve Assessment	Term End I		
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Total
Details of Evaluation	Average of two tests of 20 marks each	<ol> <li>25 marks for each practical</li> <li>One PST of 25 marks</li> </ol>	Term End Theory Exam (03 hours)	As per Proforma-III	
Marks	20		80	25*	125

## **RATIONALE :**

The civil engineering branch has great responsibility to protect the environment and to distribute the nature's gifts to all in a rational manner. In this context the student shall have the knowledge of available basic resources like land, water, light, air. It is ultimate responsibility of the planner to see that any resource is not over stretched or over consumed. The student / planner has to consider socio-economic structure of the region. Understanding interdependency of regions and the environment, he should be able to suggest draft plan for future, keeping in view the healthy atmosphere and room for expansion to all components.

#### COMPETENCY

Apply principles of town planning and bye-laws of local authority for a town and rural planning as follows :

Cognitive :Understanding and applying principles of town planning for a town and rural planning.

Psychomotor :i) Carrying field survey to collect data ii) Planning of town and rural area

Affective :Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

#### **COURSE OUTCOMES :**

**CEF410-1** Plan the town using basic town planning principles

CEF410-2 Carry field survey to collect various data

CEF410-3 Work to improve slum areas, select the ideal site for industries, public buildings, provide

facilities like parks and playgrounds.

CEF410-4 Plan residential area using neighborhood concept

CEF410-5 Plan the region as per MR&TP act

CEF410-6 Plan the buildings as per building bye laws of local authority

CEF410-7 Plan and design rural housing at low cost

#### COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply principles of town planning and bye-laws of local authority for a town and rural planning as follows	3	3	3	2	2	-	-	1	1	1	2	2	1
<b>CEF410-1</b> Plan the town using basic town planning principles	3	3	-	-	2	-	-	1	1	2	1	1	1
CEF410-2 Carry field survey to collect various data	3	3	3	3	3	-	_	1	1	2	2	2	1
<b>CEF410-3</b> Work to improve slum areas, select the ideal site for industries, public buildings, provide facilities like parks and playgrounds.	2	3	3	2	3	2	-	1	1	1	2	2	1
CEF410-4 Plan residential area using neighborhood concept	3	3	2	2	2	-	-	1	1	2	2	2	1

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
CEF410-5 Plan the region as per MR&TP act	3	3	2	1	3	-	-	1	1	2	2	2	1
<b>CEF410-6</b> Plan the buildings as per building bye laws of local authority	3	3	2	2	3	2	-	1	1	1	2	2	1
CEF410-7 Plan and design rural housing at low cost	3	3	3	2	2	2	-	1	1	1	2	2	1

## **CONTENT : THEORY :**

Section 1	[
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Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation
		(nours)	(Marks)
CEF4	<b>10-1</b> Plan the town using basic town planning principles	1 1	
1 Cour 2	<ul> <li>Introduction <ol> <li>Meaning and scope of the subject.</li> <li>Evolution of town planning.</li> <li>Objects of town planning</li> <li>Principles of town planning</li> <li>Growth of towns –concentric ,satellite, Ribon develop, etc</li> </ol> </li> <li>se Outcome CEF410-2 Carry field survey to collect various data Nature and purpose of town and country planning <ol> <li>Forms of town and country planning, i.e. local planning, country planning, regional planning, national planning, international planning,</li> <li>Various types of surveys. i.e. Town or city survey, Regional survey, National survey, Civil survey </li> <li>Zoning - Definition Types of zoning ,Land use analysis.</li> <li>Landscape Architecture. – Objects and salient features of the landscape architecture.</li> </ol></li></ul>	06 06 al site for in	08 08 08
buildi	ngs, provide facilities like parks and playgrounds.		dustries, public
3	<ul> <li>Various techniques and practice</li> <li>3.1 Introduction to 5 year plan</li> <li>3.2 Master plan – Definition, objects, necessity, Data to be collected, details to be shown on master plan drawings, steps/stages in the preparation of master plan</li> <li>3.3 Housing – Housing problem in India, classification of housing,</li> <li>3.4 Slums – Definition, Causes, effects of slums on town life, precautions to be taken against slum formation, slum clearances</li> <li>3.5 Industries – Classification of industries, selection of site for industries, planning of industrial estate</li> <li>3.6 Public Buildings - Grouping of public buildings in various categories, site selection of public buildings</li> <li>3.7 Parks and play grounds – Types of re-creation systems, various forms of recreation amenities i.e. type of parks and play grounds</li> </ul>	08	16

4	Neighbour-hood planning	04	08
	4.1 Concept and principles of NH planning		
	4.2 Importance of NH planning		
	4.3 Features of NH Planning		
	4.4 Agencies for housing schemes i.e. State Housing Board, Co-		
	operative Housing Societies, Private Enterprises, Individuals,		
	brief description of each.		
	Total	32	40
Seme times only.	ster end exam question paper should be such that total marks of questions the marks allotted above but the candidates are able to attempt questions	on each topi s of the abov	c is one and half ve allotted marks

## Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Cour	se Outcome CEF410-5 Plan the region as per MR & TP act.		
5	Law in relation to planning	08	14
	<ul> <li>5.1 Necessity of planning law and legislation</li> <li>5.2 Existing legislations for clearance, development and control of urban land (only list)</li> <li>5.3 Land acquisition act (Introduction only)</li> <li>5.3.1 Aims of land acquisition act</li> <li>5.4 Planning legislation in Maharahstra state (MR &amp; TP act)</li> <li>6. Categories of MR &amp; TP act <ul> <li>i.e</li> <li>brief</li> <li>details</li> <li>like</li> <li>agency,functionscontents,procedure etc.</li> </ul> </li> <li>5.5 Framework and functions of local authorities</li> <li>5.5.1 Local</li> <li>authorities</li> <li>a)</li> <li>Village</li> <li>panchayat&amp;panchayatsamiti</li> <li>b)</li> <li>ZilhaParishads</li> <li>c)</li> <li>Municipal</li> <li>councils</li> <li>(A,B,C,)</li> <li>class, Municipal</li> </ul>		
Cour	se Outcome CEF410-6 Plan the buildings as per building bye-laws	of local auth	ority
6	Building bye-laws6.1 Definition6.2 Objects of bye-laws6.3 Importance of bye-laws6.4 Applicability of bye-laws6.5 Set-BACK & light plane6.6 Floor space index (FSI), Floating FSI- definition, explanationwith one example	08	14

Sr. No.	Topics / Sub-topics         6.7 Off-street parking. Fire protection, minimum plot sizes	Lectures (Hours)	Theory Evaluation (Marks)
	Course Outcome CEF410-7 Plan and design rural housin	ng at low cos	rt
7	<ul> <li>Planning of rural development</li> <li>7.1 Village planning – Necessity, difference between rural &amp; urban areas, types of villages.</li> <li>7.2 Principles of village planning</li> <li>7.3 General principles of rural housing design</li> <li>7.4 Rural housing problem in India</li> <li>7.5 Rural housing scheme</li> <li>7.6 Introduction to low cost housing &amp; agro industries</li> </ul>	08	12
	Total	32	40
Semestimes only.	ster end exam question paper should be such that total marks of questions the marks allotted above but the candidates are able to attempt question	on each topi s of the above	c is one and half ve allotted marks

Торі		Distribution (	G	Total		
c No.	Name of topic	Remember Understand Applica- -tion		Outcome	Marks	
1	Introduction	04	04		CEF410-1	08
2	Nature and purpose of town and country planning	04	04		CEF410-2	08
3	Various techniques and practices	06	10		CEF410-3	16
4	Neighborhood planning	02	04	02	CEF410-4	08
5	Law in relation to planning	06	08		CEF410-5	14
6	Building bye-laws	04	06	04	CEF410-6	14
7	Planning of rural development	02	06	04	CEF410-7	12
TOTAL		24	35	21		80

Specification table for setting question paper for semester end theory examination :

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

## A) TERM WORK

#### Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work:

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Land subdivisioning problem	7. Data collection & presentation skills	CEF410-2
2	Planning of housing scheme leading to detailed neighbourhood planning	8. Planning of housing scheme as per neighbourhood principles	CEF410-4
3	Case studies of town planning schemes having report and drawing	4. Studying MR & TP act, planning town planning schemes	CEF410-5
4	Collection of building bye-laws of local authority	5. Planning of all buildings as per local bye laws	CEF410-6
5	Parking bye laws for different types of public buildings	Studying parking space required for different types of public buildings	CEF410-6

#### **B) INDUSTRIAL EXPOSURE :**

(Included in Laboratory Manual for Applied Mechanics)

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Every chapter of theory syllabus
2.	Field examples of course application	Term-work assignment

## ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

#### • Assessment Criteria for Term work :

#### i) Continuous Assessment of Practical Assignments :

Every practical assignment shall be assessed for 50 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	05
Cognitive	Application	05
Developmentor	Carrying field work skills	10
Psycholiotol	Planning town and rural areas	10
Affactivo	Discipline and punctuality	10
Allective	Decency and presentation	10
	50	

## ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 50 marks shall be conducted as per Proforma III Final marks of term work shall be awarded as per *Assessment Pro-forma III*.

#### **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

#### **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Item Bank

#### **REFERENCE MATERIAL :**

#### a) Books / Journals / IS Codes

Sr.No.	Author	Title	Publisher
1.	G.H.Hiraskar	Fundamentals of town planning	Dhanpatrai Publications New Delhi
2.	S.C.Rangwala	Town Planning	Charotar Publishing House - Anand
3.	N.K.Gandhi	Study of town and country planning	-

#### **b)** Websites

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## CURRICULUM CONTENTS OF LEVEL – V

## MANAGEMENT AND DIVERSIFIED COURSES

#### COURSE ID:

Course Name	: INDUSTRIAL ORGANIZATION AND
	MANAGEMENT
Course Code	: CCF501
<b>Course Abbreviation</b>	: FIOM

#### **TEACHING AND EVALUATION SCHEME :**

**Pre-requisite Course(s)** : <*nil* >

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	03	03
Practical		

#### **Evaluation Scheme :**

	Progressiv	ve Assessment	Term End H			
Mode of Evaluation	Theory	Practical	Theory Examination	Term Work	Total	
Details of Evaluation	Average of two tests of 20 marks each	<ol> <li>25 marks for each practical</li> <li>One PST of 25 marks</li> </ol>	Term End Online Theory Exam	As per Proforma-III		
Marks	20		80	-	100	

#### **RATIONALE :**

Management ability is a higher-grade ability, which every successful engineer must possess. This science has been developed in those days when it was treated as an art in earlier stages. It is impossible for an individual though technically sound to achieve goals of the organizations. Effective implementation of management policies is a tough task. The Diploma holder should learn these principles of management and various techniques.

**COMPETENCY:** Plan and implement managerial and administrative strategies.

Cognitive :Use management principles and techniques.

**Psychomotor :**i) Apply management principles ii) Control inventory iii) Use personal protective devices for safety

Affective :Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

#### **COURSE OUTCOMES :**

CCF 501.1 Apply principles of management and carry out various functions of management.

CCF 501.2 Prepare organization structure for small and medium scale industry.

CCF 501.3 Perform duties of stores in-charge, material and finance manager.

CCF 501.4 Practice industrial safety rules, codes, practices and acts.

CCF 501.5 Apply various modern management techniques.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

Competency	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	PO 5	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	PO 10	PSO 1	PSO 2	PSO3
and	Basic	Disciplin	Experim	Enginee	The	Environ	Ethics	Individu	Commu	Life-	Maintai	Maintai	<b>.</b>
COs	knowled	е	ents and	ring	engineer	ment		al and	nication	long	n	n	Problem
	ge	knowled	practice	Tools	and	and		team		learning	Electric	Electric	Solving
	0	ge	-		society	sustaina		work:		0	al	al	on field
		0			-	bility					equipme	power	
						ĩ					nt	systems	
Competency:												2	
Plan and													
implement													
managerial	2	-	-	-	1	-	1	3	2	2	2	2	
and													
administrativ													
e strategies													
CCF501.1													
Apply													
principles of													
and carry out	2	-	-	-	1	-	1	3	2	2	1	1	
various													
functions of													
management.													
CCF501.2													
Prepare													
organization													
structure for	2	2	_	_	2	2	2	3	1	1	0	0	
small and	2	2	-	-	2	2	2	5	1	1	0	0	
medium scale													
industry.													
CCF501.3													
Perform dution of													
stores in-													
charge	2	2	1	1	-	-	1	3	2	2	2	2	
material and													
finance													
manager.													
CCF501.4Pra			1								1		1
ctice													
industrial	2	3	2	1	1		1	3	2	2	3	3	
safety rules,	2	5	<u></u>	1	1	-	1	5	۷	2	5	5	
codes,													
practices and													

 $Curriculum \ MPECS-2016 \ \ \text{Diploma} \ \text{in CIVIL ENGINEERING}$ 

Competency and COs	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO 1 Maintai n Electric al equipme nt	PSO 2 Maintai n Electric al power systems	PSO3 Problem Solving on field
acts.													
CCF501.5 Apply various modern management techniques	2	-	-	-	1	-	1	3	2	2	2	2	

## **CONTENT :**

## **THEORY**:

## SECTION -I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
CCF S	501.1Apply principles of management and carry out various functions of mana	gement.	
1	PRINCIPLES OF MANAGEMENT	06	10
	1.1 Concept of management		
	1.2 Principles of management		
	1.3 Objectives of management		
	1.4 Scope and importance of management		
	1.5 Levels of management		
	1.6 Managerial competencies : Communication, Planning and		
	Administration, Team work, Strategic action and General awareness		
2	FUNCTIONS OF MANAGEMENT	08	12
	2.1 Planning: Forms of planning, Strategic levels and Planning,		
	Phases of Planning		
	2.2 Decision Making: Decision making conditions, Basic types		
	of Decisions		
	2.3 Organizing: Introduction to Organization design, basic types of		
	Departmentalization, Co-ordination, Authority		
	2.4 Motivation: Work Motivation, Three approaches to Motivation,		

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	2.5 Leadership: Leadership and Power, Leadership Development		
	2.6 Communication: The Communication process, Impact of		
	Information Technology, Hurdles to effective communication		
	2.7 Controlling: Foundations of control, creative Effective control,		
	Primary methods of control		
3 CCF.	<ul> <li>HUMAN RESOURCE MANAGEMENT(Personnel Management)</li> <li>3.1 Definition and concept,</li> <li>3.2 Aim, Objectives and functions of HR dept.</li> <li>3.2 Principles of personnel policy, details recorded in policy</li> <li>3.3 Recruitment and selection of employees</li> <li>3.4 Training : Objectives, benefits, types and methods</li> <li>3.5 Workers Participation in Management</li> </ul>	06	10
4	FORMS OF BUSINESS ORGANISATION	04	08
	4.1Types of industrial sectors		
	4.2 Forms of business organization		
	4.3 Individual Proprietorship		
	4.4 Partnership		
	4.5 Joint stock companies		
	4.6 Co-operatives		
	4.7 Public sectors		
	4.8 Government undertakings.		
	Total	24	40

	SECTION	II
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Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
CCF.	501.3Perform duties of stores in-charge,material and finance manager.		
5	MATERIALS MANAGEMENT	06	10
	5.1 Importance of purchase		
	5.2 Functions and Objectives		
	5.3 Duties of purchasing officer		
	5.4 Methods of purchasing and procedure		
	5.5 Scope and importance of material management		
	5.6 Objectives of material management		
	5.7 Duties of Material manager		
	5.8 Concept of supply chain management		
	5.9 Modern trends in material management : MRP,ERP		
6	FINANCIAL MANAGEMENT	04	08
	6.1 Concept, Scope and Importance		
	6.2 Functions of financial management		
	6.3 Types of capital: Fixed, working		
	6.4 Factors affecting Working capital		
	6.5Capitalization : over, under		
	6.6 Sources of Finance		
	6.7 Industrial taxation		
CCF .	501.4Practice industrial safety rules, codes, practices and acts.		
7	INDUSTRIAL ACT & SAFETY	08	12
	7.1 Factory Act, Boiler Act, Workmen Compensation Act,		
	ESI Act, pollution Control Act		
	I		

	<ul> <li>8.1 PERT &amp; CPM</li> <li>8.2 Various terms related with network analysis</li> <li>8.3 Various Time estimates</li> <li>8.4 Construction of Network Diagram</li> <li>8.5 Computation of Critical Path</li> </ul>		
	<ul> <li>8.1 PERT &amp; CPM</li> <li>8.2 Various terms related with network analysis</li> <li>8.3 Various Time estimates</li> <li>8.4 Construction of Network Diagram</li> </ul>		
	<ul><li>8.1 PERT &amp; CPM</li><li>8.2 Various terms related with network analysis</li><li>8.3 Various Time estimates</li></ul>		
	<ul><li>8.1 PERT &amp; CPM</li><li>8.2 Various terms related with network analysis</li></ul>		
	8.1 PERT & CPM		
8	MODERN MANAGEMENT TECHNIQUES	06	10
CCF	501.5Apply various modern management techniques.		
	procedure		
	7.5 Housekeeping: definition, concept, necessity, advantages,		
	7.4 Occupational Safety and Health Administration – Promoting, norms and standards		
	7.3 Safety management: safety in industry, committees, programs, Safety codes, Safety training,		
	Reporting & Investigation of accidents		

## Specification table for setting question paper for semester end theory examination:

Topic		Distribution of	Course	Total		
No.	Name of topic	Remember	Understand	Apply	Outcome	Marks
1	Principles Of Management	02	04	04	CCF501.1	10
2	Functions Of Management	02	04	06	CCF501.1	12
3	Human Resource management	04	04	02	CCF501.1	10
4	Forms Of Business organization	02	04	02	CCF501.2	08
5	Materials Management	04	02	04	CCF501.3	10
6	Financial Management	02	02	04	CCF501.3	08
7	Industrial Act & Safety	04	04	04	CCF501.4	12
8	Modern Management Techniques	02	02	06	CCF501.5	10
TOTA L		22	26	32		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

#### **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

#### **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Item Bank

#### **REFERENCE MATERIAL :**

Sr. No.	Author	Title	Publisher
1	Bangaand Sharma	Industrial Organisation& Management	Khanna Publisher
2	O P Khanna	Industrial Engg. & Management	DhanpatRai& sons New Delhi
3	P.C. Pandey&C.K.Sing	Management Science	DhanpatRai& sons New Delhi
4	Industrial Organisation	P.T. Ghan	Tata McGraw Hill
5	Management Information System	Waman S. Jawadekar	Tata McGraw Hill
6	P.C. Pandey&C.K.Sing	Management Science	DhanpatRai& sons New Delhi

#### a) Books / Journals / IS Codes

#### b) Websites

- i) nptel/iitm.ac.in
- ii) <u>http://iete.ac.in/subjects/amindustry/Mgmt.htm</u>

#### COURSE ID:

Course Name	: CIVIL ENGINEERING PROJECT I
Course Code	: CEF501
<b>Course Abbreviation</b>	: FCPI

#### **TEACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s) : NIL.

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory		02
Practical	02	_

#### **Evaluation Scheme :**

Mode of	Progressive	Assessment	Term	Total		
Evaluation	Theory	Practical	Theory	TW	Oral	
Details of Evaluation				As per Proforma VI	Based on TW as per proforma IV	
Marks				25*		25

\*( To be assessed by internal examiner )\*\* (To be assessed by internal and external examiner)

#### **RATIONALE :**

The subject of Civil Engg Project - I work is included in the curriculum mainly with a view to provide students with an opportunity to develop synthesizing skill and to enable them to integrate knowledge of all core Subjects in producing a total meaningful scheme.

A student is given a real life problem and he has to provide a feasible solution for which he is supposed to collect suitable data through survey and contacting various resources viz. various engineering and non engineering sectors, handbooks and data-books. He will analyse and organize the data and prepare drawings and write a detailed report of every activities he undertook to reach to the solution. Through independent individual as well as group activities a student is made interact with his colleagues and persons in the field, technical profession and justify his own decisions. Ultimately, the project and seminar activity develops capacity in the diploma holders to enter in to the world of today.

#### **COMPETENCY :**

Achieve the technique of collection of data, leadership quality, reading drawings and designing.

**Cognitive :** Applying principles of Engineering of core subjects learnt earlier.

Psychomotor: i) Collection of data ii) Forecasting iii) Innovative ideas iv) Designing

Affective : Attitude of i) Calculative aspect ii) accuracy iii) safety iv) aesthetic presentation

v) innovative vi) civic sense

#### A. COURSE OUTCOMES :

**CEF501-1** Decide a Project.

**CEF501-2** Collect the data required

**CEF501-3** Collect the norms, IS codes, monograms, charts, graphs.

**CEF501-4** Calculate& design the scheme Based on data collect.

CEF501-5 Determine demerits & merits, Benefit cost ratio, eco-friendly, if any.

**CEF501-6** Present seminar.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

	PO 1 Basic knowl edge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO 1 Maintai n Electric al equipme nt	PSO 2 Maintai n Electric al power systems	PSO3 Problem Solving on field
Competency: Achieve the technique of collection of data, leadership quality, reading drawings and designing.	2	-	-	-	1	-	1	3	1	2	-	-	
<b>CEF501-1</b> Decide a Project.	2	-	-	-	1	-	1	3	2	2	1	1	
<b>CEF501-2</b> Collect the data required	2	2	-	-	2	2	2	3	1	1	-	-	
CEF501-3 Collect the norms, IS codes, monograms,	2	2	-	2	-	-	1	3	1	2	2	2	

#### Curriculum MPECS-2016 Diploma in CIVIL ENGINEERING

	PO 1 Basic knowl edge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO 1 Maintai n Electric al equipme nt	PSO 2 Maintai n Electric al power systems	PSO3 Problem Solving on field
charts, graphs.													
CEF501-4 Calculate& design the scheme Based on data collect.	2	3	2	1	1	-	1	3	2	2	3	3	
CEF501-5 Determine demerits & merits, Benefit cost ratio, eco- friendly, if any.	2	-	2	-	2	-	1	3	2	2	1	1	
CEF501-6 Present seminar.	2	-	-	-	1	-	1	3	2	2	3	3	

#### **In-plant training**

#### The Seminar shall contain :

- 1.1 Title of the Project
- 1.2 Names of the students
- 1.3 The report shall be based on the above preliminary investigations
- 1.4 Conclusion & further Scope
- 1.5 Bibliography & References

## ( The number of students per batch shall be 5 To 6 )

#### List of Projects :

The students should submit **ANY ONE** of the following projects with complete details covering the above cited Preliminry investigations and seminar

- 1. Minor Irrigation Project.
- 2. Percolation tank.
- 3. Lift Irrigation.
- 4. Drip Irrigation.
- 5. K.T. Weir
- 6. Rain Water harvesting for domestic and public building.

- 7. Green House.
- 8. Water Shed Development of small catchment.
- 9. Planning and Design of Water treatment plant for given data.
- 10. Water Supply scheme for a small town or village.
- 11. Sewerage system for a town or city.
- 12. Water distribution system for a town/a big colony/a big size public building
- 13. Industrial waste treatment of an Industry.
- 14. Solid Waste management.
- 15. Hospital Waste disposal.
- 16. Recycling of resources.
- 17. Highway Construction project including design of a cross drainage work.
- 18. Permanent way construction of Railway including a tunnel with detailed drawing & Design.
- 19. Bridge Design.
- 20. Earthquake resistant building construction.
- 21. Earthquake resistant design of Engineered and Non engineered structures.
- 22. Retrofitting of Structures.
- 23. Advance Repair Techniques.
- 24. Advance Construction Techniques.
- 25. Low cost housing.
- 26. Ferro cement Units.
- 27. Manufacturing of Precast Concrete Products
- 28. Town planning.
- 29. Junction Planning for City roads / Planning for Roads for congested area / Parking Studies.
- 30. House Keeping in Building Construction.
- 31. Village Sanitation and Health.
- 32. NDT of any RCC building
- 33. Non-conventional sources of energy
- 34. Interior design and decoration.
- 35. Thermal efficient construction : Green bulding,etc
- 36. Flood resistant buildings
- 37. Disaster Management
- 38. Permanent Way Construction
- 39. Tunnels /Docks/Runways/International standard Swimming Pool Construction
- 40. Any current topic related to Civil Engineering.

## B. In-plant training : ( Phase I )

#### Evaluation of 4 weeks in-plant training performed during vacation after IV sem

The students will present the report of their in-plant training .The presentation of in-plant training shall

consist of following :

- Name of the firm/industry/Organization/Company
- Name of the owner :
- Details of Organization/Company : whether LLP, PVT Ltd, or so,
- Number of project performed by the Organization/Company for last 3 years
- Turn -over of the Organization/Company
- Equipment and machinery involved : Owned and hired, Numbers ,and capacities and make
- The current projects going during training

- The details of current project shall include its purpose of project, investigations, planning, drawing, design ,estimate,etc
- The presentation shall include written material, photographs and videos

#### C) TERM WORK

#### Criteria for Continuous Assessment of Practical work and Progressive Skill Test:

Sr. no	Criteria	Marks allotted
1	Attendance at regular practical	02
2	Collection of data	05
3	Planning and finalizing of project	05
4	Participation /Team work.	03
5	Presentation of Seminar.	10
	Total	25

#### **D) INDUSTRIAL EXPOSURE :**

SN	Mode of Exposure	Торіс
1.	Field Visits concerned to project work	All concerned subjects including allied subjects
2	In-plant training in any industry or organization	All concerned subjects including allied subjects

#### **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

#### **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Question Bank

#### COURSE ID:

Course Name	: CIVIL ENGINEERING PROJECT II
Course Code	: CEF502
Course Abbreviation	: FCPII

#### **TEACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s) : FCPI- CEF501

**Teaching Scheme :** 

Scheme component	Hours / week	Credits	
Theory		04	
Practical	04		

#### **Evaluation Scheme :**

Mode of Evaluation	Progressive Assessment		Term End Examination			Total
	Theory	Practical	Theory	TW	Oral	
Details of Evaluation				As per Proforma VI	Based on TW as per proforma IV	
Marks				25*	50**	75

\*( To be assessed by internal examiner )\*\* (To be assessed by internal and external examiner)]

#### **RATIONALE :**

A part of supervising the construction of Civil Engg. works, a diploma technician has to survey, collect data, refer handbooks and design some components on the basis of his knowledge of different subjects like Applied Mechanics, Concrete Technology, Soil Mechanics, Hydraulics, Construction, Irrigation and Environmental Engg. etc.

The subject of project work is included in the syllabus mainly with a view to provide students with an opportunity to develop synthesizing skill and to enable them to integrate knowledge of Subjects in producing a total meaningful scheme.

A student is given a real life problem and he has to provide a feasible solution for which he is supposed to collect suitable data through survey and contacting various resources through handbooks and data-books, design suitable components, prepare drawings and write a detailed report of activities he undertook to reach to the solution. Through independent individual as well as group activities a student is made interact with his colleagues and persons in the field, technical profession and justify his own decisions. The project and seminar activity develops capacity in the diploma holders to enter in to the world of today.
#### **COMPETENCY :**

Achieve the technique of collection of data, leadership quality, reading drawings and designing.

Cognitive : Applying principles of Engineering of core subjects learnt earlier.

Psychomotor: i) Collection of data ii) Forecasting iii) Innovative ideas iv) Designing

Affective : Attitude of i) Calculative aspect ii) accuracy iii) safety iv) aesthetic presentation

v) innovative vi) civic sense

#### **COURSE OUTCOMES :**

CEF502-1 Decide a particular project among the various alternatives, studied under CEF 501

CEF502-2Collect various data related to selected project

CEF502-3 Correlate & handle the collected data in sequence

CEF502-4Design the scheme using norms, IS codes, nomograms, charts, graphs, if any

**CEF502-5**Establish the project theme / new idea towards the expected denouements after going through its merits and de-merits, BC ratio, eco-friendliness, if any

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

	PO 1 Basic know ledge	PO 2 Disci pline kno wled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO 1 Maintai n Electric al equipme nt	PSO 2 Maintai n Electric al power systems	PSO3 Problem Solving on field
Competency: Achieve the technique of collection of data, leadership quality, reading drawings and designing.	2	-	-	-	1	-	1	3	1	2	-	-	
CEF502-1 Decide a particular project among the various alternatives, studied under CEF 501	t s 1 2	-	-	-	1	-	1	3	2	2	1	1	
CEF502-2 Collect various data related to selected project	2	2	-	-	2	2	2	3	1	1	-	-	
CEF502-3 Correlate & handle the collected data in sequence	2	2	-	2	-	-	1	3	1	2	2	2	
CEF502-4 Design the scheme using norms. IS codes, nomograms. charts, graphs, if any	, 2	3	2	1	1	-	1	3	2	2	3	3	
CEF502-5 Establish the project theme / new idea towards the expected denouements after going through its merits and de-merits. BC ratio, eco- friendliness, if any	2 2	-	2	-	2	-	1	3	2	2	1	1	
	2	-	-	-	1	-	1	3	2	2	3	3	

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

#### 1. The project report shall contain :

- 1.1 Title of the Project
- 1.2 Names of the Students
- 1.3 Certificate
- 1.4 Acknowledgement
- 1.5 Index
- 1.6 Synopsis
- 1.7 <u>Chapters</u>
  - i. Introduction
  - ii. Concepts & principles :
  - iii. Survey & investigations
  - iv. Planning concepts
  - v. design & drawing.
  - vi. Case study : Information regarding data required for planning, designing
  - & construction, drawings,etc must be included
  - vii. Conclusion & further Scope
  - viii. Bibliography & References

#### List of Projects :

The students should submit **ANY ONE** of the following projects with complete details viz. collection of data, Survey work, Management and construction procedure, Resource scheduling, design & drawing, Conclusion, etc.

- 1. Minor Irrigation Project.
- 2. Percolation tank.
- 3. Lift Irrigation.
- 4. Drip Irrigation.
- 5. K.T. Weir
- 6. Rain Water harvesting for domestic and public building.
- 7. Green House.
- 8. Water Shed Development of small catchment.
- 9. Planning and Design of Water treatment plant for given data.
- 10. Water Supply scheme for a small town or village.
- 11. Sewerage system for a town or city.
- 12. Water distribution system for a town/a big colony/a big size public building
- 13. Industrial waste treatment of an Industry.
- 14. Solid Waste management.
- 15. Hospital Waste disposal.
- 16. Recycling of resources.
- 17. Highway Construction project including design of a cross drainage work.
- 18. Permanent way construction of Railway including a tunnel with detailed drawing & Design.
- 19. Bridge Design.
- 20. Earthquake resistant building construction.
- 21. Earthquake resistant design of Engineered and Non engineered structures.
- 22. Retrofitting of Structures.
- 23. Advance Repair Techniques.
- 24. Advance Construction Techniques.
- 25. Low cost housing.
- 26. Ferro cement Units.
- 27. Manufacturing of Precast Concrete Products
- 28. Town planning.
- 29. Junction Planning for City roads / Planning for Roads for congested area / Parking Studies.

- 30. House Keeping in Building Construction.
- 31. Village Sanitation and Health.
- 32. NDT of any RCC building
- 33. Non-conventional sources of energy
- 34. Interior design and decoration.
- 35. Thermal efficient construction : Green building,etc
- 36. Flood resistant buildings
- 37. Disaster Management
- 38. Permanent Way Construction
- 39. Tunnels /Docks/Runways/International standard Swimming Pool Construction
- 40. Any current topic related to Civil Engineering.

## The number of students per batch shall be 5 To 6

## 2. In-plant training : ( Phase II )

#### Evaluation of 2 weeks in-plant training performed during vacation after V sem

The students will present the report of their in-plant training .The presentation of in-plant training shall consist of following :

- Name of the firm/industry/Organization/Company
- Name of the owner :
- Details of Organization/Company : whether LLP, PVT Ltd, or so,
- Number of project performed by the Organization/Company for last 3 years
- Turn -over of the Organization/Company
- Equipment and machinery involved : Owned and hired, Numbers ,and capacities and make
- The current projects going during training
- The details of current project shall include its purpose of project, investigations, planning, drawing, design ,estimate,etc
- The presentation shall include written material, photographs and videos, etc

#### **TERM WORK**

Criteria for Continuous Assessment of Practical work and Progressive Skill Test:

Sr. no	Criteria	Marks allotted
1	Attendance at regular practical	05
2	Collection of data	05
3	Planning /design of project	10

4	Participation /Team work.	10
5	Preparation of Plans/drawing/charts/ Graphs.	10
6	Report writing /preparation/Seminar	10
	Total	50

#### **E) INDUSTRIAL EXPOSURE :**

SN	Mode of Exposure	Торіс
1	Field Visits concerned to project work	All concerned subjects including allied
1.		subjects

#### **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices
- 3. Site visits

## **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Question Bank

# **GOVERNMENT POLYTECHNIC, KOLHAPUR**

(An Autonomous Institute of Government of Maharashtra)

# Performa P-1

# **PROJECT SHEET**

(for each project)

Programme :

Title of Project :

**Rationale of Project :** 

Type of project : (Product making / research / problem solving / industry based / etc.)

Uniqueness of project :

Inter-disciplinary component of project :

#### Process of Identification and Finalization of Topic of Project :

(Review of previous projects / Brain storming session for project ideas / Internet search for topic / Industry or field problem search, etc.)

## **Project Outcomes (PROs)**

1.

- 2.
- 3.
- 4.

						Program	nme Outc	omes POs	and PSOs	5				
Project Outcomes (PROs)	PO 1 Basic knowled ge	PO 2 Disciplin e knowled ge	PO 3 Experim ents and practice	PO 4 Engineer ing Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commun ication	PO 10 Life-long learning	PSO1	PSO2	PSO3	PSO4
1														
2														
3														

# PRO-PO Consistency Matrix :

Details of Students' Group : Project Batch -.....

Sr.	Full name of student	Roll No	Role in the project				
No.	(Beginning with surname)	Kon 100.	General	Particular			
1.				Leader			
2.							
3.							
4.							

# Detailed Planning of Project Work :

S N	Activity	Details	Date of completion
1.	Finalization of students' groups and assignment of project guide (Performa P-1)	Policy to be decided by programme department	
2.	Identification and finalization of topic (Performa P-1)	<ul> <li>Review of previous projects</li> <li>Brain storming session for project ideas</li> <li>Internet search for topic</li> <li>Industry / field problem search</li> </ul>	
3.	Preparation and presentation of project synopsis including project completion plan (Performa P-2)	<ul> <li>Synopsis ** to be submitted by group in printed form in prescribed format</li> <li>Synopsis to be presented by group in ppt presentation in front of faculty dean and project guide</li> <li>Assessment as per prescribed rubrics</li> </ul>	
4.	Demonstration-1 (term-1 end) (Performa P-3)	PowerPoint presentation to be assessed as per prescribed rubrics	
5.	Demonstration-2 (mid-term-2 end) (Performa P-4)	PowerPoint presentation to be assessed as per prescribed rubrics	
6.	Presentation of final project report (Performa P-5)	• Submission of final project report with conclusion of project	

		PowerPoint presentation	
		• Assessment as per prescribed rubrics	
7.	Final examination	As per curriculum specifications	

\*\*Synopsis shall contain the following :

- 1. Cover page
- 2. Index
- 3. Project Sheet
- 4. Activity schedule for project work

Name and signature of Project Guide

Name and signature of Programme

Dean

# **GOVERNMENT POLYTECHNIC, KOLHAPUR**

(An Autonomous Institute of Government of Maharashtra)

Performa P-2

# FINALIZATION OF PROJECT GROUPS, TOPICS AND GUIDES

Programme :

Academic Year :

Class :

Date :

S N	Project Group	Project	Group			<b>Type of Project</b> (Product making
	ID	Roll No.	Names of Students	Title of Project	Name of Project Guide	/ research / problem solving / industry based / etc.)
1.						
2.						
3.						
4.						
5.						
6.						
7.						
•••						

Name and signature of Programme Dean

Date :

# **GOVERNMENT POLYTECHNIC, KOLHAPUR**

(An Autonomous Institute of Government of Maharashtra)

#### Performa P-3

#### ASSESSMENT RUBRICS FOR SYNOPSIS OF PROJECT

Programme : Academic Year : Title of Project :

Project Group ID : Name of Project Guide :

Performance grades and their meaning for each Assessment point-wise score (out of 5) of each student in project group assessment point S Assessment Very Roll Roll Roll Roll No.: Roll No. : Roll No. : Roll No. : Ν point Poor Fair Good Excellent Good No.: No.: No.: ..... ..... ..... ..... (2) (5) (1) (3) (4) ••••• 1 2 3 4 5 6 7 8 9 1 0 TOTAL SCORE >>

**Project Guide** 

**Programme Dean** 

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# **GOVERNMENT POLYTECHNIC, KOLHAPUR**

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## Performa P-4

# ASSESSMENT RUBRICS FOR DEMONSTRATION-1 OF PROJECT

Programme : Academic Year : Title of Project :

Project Group ID : Name of Project Guide :

Date :

G	Assessment	Per	Performance grades and their meaning for each assessment point						Assessment point-wise score (out of 5) of each student in project group							
N N	Assessment point	Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)	Roll No.:	Roll No.:	Roll No.:	Roll No.: 	Roll No. :	Roll No. : 	Roll No. :			
1																
2																
3																
4																
5																
6																
7																
8																
9																
1																
TO	TAL SCORE >>															

**Project Guide** 

**Programme Dean** 

Date :

# **GOVERNMENT POLYTECHNIC, KOLHAPUR**

(An Autonomous Institute of Government of Maharashtra)

#### Performa P-5

# ASSESSMENT RUBRICS FOR DEMONSTRATION-2 OF PROJECT

Programme : Academic Year : Title of Project :

Project Group ID : Name of Project Guide :

S N		Performance grades and their meaning for each assessment point						Assessment point-wise score (out of 5) of each student in project group							
	point	Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)	Roll No.:	Roll No.:	Roll No.:	Roll No.: 	Roll No. : 	Roll No. : 	Roll No. : 		
1															
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4															
5															
7															
8															
9															
1 0															
TO	TAL SCORE >>	•	•	•	•	•									

**Project Guide** 

**Programme Dean** 

# **GOVERNMENT POLYTECHNIC, KOLHAPUR**

(An Autonomous Institute of Government of Maharashtra)

## Performa P-6

# ASSESSMENT RUBRICS FOR FINAL PRESENTATION OF PROJECJ

Programme : Academic Year : Title of Project :

Project Group ID : Name of Project Guide :

G		Per	Performance grades and their meaning for each assessment point						Assessment point-wise score (out of 5) of each student in project group							
S N	Assessment point	Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)	Roll No.:	Roll No.:	Roll No.:	Roll No.: 	Roll No. : 	Roll No. :	Roll No. : 			
1																
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3																
4																
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6																
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9																
1																
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TO	TAL SCORE >>															

**Project Guide** 

**Programme Dean** 

Date :

## COURSE ID:

Course Name	: Construction Field Skills
Course Code	: CEF 503
Course Abbreviation	: FCFS

TEACHING AND EVALUATION SCHEME:

Pre-requisite Course(s) : Nil

**Teaching Scheme:** 

Scheme component	Hours / week	Credits
Theory		4
Practical	4	

## **Evaluation Scheme:**

Component	Progressive	Assessment	Seme	Total	
I	Theory	Practical	Oral	Term work	
Duration	-	-	-		
Marks	-	-	25*	50 *	75

\*\* Assessment as per Pro-forma for TW - VI, OR - V

## **Rationale:**

A civil engineer's training should continue throughout his or her entire career. An effective engineer realizes that continuing education is the key to success. In college an engineer gains an ability to learn that will last throughout life, while at the knowledge and skills that every engineer must master. On-the-job experience, gained through coop assignments, internships, or summer jobs, is a vital factor in making a young engineer credible to potential employers. Gaining professional to career advancement. Becoming marketable means having the skills and experiences beyond the basics, perhaps through leadership in student or community organizations, plus having the ability to communicate one's unique qualification clearly.

In line with these concepts the course of construction field skills is included in the syllabus mainly with a view to provide students with an opportunity to develop synthesizing skill and to enable them to integrate knowledge of various courses while discharging the duty as a site Engineering at various types of Civil Engineering Projects.

# **Objectives:**

The students will be able

- 2. To work independently as a leader as well as member of a team.
- 3. To prepare schedule for different resources.
- 4. To check quality of materials & workmanship.
- 5. To perform his duties as site engineer.

## **COURSE OUTCOMES :**

CEF503-1To develop the ability of reading & interpretation of various drawings with respect to

execution of the proposal work collect the date.

**CEF503-2**To collect the date required for planning & designing of the project work.

**CEF503-3**To develop the ability as a site engineer to execute the work with in optimum time

with optimum cost & desired quality.

**CEF503-4**To acquire the skill required for checking the quality of work at Building construction site.

**CEF503-5**To acquire the skill required for checking quality aspects of the roads.

**CEF503-6** To develop the ability to work as a middle level management personal.

**CEF503-7** To acquire the skill required for preparing the bills payment of the contractors.

**CEF503-8** To develop the multidisciplinary skill related to the services provided in the construction work.

**CEF503-9** To develop the skills required for effective communication.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

					Pro	ogramme	Outcome	s POs and	l PSOs				
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply facts, concepts, principles and procedure in construction field skills	3	3	-	-	-	3	-	1	1	2	-	3	3
CEF503-1Todevelop the ability ofreading&interpretationofvarious drawings withrespect to executionoftheproposalworkcollect the date.	3	3	-	-	-	3	-	1	1	2	3	3	3
<b>CEF503-2</b> To collect the date required for planning & designing of the project work.	3	3	-	-	3	2	-	1	1	2	3	3	3
<b>CEF503-3</b> To develop the ability as a site engineer to execute the work with in optimum timewith optimum cost & desired quality.	3	3	-	-	3	3	3	1	2	2	3	3	3
<b>CEF503-4</b> To acquire the skill required for checking the quality of work at Building construction site.	3	3	3	3	-	3	-	1	1	2	-	3	3
<b>CEF503-5</b> To acquire the skill required for checking quality aspects of the roads.	3	3	3	3	-	3	-	1	1	2	2	3	3

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>CEF503-6</b> To develop the ability to work as a middle level management personal.	2	2	-	-	2	3	-	2	1	3	2	3	3
<b>CEF503-7</b> To acquire the skill required for preparing the bills payment of the contractors.	3	3	-	-	-	-	-	-	2	2	2	3	3
CEF503-8Todevelopthemultidisciplinaryskillrelated to the servicesprovidedintheconstruction work.	3	2	-	-	2	-	-	-	-	2	2	3	3
<b>CEF503-9</b> To develop the skills required for effective communication.	-	2	-	-	2	-	-	-	3	2	-	-	2

The students should complete their TERM WORK as per following list of exercises:-

Sno	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
1	Observe various types of drawings to understand the details of construction.	To develop the ability of reading & interpretation of various drawings with respect to execution of the proposal work collect the date.	CEF503 -1
2	Understand the use of dumpy level, auto level, theodolite & total station in building project & road project.	To collect the date required for planning & designing of the project work.	CEF503 - 2
3	Decide the bearing capacity of different types of soil strata by field observation.	To collect the date required for planning & designing of the project work.	CEF503 - 2
4	Carry out the line -out of proposed building.	To develop the ability as a site engineer to execute the work with in optimum time with optimum cost & desired quality.	CEF503 - 3
5	Receiving the various materials & checking the quality as well as quantity.	To develop the ability as a site engineer to execute the work with in optimum time with optimum cost & desired quality.	CEF503 - 3
6	Deciding the team & team members required for various construction activities.	To develop the ability as a site engineer to execute the work with in optimum time with optimum cost & desired quality.	CEF503 - 3
7	Study of construction features of RCC members.	To develop the ability as a site engineer to execute the work with in optimum time with optimum cost & desired quality.	CEF503 - 3

8	Preparing checklist for various construction activities.	To develop the ability as a site engineer to execute the work with in optimum time with optimum cost & desired quality.	CEF503 - 3
9	Study & use of level tube in various construction activities.	To acquire the skill required for checking the quality of work at Building construction site.	CEF503 -4
10	Study of construction-features of septic tank.	To acquire the skill required for checking the quality of work at Building construction site.	CEF503 -4
11	Verify camber, thickness of layer, gradient, compaction during construction of bitumen & WBM road.	To acquire the skill required for checking quality aspects of the roads.	CEF503 - 5
12	Preparing the bar chart / CPM network for a given construction project.	To develop the ability to work as a middle level management personal.	CEF503 - 6
13	Taking measurements of various constructions items & preparing bill of quantities.	To acquire the skill required for preparing the bills payment of the contractors.	CEF503 - 7
14	Thumb rules for deciding quantities of materials required for various items	To acquire the skill required for preparing the bills payment of the contractors.	CEF503 - 7
15	Study about domestic electrification work.	To develop the multidisciplinary skill related to the services provided in the construction work.	CEF503 - 8
16	Study about Interview Technique.	To develop the skills required for effective communication.	CEF503 - 9

### **INSTRUCTIONAL STRATEGIES:**

#### **Instructional Methods:**

- 1. Lectures cum Demonstrations.
- 2. Site visits& group discussions.
- 3. Classroom practices.

## **Teaching and Learning resources:**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations

Sr. no	Criteria	Marks allotted
1	Attendance at regular practical	05
2	Collection of data	05
3	Planning /design of project	10
4	Participation /Team work.	10
5	Preparation of Plans/drawing/charts/ Graphs.	10
6	Report writing /preparation/Seminar	10
	Total	50

# Criteria for Continuous Assessment of Practical work and Progressive Skill Test:

#### **REFERENCE MATERIAL:**

## a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	Sandeep Mantri	The AtoZ of Practical Construction & It's Management	Satya Publishers, New Delhi

#### b) Websites

i) www. Sandeepmantri.com

#### COURSE ID:

Course Name	: CONTRACTS AND ACCOUNTS
Course Code	: CEF504
<b>Course Abbreviation</b>	: FCAA

#### **TEACHING AND EVALUATION SCHEME :**

**Pre-requisite** Course(s) : <*nil* >

#### **Teaching Sheme :**

Scheme component	Hours / week	Credits
Theory	03	03
Practical	-	

#### **Evaluation Scheme :**

Mada af	Progressiv	ve Assessment	Term End I		
Evaluation	Theory	Practical	Theory	Practical	Total
			Examination		
Details of Evaluation	Average of Two tests of 20marks each(1 hour duration each)		Term End Theory Exam (03 hours)		
Marks	20		80		100

#### **RATIONALE :**

This is a core technology subject which will enable the students to learn facts, concepts, principles and procedure in contracts and accounts. With this knowledge and skill, he will be able to prepare tender papers for contract and contract documentation before start of construction.

He will get acquainted with procedures and different forms used by PWD as well as private construction firms and will therefore be able to prepare bills and pay contractor for the work.

#### COMPETENCY

Apply facts, concepts, principles and procedure in contracts and accounting process.

**Cognitive :** Understanding and applying facts, concepts, principles and procedure in contracts and accounting process to administer departmental official procedure.

**Psychomotor :** i) Prepare tender document ii) Draft tender notice for various types of construction. **Affective :** Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

vi) civic sense

#### **COURSE OUTCOMES:**

CEF504-1 The student knows different categories of civil works, methods of executing works, PWD

procedure of executing works and duties and responsibilities of junior engineer.

**CEF504-2** Know Different types of Contract, Conditions of valid contract and class of contractor **CEF504-3** Know Different conditions of Contract .

**CEF504-4** Know different types of tenders, Draft tender notice for various types of construction works, Prepare

tender documents, know tender opening procedure and acceptance or rejection of tenders.

CEF504-5 Know objectives and functions of financial management, types of budgets and

taxes.

CEF504-6 Know PWD accounting procedure and to make payment to contractor and supplier.

**CEF504-7** Know the different types of value,Calculate the capitalized value of property calculate the depreciation and value of land and old buildings.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

					Pro	ogramme	Outcome	s POs and	l PSOs				
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
Competency:Applyfacts,concepts,principles and procedureincontractsandaccounting process.	3	3	3	2	2	3	-	1	1	2	3	3	1
<b>CEF504-1</b> The student knows different categories of civil works, methods of executing works, PWD procedure of executing works and duties and responsibilities of junior engineer.	3	3	-	-	3	3	-	1	1	2	2	2	1
CEF504-2 Know Different types of Contract, Conditions of valid contract and class of contractor.	3	3	3	2	3	2	-	1	1	2	2	2	1
CEF504-3 Know Different conditions of Contract	3	3	3	3	3	3	-	1	2	2	2	2	1

Curriculum MPECS-2016	Diploma in CIVIL	ENGINEERING
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					Pro	ogramme	Outcome	es POs and	d PSOs				
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
CEF504-4 Know different types of tenders, Draft tender notice for various types of construction works, Prepare tender documents, know tender opening procedure and acceptance or rejection of tenders.	3	3	3	3	2	3	-	1	1	2	2	2	1
CEF504-5 Know objectives and functions of financial management , types of budgets and taxes.	3	3	1	1	3	3	2	1	1	2	2	2	1
<b>CEF504-6</b> Know PWD accounting procedure and to make payment to contractor and supplier.	2	2	1	3	2	3	3	1	1	3	2		1
<b>CEF504-7</b> Know the different types of value, Calculate the capitalized value of property, calculate the depreciation and value of land and old buildings.	2	2	2	3	2	2	-	1	2	2	2	3	1

# **CONTENT : THEORY**

# Section – I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
<i>Cours</i>	e Outcome- CEF504-1 The student knows different categories of civil PWD procedure of executing works and duties and responsibilities of	l works, meth	ods of executing
1	<ul> <li>Methods of executing work.</li> <li>1.1 Classification of works-major work, minor work, special works and maintenance works.</li> <li>1.2 Execution of works-various methods adopted in Government organization, contracts, Departmental method, rate list, piecework, day work &amp; BOT.</li> <li>1.3 P.W.D. procedure - Administrative approval Technical sanction. Budget Provision</li> <li>1.4 Duties and responsibilities of the Junior Engineer, Site Engineer in P.W.D.</li> </ul>	06	12
Cours	e Outcome- CEF504-2 Know Different types of Contract, Conditions	s of valid con	tract and class of
2.	<ul> <li>Contracts.</li> <li>2.1 Definition, Essentials of valid contract, Contract documents</li> <li>2.2 Types of Contracts, its meaning, advantages, disadvantages and documents required for Lump sum, item rate, Percentage rate, Cost plus percentage, Cost plus fixed fees, Cost plus variable fees, negotiated, target, Labour contract, Sub contract Demolition contract.</li> <li>2.3 Class of contractor, procedure for registration of contractor.</li> </ul>	06	10
Cours	se Outcome- CEF504-3 Know Different conditions of Contract.	1	
3	<ul> <li>Conditions of Contract.</li> <li>3.1 Importance of conditions of contract</li> <li>3.2 Important conditions as Time limit &amp; its importance,Extension of time limit, Defective material and workmanship,Liquidation of contract,Defect liability period,Extra item, penalty,subletting of conract, supervision of work Escalation of cost, Arbitration, Liquidated Damage, earnest money deposit and security deposit.</li> </ul>	04	U6

*Course Outcome* - CEF504-4 Know different types of tenders, Draft tender notice for various types of construction works, Prepare tender documents, know tender opening procedure and acceptance or rejection of tenders.

4	Tender and tender notice.	08	12
	4.1 Definition and necessity of tender		
	4.2 Classification of tender, local & Global.		
	4.3 Points to be included while drafting tender notice.		
	4.4 Corrigendum to tender notice & its necessity.		
	4.5 Methods of preparing & submitting the tender,		
	4.6 Security deposit, Earnest money, Validity Period		
	4.7 Filling up of Tender by Contractor & Points		
	observed by him.		
	4.8 Scrutiny of tenders, acceptance of tender, award of		
	tender. work order		
	4.9 Reasons for rejections of lowest tender and all		
	tenders		
	4 10 Two envelop method technical bid/commercial bid		
	4 11 Unbalanced tender Ring formation		
	1.11 Chouldhood tondor, King Tormation.		
	Total	24	40
(Sem	ester end exam question paper should be such that total marks of	f questions	on each topic is
one a	nd half times the marks allotted above but the candidates are a	ble to atter	npt questions of
the al	pove allotted.)		

#### Section II

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Course	e Outcome - CEF504-5 Know objectives and functions of financial mana	agement, type	s of budgets and
taxes.			
5	<ul> <li>Financial management.</li> <li>5.1 Financial management-Objectives and Functions</li> <li>5.2 Capital generation and management, Types of capitals,Sources of finance.</li> <li>5.3 Budgets and accounts-Types of budgets and accounts,Preparation of profit and loss,Balance sheet.</li> <li>5.4 Taxes and Tax registration-Introduction to Excise tax,Service tax, Income tax,VAT, Sales tax, Royalty tax.</li> </ul>	06	10

Course Outcome - CEF504-6 Know PWD accounting procedure and to ma	ke payment to	contractor and
supplier.		
<ul> <li>6 P.W.D. accounts And Payment to suppliers and contractors.</li> <li>6.1 Importance of maintaining accounts of works &amp; stores.</li> <li>6.2 Documents maintained in P .W.D. such as, Work order book, Dailydiary, Muster Roll, Measurement book, Imprest Indents, Daily Labour report, Work abstract, cash abstract, Invoice, Bills, voucher, temporary advance.</li> <li>6.3 Mode of Payment to contractor.</li> <li>6.4 Running account bills Secured advance, Advance</li> </ul>	06	10
payment, Interim payment Petty advance, final payment, First & Final Payment, retention money, reduce rate payments, Mobilization advance.		
<i>Course Outcome</i> -CEF504-7 Know the different types of value, Calculate the	e capitalized v	alue of property
7 Valuation.	12	20
<ul> <li>7.1 Definition, Necessity Of Valuation. Definitions – Cost Price, Value, Difference Between Them, Characteristics Of Value, Factors Affecting Value.</li> <li>7.2 Types Of Value :- Book Value, Scrap Value, Salvage Value, Speculative Value, Distress Value ,Market Value, Monopoly Value, Sentimental Value, Factors Affecting Value.</li> <li>7.3 Depreciation, Obsolescence, Sinking Fund .Methods Of Calculation Of Depreciation – Straight Line Method, Sinking Fund Method Constant Percentage Method Quantity Survey Method.</li> <li>7.4 Computation Of Capitalized Value, Gross Income, Outgoing, Net Income, Years Purchase. Types Of Outgoing And Their Percentages.</li> <li>7.5 Valuation Of Lands &amp; Buildings , Factors Affecting Their Valuation, Book Value Method, Replacement Value</li> </ul>		
Tables .Deferred Value Of Land. 7.6 Fixation Of Rent As Per PWD Practice.		

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

Торі		Distributio	on of marks (Cogr wise)	Course	Total	
c No.	Name of topic	Remember	Understand	Applica- tion	Outcome	Marks
1	Methods of executing work	02	04	06	CEF504-1	12
2	Contracts.	02	02	06	CEF504-2	10
3	Conditions of Contract	02	02	02	CEF504-3	06
4	Tender and tender notice	02	04	06	CEF504-4	12
5	Financial management	03	03	04	CEF504-5	10
6	P.W.D. accounts And Payment to suppliers and contractors	03	03	04	CEF504-6	10
7	Valuation	04	07	09	CEF504-7	20
TOTAL		18	25	37		80

#### Specification table for setting question paper for semester end theory examination :

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.)

#### F) INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс
1.	Collecting tender notices from news papers, collecting tender documents from PWD office for study.	Topic no.4-Tender and tender notice

#### **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

#### **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Question Bank

4.Tender notices from news papers, tender documents from PWD office for study.

## **REFERENCE MATERIAL :**

## **Reference Books / Journals / IS Codes**

Sr.	A 41	T:41-	Duklishov	
No.	Autnor	Title	Publisher	
1.	B. N. Datta	Estimating and costing	U B S Publishers Distributers Pvt. Ltd., New Delhi	
2.	M. Chakraborti	Estimating and costing, Specification and Valuation	M. Chakraborti, Calcutta	
3.	S. C. Rangwala	Elements of Estimating and costing	Charator Publication, Anand	
4.	B. S. Patil	Civil Engg.Contracts & estimates	Orient Longman, Mumbai	
5.	G. S. Birdi	Test Book of Estimating & costing	Dhanpat Rai & Sons, Delhi	
6	R. H. Nanavati	Valuation		
7	S. C. Rangwala	Valuation	Charator Publication, Anand	
8	Bureau of Indian Standards	Standard mode of Measurement for Buillding - I.S.1200	Bureau of Indian Standards	
9	Bureau of Indian Standards	S.P. 13 I.S. 7272 Part – I	Bureau of Indian Standards	
10	Govt. of Maharashtra	P.W. and Housing Department, Govt.of Maharashtra, Vol.I (1979), Vol.II (1981)	Govt. of Maharashtra	

#### COURSE ID:

Course Name	: ENVIRONMENTAL ENGINEERING
Course Code	: CEF506
Course Abbreviation	: FENE

#### **TEACHING AND EVALUATION SCHEME :**

**Pre-requisite** Course(s) : <*nil* >

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	04	06
Practical	02	

#### **Evaluation Scheme :**

	Progressiv	ve Assessment	Term End I		
Mode of Evaluation	Theory	Oral	Theory Examination	Oral	Total
Details of Evaluation	Average of Two tests of 20marks each(1 hour duration each)	One Progressive Skill Tests of 25 marks	Term End Theory Exam (03 hours)	As per Proforma-I	
Marks	20 25		80	25**	125

\*\* Assessment of oral as per Pro-forma –I (To be assessed by internal and external examiner)

#### **RATIONALE :**

Water is the basic need for all living beings. Water plays a critical role in maintaining a balance between living things and the environment in which they live. The quest for pure water can benefit the life and health of every one. Water purification is now confronted with myriod of difficulties. Problems caused due to sources receiving greatly increased pollution loads of domestic and industrial wastes. The water supply and drainage schemes are being commissioned on large scale so as to make water available for drinking, industrial use and provide drainage arrangement at all places in rural and urban areas. This subject is intended to teach the students, the concepts, principles and constructional procedures to understand various water supply and sanitary engineering Schemes; which will enable them to apply this knowledge for design, construction and supervise the various elements of construction related to water supply and sanitary engineering projects.

#### COMPETENCY

Apply principles of environmental engineering (water supply and sanitary engineering) to solve engineering problems as follows.

**Cognitive :** Understanding and applying principles of environmental engineering to engineering problems.

**Psychomotor :** i) Operating Digital instruments during experimental work ii) Handling chemicals and preparation of chemical solutions.

Affective : Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

vi) hygiene vii) civic sense

#### **COURSE OUTCOMES :**

CEF506-1The students know and understand necessity and need of water supply scheme and different water sources

CEF506-2Know various water demands and Estimate demand of water to city.

**CEF506-3** Know and standards of purity of water & analyze the quality of water.

**CEF506-4** Understand different methods of water treatment and design, construction and maintenance aspects of treatment units.

CEF506-5 Understand methods of distribution of water.

CEF506-6 Know the principles of sanitation and objects of sewage disposal.

**CEF506-7** Understand significance, use and maintenance of various sanitary fittings used for house drainage

CEF506-8 Know the methods of collection and disposal of dry refuse (solid waste) in villages and towns

**CEF506-9** Know the methods of carrying sewage andUnderstand design, construction and maintenance of water carriage system of sewerage.

**CEF506-10** Understand analysis of sewage and Suggest waste water treatment & treatment for industrial waste.

CEF506-11 Know and understand the methods of sewage treatment.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply principles of environmental engineering (water supply and sanitary engineering) to solve engineering problems.	3	3	3	2	2	3	-	1	1	2	3	3	1
<b>CEF506-1</b> The students know and understand necessity and need of water supply scheme and different water sources	3	3	-	-	3	3	-	1	1	2	2	2	1
<b>CEF506-2k</b> now various water demands and Estimate demand of water to city	3	3	3	2	3	2	-	1	1	2	2	2	1
CEF506-3Know standards of purity of water & analyze thequality of water.	3	3	3	3	3	3	-	1	2	2	2	2	1
<b>CEF506-4</b> Understand different methods of water treatment and design, construction and maintenance aspects of treatment units.	3	3	3	3	2	3	-	1	1	2	2	2	1
<b>CEF506-5</b> Understand methods of distribution of water.	3	3	1	1	3	3	2	1	1	2	2	2	1
<b>CEF506-6</b> Know the principles of sanitation and objects of sewage disposal.	2	2	1	3	2	3	3	1	1	3	2		1
<b>CEF506-7</b> Understand significance, use and maintenance of various sanitary fittings used for house drainage.	2	2	2	3	2	2	-	1	2	2	2	3	1
<b>CEF506-8</b> Know the methods of collection and disposal of dry refuse (solid waste) in villages and towns.	2	2	1	1	2	2	3	1	1	2	2	2	1

# $Curriculum \ MPECS-2016 \ \ \text{Diploma} \ \text{in CIVIL ENGINEERING}$

Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>CEF506-9</b> Know the methods of carrying sewage andUnderstand design, construction and maintenance of water carriage system of sewerage	3	2	2	3	3	3	2	1	1	2	2	2	1
CEF506-10 Understand analysis of sewage and Suggest waste water treatment & treatment for industrial waste.	3	2	3	3	2	3	-	1	1	2	3	3	1
<b>CEF506-11</b> Know and understand the methods of sewage treatment.	3	2	2	3	3	2	1	1	2	2	3	3	1

# **CONTENT : THEORY**

# Section – I

# (Water supply Engineering)

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
<i>Cours</i> scher	<i>e Outcome-</i> CEF506-1 The students know and understand necess ne and different water sources.	ity and need	of water supply
1	<ul> <li>Introduction –</li> <li>1.1 Necessity of water supply scheme.</li> <li>1.2 Need for protected water supply, Waterborne diseases.</li> <li>1.3 Sources of Water Supply- surface and sub-surface sources like river, lake, canal, reservoir, impounding reservoir and open well, tube well, springs, artesian well, infiltration gallery (only brief idea). Requirements of source of water.</li> <li>1.4 Water conservation, Ground water recharging-Necessity importance and advantages.</li> <li>1.5 Intake structures –definition , types -river intake reservoir intake, canal intake. Factors governing the location of intake.</li> </ul>	05	06
Cours	Flow diagram of water supply scheme from source to Consumer se Outcome- CEF506-2 know various water demands and Estimate de	mand of wate	er to city.
2.	<ul> <li>Water Demand and Its Quantity Estimation –</li> <li>2.1 Water demand-Types of demands- domestic, public, industrial, commercial, fire, losses and waste ; minimum requirements as per IS -1172</li> <li>2.2 Factors affecting rate of demand</li> <li>2.3 Variation in rate of demand –Hourly ,Daily , Monthly and seasonal variations .Per capita demand , Design period</li> <li>2.4 Estimating population-Methods of population forecasting (only introduction no mathematical problems ask in examination) Necessity of population forecasting.</li> </ul>	05	06

<i>Course Outcome-</i> CEF506-3 Know and standards of purity of water & analyze the quality of water.						
3	<ul> <li>Quality Of Water –</li> <li>3.1 Meaning of term potable /wholesome water</li> <li>3.2 Impurities present in water and its classification.</li> <li>3.3 Water analysis –Need, Characteristics of water and Tests on water : physical tests – temperature, colour, turbidity, taste &amp; odor. Chemical tests- total solids, hardness, PH-value, chlorides, chlorine ,iron and manganese ,dissolve oxygen, fluoride ,nitrogen and its compounds .Biological tests- Total count of bacteria , E coli index , MPN,</li> <li>3.4 Collection of water sample-procedure, precautions to be taken.Standards for potable water as per IS.</li> </ul>	04	05			
<i>Course Outcome</i> - CEF506-4 Understand different methods of water treatment and design, construction and maintenance aspects of treatment units.						

4	Treatment of water –4.1 Screening-Types of screens.	12	15
	4.2 Aeration - Objects and methods of aeration.		
	4.3 Sedimentation - Plain sedimentation-Objects and Theory of plain sedimentation, Detention period, Types of sedimentation tank		
	4.4 Sedimentation with coagulation- Purpose, Principles of coagulation, Different chemicals used as coagulant, Advantages of alum, Feeding devices- wet feeding and dry feeding, Mixing devices, Clariflocculator. Jar test for optimum coagulant dose.		
	4.5 Filtration – Objects and Theory of filtration, Requirements of sand and gravel for filtration. Classification of filters-slow sand filters (only overview), rapid sand filters and pressure filters. Rapid sand filters(Gravity type)-filter media, base material ,its depth and grading, construction ,working and design aspects, Loss of head and negative head, Back washing process.		
	<ul> <li>4.6Disinfection– Objects of disinfection, Minor methods of disinfection. Chlorination- Properties of chlorine ,Action of chlorine, application of chlorine . different forms of chlorination ,Break point chlorination, Residual chlorine and its importance. Tests for chlorine- Orthotolodin test, Starch–iodide-test.</li> </ul>		
	4.7 Advanced water treatments –Electrolysis, Reverse Osmosis		
	4.8 Domestic appliances- Working of water purifier, Working of R.O., Domestic plant, Softner, content of bottled mineral water(Questions not to set on this sub topics)		
	4.9 Low cost water treatments: Necessity and importance in rural areas, Prevention of pollution of bores and bore wells.		

Course Outcome - CEF506-5 Understand methods of distribution of water.					
5	<ul> <li>Conveyance and distribution of Water –</li> <li>5.1 Conveyance- meaning, Different types of pipes used for conveyance of water.</li> <li>5.2 5.2 Joints in CI and concrete pipes .Laying and testing of pipe line</li> <li>5.3 5.3 Valves- sluice valve, air relief valve, reflux valve, scour valve their functions, use and location on pipe</li> </ul>	06	08		
	<ul> <li>line.</li> <li>5.4 Distribution System - Zoning of area, methods of distribution-gravity, pumping and combined system (dual system). Methods of lay-out of distribution pipes-Dead end system ,Grid iron system , Circular system and radial system, their suitability , Merits and demerits</li> <li>5.5 Service reservoirs- purpose and types-E.S.R, G.S.R.</li> </ul>				
	Total	32	40		
(0			1		

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted.)

## Section II

## (Sanitary Engineering)

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
Cours	e Oucome - CEF 500-0 Know the principles of sanitation and objects	of sewage dis	sposai.
6	Introduction-	02	04
2	<ul> <li>6.1 Necessity and principals of sanitation.</li> <li>6.2 Definitions of terms used-sewage, sullage, garbage, refuse, rubbish, night-soil, storm water, sanitary sewage, domestic sewage, bacteria etc.</li> <li>6.3 Aims and objects of sewage disposal.</li> <li>6.4Recycling and Reuse of domestic waste.</li> </ul>		
Cours used for	<i>e Outcome</i> - CEF506-7 Understand significance, use and maintenar or house drainage.	nce of various	sanitary fittings

7	House Drainage (Building Sanitation) –	05	08				
	7.1 Meaning, Principles of house drainage,						
	7.2 Definitions of terms related to building sanitation- Pipes						
	waste pipe, soil pipe, rain water pipe, vent pipe,						
	Antisiphonage pipe.						
	7.3 Building sanitary fitting- Traps –definition ,purpose,						
	Requirements of good trap, Types- Nahni trap, Gully trap,						
	Intercepting trap, P-Q-S trap, their functions use and						
	location.						
	Water closets –Indian and European type, Urinals, Flushing						
	cistern, Wash basins, sinks						
	7.4 Plumbing system of drainage-Single stake system, One pipe						
Cour	se Outcome - CEF506-8 Know the methods of collection and disposal	l of dry refus	e (solid waste) in				
villag	es and towns.						
8	Solid Waste from society – 8.1 Definitions-refuse, rubbish, dry refuse, garbage, bacteria	03	05				
	etc.common constituents of solid waste.						
	8.2 Methods of collection of solid waste.						
	8.3 Methods of treatment and disposal of solid waste.						
	8.4 Hazardous Wastes; Introduction, meaning, Types of						
Cour	se Outcome - CEF506-9 Know the methods of carrying sewage and U	nderstand des	ign, construction				
and n	and maintenance of water carriage system of sewerage.						
9	Collection and conveyance of sewage –	11	11				
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	9.1 Methods of carrying refuse -conservancy system, water						
	carriage system.						
	system its advantages and disadvantages Removal of						
	night soil and disposal of excreta .Septic tank –						
	principles, working and design. soak pit and drains .						
	Gobar gas plant – construction and operation						
	9.3 Water Carriage System –Meaning of term Water						
	carriage system, its advantages and disadvantages. 9.3.1 Quantity of sewage – sources of sanitary						
	sewage factors affecting quantity of sewage Dry-						
	Weather flow, Wet- Weather flow, Systems of						
	sewerage-Separate system, combined system,						
	Partially separate system.						
	9.3.2 Design aspect of sewers – Minimum velocity						
	(Non-scouring velocity) Size of sewer Materials						
	used for sewers. Laying and testing of sewers.						
	Sewer Appurtanances -Man-hole-types, purpose, location.						
	Catch basins. Street Inlets Ventilation of sewers.						
Cours	e Outcome- CEF506-10 Understand analysis of sewage and Suggest v	waste water tr	reatment &				
treatm	ent for industrial waste.						
10	Quality Of Sewage-	04	04				
1	10.1 Characteristics of sewage. Physical ,chemical and						
	10.2 BOD and its significance. Aerobic and anaerobic						
	decomposition.						
	10.3 COD and its significance.						
	Maharashtra pollution control Board Norms for the						
	discharge of treated sewage.						
Cours	e Outcome - CEF506-11 Know and understand the methods of sewag	e treatment.					
11	Sewage Treatment-	07	08				
	11.1 Object of sewage treatment. Degree of treatment Flow						
	diagram of sewage treatment plant for a small town						
	11.2 Primary treatment- meaning Introduction and functions						
	of screens, Grit chamber, Detritus tank, Skimming tank						
	and Clarifier. Sludge digestion tank						
	11.3 Secondary treatment- meaning.						
	11.3.1 Trickling filters and it's working.						
	11.5.2 Activated Sludge process-Flow diagram and its						
	11.4 Disposal of sewage, Oxidation pond, Oxidation ditch.						
	Total	32	40				
Same	star and arom quastion namer should be such that total marks	fanostions	on angh torig is				
Seme	sier end exam question paper should be such that total marks o	i questions	on each topic is				

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

<b>Specification table for</b>	r setting question	paper for semester	end theory	examination :
<b>F</b> • • • • • • • • • • • • • • • • • • •		r r r · · · · · · · · · · · · · · · · ·		•

Toni		Distribution (		Total		
c No.	Name of topic	Remember	Understand	Applica- tion	Course Outcome	Marks
1	Introduction	02	02	02	CEF506-1	06
2	Water Demand and Its Quantity Estimation	01	02	03	CEF506-2	06
3	Quality Of Water	02	01	02	CEF506-3	05
4	Treatment of water	02	07	06	CEF506-4	15
5	Conveyance and distribution of Water	02	02	04	CEF506-5	08
6	Introduction	01	02	01	CEF506-6	04
7	House Drainage (Building Sanitation)	02	02	04	CEF506-7	08
8	Solid Waste from society	01	02	02	CEF506-8	05
9	Collection and conveyance of sewage	02	02	07	CEF506-9	11
10	Quality Of Sewage	02	02		CEF506-10	04
11	Sewage Treatment	02	02	04	CEF506-11	08
TOT AL		19	26	35		80

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.)

#### G) TERM WORK Practical Exercises and related skills to be developed :

The following practical exercises shall be conducted as Term Work practical sessions of batches of about 20 students :

Termwork is devided in three parts as below -

1) Field visits.

2) Assignment work.

3) Experimental work.

Sr	Title of Practical Exercise	Skills / Competencies to be	Course
No.		developed	Outcome
1	<ul> <li>Field visits – <ol> <li>Visit to Water treatment plant to study the working of various treatment units and treatment processes. Draw the flow diagram and prepare detailed visit report.</li> <li>Visit to a Sewage treatment plant to study the working of various treatment units and treatment processes. Draw the flow diagram and prepare detailed visit report.</li> <li>Visit to residential / public building to study different systems of plumbing and sanitary fittings like W.C., Urinals , Flushing Cisterns , Traps , I.C. etc . and prepare the lay-out-plan of house drainage system and show all details like sanitary units , traps, pipes, drains, I.C. etc.</li> </ol> </li> </ul>	<ul> <li>9. Information collection and presentation in the form of report.</li> <li>10. Motivation through field exposure.</li> </ul>	CEF506-4 CEF506-11 CEF506-7
2	<ul> <li>Assignment work-</li> <li>1) Collecting data regarding population of any city/village and forecast population after three decades by various methods. Select the result and find out the total water demand for that city/village.</li> <li>2) Design the Septic Tank for the public building such as hostel or hospital. Draw plan and section of the same along with the the drainage arrangement in soak pit.</li> </ul>	<ol> <li>Developing self learning ability.</li> <li>Plotting and interpreting graphs.</li> <li>Developing Presentation skills.</li> </ol>	CEF506-2 CEF506-9
3	<ul> <li>.Experimentalwork–</li> <li>Water supply engineering-</li> <li>Conduct test on water sample to determine its-</li> <li>1)Turbidity. By turbidimeter</li> <li>2)Temporary, Permanent and Total Hardness.</li> <li>By titration.</li> <li>3)PH value by usingi) Universal indicator- ii)</li> <li>PH paper- iii) Digital PH meter-</li> <li>4)Chloride concentration. By titration.</li> </ul>	<ol> <li>Taking readings and assessing quality of water sample.</li> <li>Taking readings and assessing quality of sewage sample</li> </ol>	CEF506-3

5)Residual Chlorine by O.T. / S. O. test.	
6)Dissolve Oxygen. By using D.O. meter	
Sanitary engineering-	
Conduct test on waste water sample to	
determine its-	
1) Dissolve Oxygen content.	
2) pH value	
3) B.O.D.	

#### H) INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс			
1.	Field Visits	Every chapter of theory syllabus			
2.	Collecting data for assignment work	Term-work assignment			
ASSE	ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION				

#### • Assessment Criteria for Term work :

#### i) Continuous Assessment of Term Work:

Every practical assignment shall be assessed for 25 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	02
Cogintive	Application	03
Davahamatar	Operating Skills	05
Psycholilotor	Drawing / drafting skills	05
Affactivo	Discipline and punctuality	05
Allecuve	Decency and presentation	05
	TOTAL	25

# ii) Progressive Skill Test :

One mid-term *Progressive Skill Test* of 25 marks shall be conducted marks awarded in oral mark sheet as per *Assessment Pro-forma I*.

#### **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

#### **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Question Bank

#### **REFERENCE MATERIAL :**

**Books / Journals / IS Codes / Websites** 

#### a)Reference Books:

Sr. No.	Author	Title	Publisher
1.	G.S. Birdie & J. S. Birdie	Water supply &Sanitary Engg.	Dhanpat Rai & Sons, Delhi
2.	S. C. Rangwala	Water supply &Sanitary Engg.	Anand Charotar, Delhi
3.	V.N. Gharpure	Water supply Engg.	Engg. Book Publishers co.Pune
4.	V.N. Gharpure	Sanitary Engg.	Engg. Book Publishers co.Pune
5.	Kamala A. &Katth rao D.L	Environmental Engg.	New York-Tata Mcgraw hill
6	Gupta & Others	Environmental Engg. System	Nirali Prakashan Mumbai

#### **b) Recommended Further Readings:**

Sr. No.	Author	Title	Publisher
1.	Santosh Garg	Water supply &Sanitary Engg.	Khanna Publishers, New Delhi
2.	Hussain S. K.	Water supply &Sanitary Engg.	New Delhi- Oxford & IBH
3.	Gurucharan Shing	Water supply &Sanitary Engg.	Std. Pub. Distributors , Delhi
4.	Steel E. N.	Water supply &Sanitary Engg.	
5.	Fair Greyer &OKM	Water supply &Sanitary Engg.	London John Wiley

#### c)Codes of Practice: IS, BIS and international codes:

- 4. IS 14543: 2004 IS Code for testing of drinking water.
- 5. IS 8403: 1977 Code of practice disposal of Effluent from septic Tank.
- 6. Drinking water specifications (IS 10500: 1991)
- 7. BIS standard for effluent disposal printed in 1963, revised in 1968.
- 8. Code of practice for selection, installation & main water supply in building --- IS 2065

#### d) Websites:

- 1. http://en.wikipedia.org/wiki/Bisleri
- 2. . <u>http://en.wikipedia.org/wiki/</u>Aircraft\_lavatory

#### COURSE ID:

Course Name	:	IRRIGATION ENGINEERING
Course Code	:	CEF507
<b>Course Abbreviation</b>	:	FIRE

#### **TEACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s) : NIL

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	04	05
Practical	02#	

# practical alternate week

#### **Evaluation Scheme :**

Mode of	Progressive	Assessment	Term End Examination			Total	
Evaluation	Theory	Practical	Theory	TW	Oral	10tai	
Details of Evaluation	Average of Two tests of 20marks each(1 hour duration each)	One Progressive Skill Test of 25 marks	One paper (3 hours)		Based on TW as per proforma I		
Marks	20	25	80		25**	125	

\*\* (To be assessed by internal and external examiner)

#### **RATIONALE :**

India is an agricultural country majority of people live in villages. Agriculture industry is the back bone of Indian economy. India being the tropical country, rainfall is available only for 3 to 4 month and is not uniform. To increase the yield of the crops, an assured uniform supply of water throughout the year is essential. This is possible only with enhancing the irrigation facilities in the country.

The aim of the subject is to use irrigation engineering in a concise form comprising practically all the modern development. The input to the subject is the knowledge of survey for investigation, hydrology for calculation of yield from rainfall records and hydraulics for designing the storage conveyance and outlet structures.

#### **COMPETENCY :**

Apply principles of Irrigation Engineering to solve engineering problems as follows. **Cognitive :** Understanding and applying principles of Irrigation Engineering to engineering problems.

**Psychomotor :** i) Planning different types of Irrigation Projects ii) Calculate MFD iii) Water requirement of crops iv) Decide types of MI schemes for different situations v) Calculating storage capacity of reservoirs vi) Decide the types of dams and canal system for distribution of water

Affective : Attitude of i) Calculative aspect ii) accuracy iii) safety iv) aesthetic presentation

v) hygiene vi) civic sense

#### **COURSE OUTCOMES :**

CEF507-1Plan the different types of Irrigation projects

CEF507-2Calculate MFD and Yield

CEF507-3Estimate water demand for various crops

CEF507-4Decide the types of MI Schemes for different situations

CEF507-5 Calculate the storage capacity of reservoirs

**CEF507-6** Decide the types of dams

.

CEF507-7Plan Canal system for distribution of water.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
<b>Competency:</b> Apply principles of Hydraulics to solve engineering problems.	3	1	3	3	1	1	-	2	1	3	3	3	1
CEF507-1 Plan the different types of Irrigation projects	3	3	3	-	1	1	-	2	1	3	3	3	1
CEF507-2 Calculate MFD and Yield	3	3	3	-	1	1	-	2	1	3	3	3	1
CEF507-3 Estimate water demand for various crops	3	3	3	-	1	1	-	2	1	3	3	3	1
<b>CEF507-4</b> Decide the types of MI Schemes for different situations	3	1	1	-	1	1	-	1	1	1	1	1	1
<b>CEF507-5</b> Calculate the storage capacity of reservoirs	3	3	3	-	1	1	-	2	1	3	3	3	1
CEF507-6 Decide the types of dams	3	3	3	-	1	1	-	2	1	3	3	3	1
<b>CEF507-7</b> Plan Canal system for distribution of water.	3	3	3	-	1	1	-	2	1	3	3	3	1

# **CONTENT : THEORY**

# Section – I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	<i>Course Outcome-</i> <b>CEF507-1</b> Plan the different types of Irrigat	ion projects	
1	Introduction         1.1 Definition of irrigation and irrigation engg.         1.2 Necessity and Importance of irrigation.         1.3 Advantages and possible ill effect of irrigation projects.         1.4 Types of Irrigation projects.         Course Outcome- CEF507-2Calculate MFD and Yield	03	06
2	<ul> <li>Hydrology</li> <li>2.1 Definition of Rainfall, Factors affecting rainfall, characteristic of rainfall in India (emphasis on the rainfall in Maharashtra) average rainfall and its calculations.</li> <li>2.2 Definition Run off, factors affecting runoff and various methods for run off calculation.</li> <li>2.3 Catchments – definition, types, calculation of dependable yield, Maximum flood discharge &amp; methods of calculations.</li> </ul>	07	06
	Course Outcome-CEF507-3Estimate water demand for variou	is crops	
3	<ul> <li>Water Requirement For Crop</li> <li>3.1 Crop seasons in Maharashtra. Crops in Maharashtra, definitions – crop period, base period, duty, delta, improvement of duty.</li> <li>3.2 Estimating water demand for given cropping pattern, crop rotation</li> <li>3.3 Definitions – CCA, GCA, IA, intensity of irrigation, time factor</li> <li>3.3 Methods of application of water - Surface, subsurface methods, Sprinkler, drip irrigation method</li> </ul>	09	10

	Course Outcome – CEF507-4Decide the types of MI Schemes	for different	situations
4	Minor Irrigation Schemes	13	18
	<ul> <li>4.1 Bandhara irrigation - Lay out of Typical Bandhara irrigation scheme, advantages, disadvantage, selection of site, design principles</li> <li>4.2 Percolation tanks : Necessity and Importance, selection of site, component parts &amp; construction</li> <li>4.3 K.T. Weir - components, construction</li> <li>4.4 Lift Irrigation : Suitability of this type of irrigation, Component parts, function and broad design principles, advantages and disadvantages</li> <li>4.5 Well Irrigation - Advantages and disadvantages and limitations of well irrigation. open and tube wells, methods of determining, yield of wells</li> </ul>		
	Total	32	40
(Sem one a	ester end exam question paper should be such that total marks o nd half times the marks allotted above but the candidates are a	f questions ble to attem	on each topic is on pt questions of

the above allotted.)

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	Course Outcome - CEF507-5 Calculate the storage capacity of	of reservoirs	
5	Reservoir Planning	06	08
	<ul><li>5.1 Capacity of Reservoir, Use of area capacity curves in fixing up the storage's.</li><li>5.4 Height of dam, dead storage, live storage, Reservoir losses sedimentation, Flood absorption capacity, Free Board, Gross storage Simple problems on fixing control levels.</li></ul>		
	Course Outcome - CEF507-6 Decide the types of dams		
6	<ul> <li>Dams</li> <li>6.1 Types of Dams, Gravity &amp; Earthen dams</li> <li>6.2 Gravity Dams - components and their function, Theoretical &amp; Practical profiles, construction details, joints and galleries</li> <li>6.3 Earthen Dams - Components of earthen dam &amp; their functions, Typical c/s of an earthen dam, construction materials used. Seepage through earthen dam &amp; controlling methods, construction procedure of earthen dam</li> <li>6.4 Spillways, definition and Purpose, type of spillways with &amp; without gates, conditions favouring each type. Spillway gates - Radial, rectangular gates</li> <li>6.5 Outlet through Dams - Function and Component parts Energy Dissipation - Concept and methods of energy</li> </ul>	14 on of water.	16
7	<ul> <li>Canals And Distribution Systems</li> <li>7.1 Canals -Classification based on alignments &amp; its position in the network, typical canal sections, capacity of canal, time factor</li> <li>7.2 Canal cross drainage work - C.D. works, such as aqueduct, siphons, super passage, level crossing</li> <li>7.3 Canal out lets - Different types of canal outlets</li> <li>7.4 Canal Lining - Purpose &amp; common materials used for canal lining</li> <li>7.5 Water logging &amp; salt efflorescence's - causes and effect, preventive and remedial measures</li> </ul>	12	16
	Total	32	40

#### Section II

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

		Distribution		Tatal		
Topic No.	Name of topic	Remember	Understand	Applica- tion	Course Outcome	l otal Marks
1	Introduction	02	02	02	CEF507-1	06
2	Hydrology	02	02	02	CEF507-2	06
3	Water Requirement For Crop	02	04	04	CEF507-3	10
4	Minor Irrigation Schemes	06	06	06	CEF507-4	18
5	Reservoir Planning	02	02	04	CEF507-5	08
6	Dams	04	06	06	CEF507-6	16
7	Canals And Distribution Systems	04	06	06	CEF507-7	16
TOTAL		22	28	30		80

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.)

Sr No.	Title of Practical Exercise	Skills / Competencies to be developed	Course Outcome
Ι	Student should collect current rainfall data for near by place and write the report on "Use of rainfall data"	Data collection and studying the rainfall data	CEF507-6
II	<ul> <li>Students should visit and prepare a miniproject report with drawings on the following irrigation works by visiting nearby structures (Any Two)</li> <li>1) Lift irrigation scheme</li> <li>2) Percolation Tank</li> <li>3) K.T. weir</li> <li>4) Minor irrigation tank</li> <li>5) Earthen Dam.</li> <li>6) Masonary Dam</li> <li>7) Canal CD Works.</li> <li>8) Drip/ Sprinkler Irrigation</li> </ul>	Studying component parts, necessity, advantages and disadvantages of each work.	1.CEF507-4 2. CEF507-4 3. CEF507-4 4. CEF507-4 5. CEF507-6 6. CEF507-6 7. CEF507-7 8. CEF507-3
III	<ul><li>Sketches on Half imperial drawing sheets.</li><li>1) Typical section of and earthen and gravity dam.</li></ul>	1. Drawing and studying component parts of Earthen	1.CEF507-6

#### I) TERM WORK

	<ol> <li>Any two types of spillways.</li> <li>Section of canal in banking, in cutting and in partial cutting and partial banking.</li> </ol>	and Gravity Dams. 2.Drawing and studying components of spillways. 3.Drawing and studying component parts of various	2.CEF507-6 3.CEF507-7
	and in partial cutting and partial banking	canal sections.	
IV	To collect the discharge data of nearby	Data collection and studying	CEE507.2
11	Tivel for a particular day.	a particular day.	CEF307-2

#### J) INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс
1.	Field Visits	
	1.Existing irrigation projects	Every theory topic
	2. Existing irrigation structures	

#### ASSESSMENT CRITERIA FOR TERM WORK AND PRACTICAL EXAMINATION

#### • Assessment Criteria for Term work :

#### i) Continuous Assessment of Term Work:

Every practical assignment shall be assessed for 25 marks as per following criteria :

Domain	Particulars	Marks out of 50
Cognitivo	Understanding	02
Cogintive	Application	03
Davahamatar	Operating Skills	05
Psycholiotor	Drawing / drafting skills	Marks out of 50           02           03           05           05           05           05           25
Affactive	Discipline and punctuality	05
Affective	Decency and presentation	02 03 05 05 05 05 25
	TOTAL	25

#### ii) Progressive Skill Test :

One mid-term Progressive Skill Test of 25 marks shall be conducted.

#### **INSTRUCTIONAL STRATEGIES :**

#### **Instructional Methods :**

- 1. Lectures cum Demonstrations
- 2. Classroom practices

#### **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Question Bank

# **REFERENCE MATERIAL :**

Books / Journals / IS Codes / Websites

Reference Books: Sr No	AUTHOR	TITLE	PUBLISHER
1.	S. K. Garg	Irrigation Engineering	Khanna publishers, New Delhi
2.	B. C. Punamia	Irrigation Engineering and water power engg.	Standard publishers and distri, Delhi
3.	J. G.Dahigaonkar	Irrigation Engineering	Wheeler publishing, Allahabad
4.	V. S. Gajare	Text book of irrigation engg.	Nirali prakashan, Pune 2

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#### COURSE ID:

Course Name	: EARTHQUAKE ENGINEERING
Course Code	: CEF508
<b>Course Abbreviation</b>	: FEQE

#### **TEACHING AND EVALUATION SCHEME :**

<b>Pre-requisite</b>	Course(s)	:		Nil	
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#### **Teaching Scheme :**

Scheme Component	Hours / week	Credits
Theory	03	03
Practical		

#### **Evaluation Scheme :**

Mode of	Progressiv	ve Assessment	Term End Examination	Total
Evaluation	Theory	Practical	Theory	
Details of Evaluation	Average of two tests of 20 marks each		Examination (03 hours)	
Marks	20		80	100

#### **RATIONALE :**

Earthquakes are one of the most destructive forces that nature unleashes on earth. They not only cause loss of life & property but also shakes the moral of people. Devastation due to recent earthquakes viz. Khillari (Maharashtra) 1993, Bhuj (Gujrat) 2001 etc are the eye opener not only to the Engineering faculty but also to the Architects, Builders & related agencies. Since the earthquakes are so unpredictable and unpreventable, the only course open to us is to design and build the structures in such way that they will sustain the seismic shocks and minimizes loss of life and property.

#### **COMPETENCY :**

Apply principles of earthquake engineering to civil engineering structures as follows :

Cognitive : Understanding and applying principles of earthquake engineering

Psychomotor: i) Calculating skills ii) drafting skills

Affective : Attitude of i) precision ii) accuracy iii) safety iv) punctuality

#### **COURSE OUTCOMES :**

CEF507-1Explain basic concepts of seismology.

CEF507-2Explain concepts of theory of vibrations.

CEF507-3Explain response spectrum theory.

**CEF507-4** Explain principles of earthquake resistant design **CEF507-5**Explain and apply IS provisions of ductile detailing.

CEF507-6Explain construction aspects of earthquake resistant structures.

COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX :

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": no correlation ]

					Prog	gramme (	Outcomes	POs and	PSOs				
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Problem Solving on field
Competency: Apply principles of earthquake engineering to civil engineering structures	-	3	1	1	1	1	-	1	1	1	2	2	-
CEF507-1Explainbasicconceptsofseismology	-	3	1	1	1	1	-	-	1	1	2	2	
<b>CEF507-2</b> Explain concepts of theory of vibrations	-	3	1	1	1	-	-	-	1	1	2	2	L
CEF507-3 Explain response spectrum theory	-	3	1	1	1	1	-	-	1	1	2	2	
<b>CEF507-4</b> Explain principles ofearthquake resistant design	-	3	1	1	1	1	-	-	1	1	2	2	-
CEF507-5 Explain and	-	3	1	1	1	1	-	-	1	1	2	2	-

# $Curriculum \ MPECS-2016 \ \ \text{Diploma} \ \text{in CIVIL ENGINEERING}$

					Prog	gramme (	Outcomes	POs and	PSOs				
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Problem Solving on field
apply IS provisions of ductile detailing													
CEF507-6 Explain construction aspects of earthquake resistant structures	-	3	1	1	1	1	-	-	1	1	2	2	-

# **CONTENTS** :

# A) THOERY

Section I

Sr. No.	Topics Course outcome : CEF507-1Explain basic concepts of seise	Teaching (Hours) mology	Theory Evaluation (Marks)
1.	<ul> <li>Introduction to seismology</li> <li>1.1 structure of earth: Barysphere, Asthenosphere and Lithosphere</li> <li>1.2 Tectonic plates, movement of tectonic plates, zones of divergence, zones of convergence and fracture zones</li> <li>1.3 Geometric notation for description of earthquake, definition of focus, epicenter, epicentral distance, hypocentral distance</li> <li>1.4 Classification of Seismic waves : P-waves, S-waves, L-waves and Raleigh waves, properties of these waves</li> <li>1.5 Magnitude and intensity of earthquake : definition and comparison, details and MSK scale as per 1893-2002</li> <li>1.6 Classification of earthquake according to location, focal depth, origin and magnitude</li> <li>1.7 Earthquake energy released according to magnitude</li> <li>1.8 Seismograph Causes of earthquake, ill-effects of earthquake and Tsunami</li> </ul>	10	16
	<b>Course Outcome : CEF507-2</b> Explain concepts of theory of v	ibrations	I
2	<ul> <li>Theory of vibrations</li> <li>2.1 Oscillations of flexible buildings, fundamental natural periods of structures.</li> <li>2.2 Different governing equation of a vibrating system (only names)</li> <li>2.3 Damping : Types of damping, damping ratios for building materials and structures</li> <li>2.4 Definitions of free vibration, forced vibration, damped vibration, resonance, DOF and SDOF</li> <li>2.5 Mathematical modeling and equation of motion.</li> </ul>	06	10

Sr. No.	Topics	Teaching (Hours)	Theory Evaluation (Marks)
	<b>Course Outcome : CEF507-3</b> Explain response spectrum t	heory	
3	<b>Response spectrum theory</b> 3.1 Ground motion, strong ground accelograph, typical ground	08	14
	<ul> <li>3.1 Ground motion, strong ground accelegraph, typical ground acceleration record</li> <li>3.2 Important properties affecting structures : Duration, PGA, frequency content, response spectrum, equations of response Spectrum and combined spectrum.</li> </ul>		
	<ul> <li>3.3 Details of IS 1893-2016 : Terminology : Seismic zones, importance factor I, response reduction factor R, Seismic mass, seismic weight, seismic factors, ZPA, soft storey and weak storey</li> <li>3.4 Assumptions made in earthquake design of structures</li> </ul>		
	<ul><li>3.5 Load combination for earthquake design</li><li>3.6 Formula for determining design lateral force</li></ul>		
	Total	24	40
Seme times	ester end exam question paper should be such that total marks of questions of the marks allotted above. Candidate can attempt questions for the above allo	n each topic a tted marks	re one and half

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# Section II

Sr. no.	Topics	Teaching (Hours)	Theory evaluation Marks
	Course Outcome : CEF507-4 Explain principles of earthquake re	sistant design	
4	<ul> <li>Earthquake resistant design</li> <li>4.1 Seismic effects on structures, flow of seismic inertia forces through all structural components of a building, design horizontal force, seismic mass</li> <li>4.2 Definitions of terms : configuration, aspect ratio, slenderness ratio</li> <li>4.3 Lateral load resisting systems: bearing wall system, moment resisting systems, dual systems and tube systems.</li> <li>4.4 Configuration requirements form the planner's point of view</li> <li>4.5 Making a structure uniform and continuous distribution of strength from the designer's point of view</li> <li>4.6 Basic principles and guidelines for achieving earthquake</li> <li>resistant structural design</li> </ul>	10	16

Course Outcome : CEF507-5Explain and apply IS provisions of ductile detailing			
5 Ductile detailing of R.C.C. structures subjected to seismic forces as per is 13920-2016	08	12	
<ul> <li>5.1 Principles of earthquake design of RCC members : ductile failure, week-beam strong column design and failure of joints.</li> <li>5.2 Definition of terms : cross tie ductility hoon shear wall and space</li> </ul>			
<ul> <li>5.2 Deminion of terms : cross ite, ducunity, noop, shear wan and space frame</li> <li>5.3 General specification for grade of concrete and steel.</li> <li>EVUDAL MEMPERS</li> </ul>			
<ul><li>5.4 Beams : general requirements, longitudinal reinforcement, anchorage of beam bars in an external joints, lap splice in beams, beam web reinforcement</li></ul>			
<ul> <li>5.5 Columns : general requirement, longitudinal reinforcement, transverse reinforcement, column and joint detailing</li> <li>5.6 Footings : special confining reinforcement in footings</li> </ul>			
5.0 Footnigs : special comming removement in footnigs			
Course Outcome : CEF507-6 Explain construction aspects of earthqual	ke resistant s	structures	
<ul> <li>6 Construction aspects of earthquake resistant structures</li> <li>6.1 Design considerations in providing ductile detailing</li> <li>6.2 Formation of plastic hinges in beams rather than columns</li> <li>6.3 Comparison between flexible structures and stiff structures</li> <li>6.4 Desirable properties of construction materials for earthquake resistant structures.</li> <li>6.5 Salient features of earthquake resistant provisions recommended in IS : 4326 and IS 13928for the following General principle, masonry units, mortar, wall dimensions, number of storeys, masonry bond, openings, seismic strengthening arrangements</li> <li>6.6 Causes of damage in masonry building due to earthquake</li> <li>6.7 Strengthening of masonry wall construction</li> </ul>	06	12	

Topic	Nome of Tonic	Distributio	Total		
No.	Name of Topic	Remember	Understand	Apply	Marks
1	Introduction to seismology	02	04	10	16
2	Flexural Analysis and Design of Rectangular Beams	02	04	10	16
3	Flexural Analysis and Design of Flanged Beams	02	02	04	08
4	Shear, Bond and Torsion	02	04	10	16
5	Design of Slabs	02	04	06	12
6	Design of Columns and Footings	02	04	06	12
	Total	12	22	46	80

#### Specification table for setting question paper for semester end theory examination

#### **B) INDUSTRIAL EXPOSURE**

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Topics of theory syllabus

#### **IMPLEMENTATION STRATEGY:**

#### Instructional strategies:

- 2.7 Lectures and discussions
- 2.8 Time bound regular home assignments
- 2.9 Industrial visits
- 2.10 Case study

#### **Teaching and Learning Resources:**

- 9. Chalk-board
- 10. Models and Magnetic cut-outs
- 11. Demonstrative charts
- 12. Computer aided presentations

#### **REFERENCE MATERIAL :**

# e) Books / Journals / IS Codes

Sr.	Author	Title	Publisher
No.			
1.	Pankaj Agrawal	Earthquake Resistant Design of	PHI Learning Pvt.Ltd.
	Manish Shrikhande	Structures	
2.	David J. Dowrick	Earthquake Resistant Design	Wiley India Pvt.Ltd., New Delhi
3.	C.V.R.Murty	Earthquake Tips	IITR – B BM TPC
4.	Jai Krishna	Elements of Earthquake	South Asian Publications
	A.R.Chandrasekran	Engineering	
5.	P. C.Varghase	Advanced RCC Design	Prentice Hall of India,
6.	S.U.Pillai	Reinforced Concrete Design	Tata McGraw Hill,
	Devdas Menon		Mumbai
7.	David Dowrick	Earthquake Resistant Design and	Wiley India Pvt.Ltd., New
		Risk Reduction	Delhi
8.	Steven L. Kramer	Geotechnical Earthquake Engineering	Pearson Education

# f) I.S. Codes:

15. IS 13920-2016 Ductile Detailing of R. C. Building subjected to Seismic forces

16. IS 4326

17. IS 13928

18. IS 1893-2016

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#### **COURSE ID:**

Course Name	: Industrial Waste Management
Course Code	: CEF509
<b>Course Abbreviation</b>	: FIWM

#### **TEACHING AND EVALUATION SCHEME:**

Pre-requisite Course(s) : Nil

**Teaching Scheme:** 

Scheme component	Hours / week	Credits
Theory	3	3
Practical		

**Evaluation Scheme :** 

	Progressiv	ve Assessment	Term End H		
Mode of Evaluation	Theory	Practical	Theory	Term Work	Total
	Theory	Tuetteur	Examination		
Details of Evaluation	Average of two tests of 20 marks each		Term End Theory Exam (03 hours)		
Marks	20		80		100

#### **Rationale:**

Industrialization is increasing day by day. Huge quantity of industrial waste is become a serious problem to environment. Industrial waste is offensive causing nuisance, odour and danger to public health. Pollution of water, destruction of aquatic life, soil pollution, etc is caused. Therefore the study becomes essential to know the problem of industrial waste. Its effective management will enable to maintain good environment.

#### COMPETENCY

Applying knowledge of effective management to maintain good environment.

Cognitive: Understanding and applying knowledge of Industrial Waste Management.

Psychomotor: Conducting site visit to treatment plant.

Affective: Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

**Course Outcomes:** 

CEF509 -1 Decide the standards for disposal of industrial effluent.

**CEF509 -2 Decide the methods of treatment on Industrial Waste.** 

CEF509 -3 Describe the methods of disposal & reuse of water.

CEF509 -4 Decide the treatment given to different types of industrial waste.

**CEF509-5** Selection of advanced treatments on industrial waste.

CEF509 -6 Explain the concept of Common effluent treatment plant.

#### COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": no correlation]

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
Competency: Applying knowledge of Effective management to maintain good environment	3	3	2	2	3	2	-	1	1	3	3	3	1
CEF509 -1 Decide the standards for disposal of industrial effluent.	3	3	2	2	3	3	-	1	1	2	2	2	1
CEF509 -2 Decide the methods of treatment on Industrial Waste.	2	3	3	1	1	2	-	1	1	1	3	3	1
CEF509 -3 Describe the methods of disposal & reuse of water.	3	3	2	2	3	2	-	1	1	2	2	3	1
CEF509 -4 Decide the treatment given to different types of industrial waste.	3	2	2	2	2	2	-	1	1	2	3	3	1
CEF509- 5 Selection ofadvanced treatments on industrial waste.	3	3	2	1	3	2	-	1	1	2	2	2	1

		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
CEF509 -6 Explain the concept of Common effluent treatment plant.	3	2	1	1	2	2	-	1	1	2	2	2	1

# Section I

Sr. no.		Topics	Teaching (Hours)	Theory evaluation Morks
	(	Course Outcome CEF509 -1 Decide the standards for disposal of it	ndustrial efflu	ent.
1	Intr	oduction	04	08
	1.1	Brief introduction of course.		
	1.2 1	Importance		
	1.3	Industrial waste characteristics (general)		
	1.4 ]	industrial effluent standards for disposal into streams.		
	1.5 1	industrial effluent standards for disposal on land.		
		Course Outcome CEF509 -2 Decide the methods of treatment on	Industrial We	aste.
2	Trea	atment methods	14	24
	2.1	Primary treatments: 2.1.1.Screening-purpose and types,		
		2.1.2 Settling tanks- purpose and types		
		2.1.3-Floation-purpose and types		
		2.1.4Neutralisation, proportioning, equalisation-		
		Purpose and methods		
	2.2	Secondary treatments: 2.2.1.Coagulation, flocculation and adsorption-purpose and methods.		
		2.2.2-Ion exchange, Dialysis, evaporation and reverse osmosis, Precipitation- purpose and methods		
		2.2.3 .Biological treatments –Lagooning ,activated sludge trickling filtration, anaerobic digestion- purpose and brief description of each .		
	2.3	Final treatments: Treatment and disposal of sludge solids.		

Sr. no.	Topics	Teaching (Hours)	Theory evaluation
			Marks
	Digestion, vaccum filtration, lagooning ,incineration centrifuging ,land filling- purpose of each and brief description		
	Course Outcome CEF509 -3 Describe the methods of disposal &	reuse of wate	r.
3	Waste water disposal and reuse:	06	08
	3.1 Disposal		
	3.1.1 Introduction		
	3.1.2 Use for Irrigation		
	3.1.3 Rapid infiltration		
	3.2 Reuse		
	3.2.1 Recreational facilities		
	3.2.2 Industrial water supply		
	3.2.3 Ground water recharge		
	Total	24	40
Seme	ster end exam question paper should be such that total marks of questions	on each topic	is one and half

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

# Section II

Sr. no.	Topics	Teaching (Hours)	Theory evaluation
		<u> </u>	Marks
	Course Outcome CEF509 - 4 Decide the treatment given to different typ	es of industrie	al waste.
4	Waste management	12	20
	Characteristics, treatment of the wastes with flow chart for following industrial wastes :		
	<ul><li>1.1 Sugar industry.</li><li>4.2 Pulp and paper industry.</li></ul>		
	4.3 Dairy industry.		
	4.4 Textile industry.		
	4.5 Tannery industry.		
	4.6 Distillery industry .		
	4.7 Fertilizer industry.		

Sr. no.	Topics	Teaching (Hours)	Theory evaluation
			Marks
	Course Outcome CEF509- 5 Selection of advanced treatments on	industrial was	te.
5	Advanced waste treatments:(only brief idea of following)	05	08
	5.1 Removal of colour and refractory organics-		
	Chemical oxidation.		
	5.2 Removal of metals -Precipitation		
	5.3 Radioactive waste disposal.		
	Course Outcome CEF509 -6 Explain the concept of Common efflue	ent treatment p	olant.
6	Common effluent treatment plant:	07	12
	6.1 Concept and benefits of CETP.		
	6.2 Points to be observed for implementing CETP.		
	6.3 CETP for textile industrial sectors.		
	Total	24	40
Semes	ster end exam question paper should be such that total marks of questions	on each topic	is one and half
times	the marks allotted above but the candidates are able to attempt questions	s of the above	allotted marks
only.			

# Specification table for setting question paper for semester end theory examination:

Toni		Distribution of		Total		
c No.	Name of topic	Remember   Understand		Applica- -tion	Course Outcome	Marks
1	Introduction	04	02	02	CCF509-1	08
2	Treatment methods	08	08	08	CCF509-2	24
3	Waste water disposal and reuse	02	02	04	CCF509-3	08
4	Waste management	04	08	08	CCF509-4	20
5	Advanced waste treatment	02	02	04	CCF509-5	08

6	Common effluent treatment plant:	04	04	04	CCF509-6	12
TOTAL		24	26	30		80

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

### **K) INDUSTRIAL EXPOSURE :**

(Included inLaboratory Manual for Industrial Waste Management)

SN	Mode of Exposure	Торіс
1.	Field examples of course application	Every chapter of theory syllabus
2.	Field examples of course application	Term-work assignment

#### **Instructional Methods :**

- 1. Lectures
- 2. Assignments.
- 3. Site visits
- 4. Group discussion
- 5. Seminar

#### 6. Teaching and Learning resources:

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Item Bank

#### **REFERENCE MATERIAL :**

#### a) Books / Journals / IS Codes

Sr. No.	Author	Title	Publisher
1.	Soli J Arecivala	Waste water treatment for pollution control	Tata McGraw Hill
2.	Peavy, Row	Environmental Engg	Tata McGraw Hill
3.	Fair and Geyer	Water and waste water engg	John Willey and Sons, New York, London
4.	G. S. Birdi	Water supply and sanitary engg.	Standard Book House
5.	S. K. Garg	Sewage disposal and air pollution engg.	Khanna publishers, Delhi
6.	Metalcalf Eddy	Waste water engg	Tata McGraw Hill

#### COURSE ID:

Course Name	: SOLID WASTE MANAGEMENT
Course Code	: CEF 510
Course Abbreviation	: FSWM

#### **TEACHING AND EVALUATION SCHEME :**

Pre-requisite Course(s) : NIL

**Teaching Scheme :** 

Scheme component	Hours / week	Credits
Theory	03	03
Practical		

#### **Evaluation Scheme :**

Mode of	Progressive	Assessment	Term	Total		
Evaluation	Theory	Practical	Theory	TW	Oral	Total
Details of Evaluation	Average of Two tests of 20marks each(1 hour duration each)		One paper (3 hours)			
Marks	20		80			100

#### **RATIONALE :**

The problem of solid waste is spread all over the country, within the urban as well as rural area. That's why its management at national level is today prime need to keep the environment safe and clean. Solid waste management include the activities related to generation of refuse, its storage, Collection, transportation, processing, recycling, reuse, recovery and disposal in an environmentally acceptable manner. The responsibility lies not only on local bodies, government but also on all the citizens. This is elective subject and intended to teach the students; the activities related to generation of waste storage, collection, transportation, processing, reuse, recovery, recycling and disposal in economic and environmentally acceptable manner.

#### COMPETENCY

Apply principles collection, handling and disposing of the solid waste. **Cognitive :** Understanding the art of collection and transporting the solid waste.

**Psychomotor :** i) Designing the disposal methods ii) Fixing the capacity of transporting equipments iii) Designing sorting equipments.

Affective : Attitude of i) Calculative aspect ii) accuracy iii) safety iv) aesthetic presentation

v) hygiene vi) civic sense

#### **COURSE OUTCOMES :**

**CEF510-1**Decide the types and characteristics of wastes.

CEF510-2 Decide the collection techniques and transporting of solid waste.

**CEF510-3** Aware about health aspects in solid waste management.

**CEF510-4** Decide the handling and disposal of Hospital waste.

CEF510-5 Control the methods of sanitary land filling.

CEF510-6 Decide the methods of composting of waste.

CEF510-7 Describe the needs of Incineration & pyrolysis of waste .

CEF510-8 Shoulder the responsibility of Industrial waste disposal & recycling.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[ Note : Correlation levels : 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-" : no correlation ]

		Programme Outcomes POs and PSOs											
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Problem Solving on field
<b>Competency:</b> Apply principles of Solid Waste Management to solve engineering problems.	1	1		1	2	2	-	2	1	3	3	3	1
<b>CEF510-1</b> Decide the types and characteristics of wastes.	3	3	1	2	2	2	1	2	2	3	3	3	1
<b>CEF510-2</b> Decide the collection techniques and transporting of solid waste.	3	3	1	1	2	1	-	2		3	3	3	1
<b>CEF510-3</b> Aware about health aspects in solid waste management.	3	3	1	-	2	1	-	2		3	3	3	1
<b>CEF510-4</b> Decide the handling and disposal of Hospital waste.	3	1	1	1	2	1	-	1		1	1	1	1

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	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basi c kno wled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Problem Solving on field
<b>CEF510-5</b> Control the methods of sanitary land filling.	3	3	1	1	2	1	-	2		3	3	3	1
<b>CEF510-6</b> Decide the methods of composting of waste.	3	3	1	-	2	1	-	2		3	3	3	1
<b>CEF510-7</b> Describe the needs of Incineration & pyrolysis of waste.	3	3	1	-	2	1	-	2		3	3	3	1
<b>CEF510-8</b> Shoulder the responsibility of Industrial waste disposal & recycling.	3	3	1	1	2	1	-	2		3	3	3	1

# **CONTENT : THEORY**

# Section – I

Sr. No.	Topics / Sub-topics	Lectures (Hours)	Theory Evaluation (Marks)
	Course Outcome- CEF510-1Decide the types and character	eristics of wa	astes
1	Introduction –         1.1 Definitions of solid waste, classification, Domestic waste, Commercial waste, Institutional waste, Industrial waste, Construction waste, Institutional waste, Industrial waste, Construction waste, Hazardous waste, Toxic waste, street sweepings, E – waste         1.2 Sources of solid waste         1.3 Composition of solid waste         1.4 Quantities of solid waste         1.4 Quantities of solid waste generated, sample figure for some cities in India as well as outside India         1.5 Factors affecting on solid waste generation .         1.6 Physical and chemical characteristics.         Course Outcome- CEF510-2 Decide the collection technique waste	06 es and trans	10 porting of solid
	waste		
2	<ul> <li>Storage, Collection and Transportation of Waste</li> <li>2.1 Storage of Municipal Waste</li> <li>2.2 Collection of Municipal Waste</li> <li>2.3 Transportation of Municipal Waste</li> <li>2.3.1 Transportation Equipments-Litter bin ,Broom, Shovels ,Hand carts, Mechanical road sweepers, Community bins like movable and stationary.</li> <li>2.3.2 Transportation vehicles with their capacity and working-Animal carts, Auto vehicles ,Tractors or Trailers, Trucks, Dumpers, Compactor vehicles.</li> <li>2.4Transfer stations: meaning, necessity, location.</li> <li>2.5 Organization pattern of solid waste management.</li> <li>2.6 Recycling of Municipal Waste, reuse and Resource Recovery</li> <li>2.7 Segregation and salvage recovery</li> <li>2.8 Use of solid waste as raw material in industry</li> </ul>	10	14

Cours	e Outcome-CEF510-3 Aware about health aspects in solid waste	e manageme	nt.				
3	Health Aspect In Solid Waste Management	04	08				
	3.1 Health aspect and during solid waste handling and						
	processing.						
	3.2 Health problems arising at the time of segregation,						
	reuse, Recovery recycling and at final disposal sites.						
	3.3 Handling and disposal of hazardous waste.						
	3.4 Public involvement and participation in solid waste						
	management.						
Cours	Course Outcome -CEF510-4 Decide the handling and disposal of Hospital waste.						
4	Handling and Disposal of Hospital waste	04	08				
	4.1 Types of hospital waste-clinical and non clinical						
	4.2 Storage of hospital waste						
	4.3 Collection of hospital waste						
	4.4 Transportation of hospital waste						
	4.5 Disposal of hospital waste- Incinration						
	Total	24	40				
(Seme	ester end exam question paper should be such that total marks of	of questions	on each topic is				
one a	nd half times the marks allotted above but the candidates are a	able to atten	npt questions of				
the ab	pove allotted.)						

# Section II

Sr. No.	<b>Topics / Sub-topics</b> <i>Topics - CEF510-5</i> Control the methods of sanitary land fil	Lectures (Hours) ling.	Theory Evaluation (Marks)
5	Sanitary landfilling-	06	10
	5.1 Factors affecting Site selection.	00	10
	5.2 Land filling Methods-Area method, Trench method,		
	Ramp method.		
	5.3 Leach ate and its control		
	5.4Control of contamination of ground water.		
	5.5 Advantages and disadvantages of land filling methods.		

6	Composting of waste -	08	14
	6.1 Theory of Composting-Principles of composting process.		
	6.2 Factors governing Composting process		
	6.3 Process before Composting		
	6.4 Methods of Composting –		
	A) Manual composting		
	Bangalore method, Indore method, 14 days method,		
	Anaerobic method, Vermi composting- concept,		
	composting at home.		
	B) Mechanical composting plant – (General Introduction)		
	Dano process,		
	6.5 Benefits of composting,		
	6.6Recovery of bio-gas energy from organic solid		
	worth		
Cour	se Outcome - CEF510-7 Describe the needs of Incineration & pv	rolvsis of wa	aste .
		·	
7	Incineration of waste –	05	08
	7.1 Introduction of incineration process.		
	7.2 Need of incineration		
	7.3 Types of incinerators-Multiple chamber Incinerator,		
	Municipal Incinerator		
	7.4 Pyrolysis of waste- Definition and methods.		
<u> </u>	7.5 Advantages and disadvantages of incineration process.	. 1'	1.0 1
Cour	se Outcome - CEF510-8 Shoulder the responsibility of industrial v	vaste dispos	al & recycli
	Industrial Waste And Its Disposal –	05	08
8			
8	8.1 Responsibility of industry		
8	<ul><li>8.1 Responsibility of industry</li><li>8.2 Recycling of industrial waste</li></ul>		
8	<ul><li>8.1 Responsibility of industry</li><li>8.2 Recycling of industrial waste</li><li>8.3 The problem of disposal of industrial waste -</li></ul>		
8	<ul> <li>8.1 Responsibility of industry</li> <li>8.2 Recycling of industrial waste</li> <li>8.3 The problem of disposal of industrial waste -</li> <li>8.3.1 Industries producing mainly organic wastes like -</li> <li>Eruit processing Slaughter-house waste</li> </ul>		
8	<ul> <li>8.1 Responsibility of industry</li> <li>8.2 Recycling of industrial waste</li> <li>8.3 The problem of disposal of industrial waste -</li> <li>8.3.1 Industries producing mainly organic wastes like -</li> <li>Fruit processing, Slaughter-house waste.</li> </ul>		
8	<ul> <li>8.1 Responsibility of industry</li> <li>8.2 Recycling of industrial waste</li> <li>8.3 The problem of disposal of industrial waste -</li> <li>8.3.1 Industries producing mainly organic wastes like -</li> <li>Fruit processing, Slaughter-house waste.</li> <li>8.3.2 Industries producing mainly inorganic wastes like -</li> </ul>		
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8	<ul> <li>8.1 Responsibility of industry</li> <li>8.2 Recycling of industrial waste</li> <li>8.3 The problem of disposal of industrial waste -</li> <li>8.3.1 Industries producing mainly organic wastes like -</li> <li>Fruit processing, Slaughter-house waste.</li> <li>8.3.2 Industries producing mainly inorganic wastes like -</li> <li>Solid waste from Steel Plants, Fly ash from Thermal Power Plants.</li> </ul>		
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Topic	Norman Character	Distribution	n of marks (Co wise)	Course	Total	
No.	Name of topic	Remember	Remember Understand tion		Outcome	Marks
1	Introduction	04	04	02	CCF510-1	10
2	Storage, Collection and Transportation of Waste	04	06	04	CCF510-2	14
3	Health Aspect In Solid Waste Management	04	02	02	CCF510-3	08
4	Handling and Disposal of Hospital waste	04	02	02	CCF510-4	08
5	Sanitary landfilling	04	02	04	CCF510-5	10
6	Composting of waste	04	04	06	CCF510-6	14
7	Incineration of waste	02	04	02	CCF510-7	08
8	Industrial Waste And Its Disposal	02	04	02	CCF510-8	08
TOTAL		28	28	24		80

#### Specification table for setting question paper for semester end theory examination :

(Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.)

#### L) INDUSTRIAL EXPOSURE :

SN	Mode of Exposure	Торіс
1.	Field Visits	
	1.Existing solid waste collection and disposal	Every theory topic
	methods of a town or city	

#### M) INSTRUCTIONAL STRATEGIES : Instructional Methods :

1. Lectures cum Demonstrations

2. Classroom practices

#### **Teaching and Learning resources :**

- 1. Chalk board
- 2. LCD presentations
- 3. Audio presentations
- 4. Question Bank

#### **REFERENCE MATERIAL :**

#### a. Books / Journals / IS Codes / Websites

Sr. No.	Author	Title	Publisher
1	Dr. A. D. Bhide	Solid Waste Management	
2	Gorge Techobanoglous	Solid Wastes	– McGraw Hill
3	Pavoni	Hand Book on Solid Waste	
		Management	
4	Gottas	Composting -	
5	Khopkar S.M. (1993)	Environmental Pollution	New Age International (p)
		Annalysis	Limited .
6	Rao C. S.	Environmental Pollution	Wiley Eastern Limited
		Control Engineering.	
7	S.K. Garg.	Sewage disposal and air	
		pollution Engineering	
8	Edwards and Lofty.	Earthworm Biology.	
9	Anubha Kaushik & C.P.	Perspectives in Environmental	New Age International (p)
	Kaushik -	Studies	Limited, Publishers
10	D.L.Manjunath	Environmental studies	PEARSON Publication
11	Anindita Basak	Environmental studies	PEARSON Publication
12	B.B. Hosetti	Prospect and Perspectives of	New Age International
		Solid Waste Management	Limited

#### **b.Websites:**

1.www. hsagolden.com

2. www.almitrapatel.com

3.www.yousee.in

4.www.skgsangha.org

5.www.epa.gov/epaoswer/non-hw/muncipal/index.htm

6. En. Wikipedia.org/waste-management

\* \* \*
## COURSE ID:

Course Name	: Watershed Management
Course Code	: CEF 511
Course Abbreviation	: FWSM

## **TEACHING AND EVALUATION SCHEME:**

Pre-requisite Course(s) : Nil

**Teaching Scheme:** 

Scheme component	Hours / week	Credits
Theory	3	3
Practical		

#### **Evaluation Scheme :**

Mada ef	Progressiv	ve Assessment	Term End H		
Evaluation	Theory	Practical	Theory	Term Work	Total
	Theory	Tactical	Examination	Term work	
Details of	Average of		Term End		
Evaluation	two tests of 20 marks each		(03 hours)		
Marks	20		80		100

#### **Rationale:**

Water resources play a very important role in the overall development of a country like India. Day by day these resources are becoming scarce & users are multiplying in larger numbers. The drinking water and other purpose water problem is becoming very serious day by day in rural as well as urban area. It is need of the hour to adopt scientific approaches for making use of water resources judiciously and intelligently. Water resources need to be conserved at all cost keeping in mind the future demands. This situation may be improved by carrying watershed development works.

Watershed management implies, the judicious use of all the resources i.e land, vegetation and water of the watershed to achieve maximum productivity with minimum hazard to the natural resources and for the wellbeing of mankind..

The topics on runoff and soil erosion will provide necessary guidelines to be followed during planning for watershed management. Topics on water harvesting and ground water recharge will provide the information about different methods for the same.

The topics on water conservation measures will provide construction and location etc. of different measures those can be adopted for water conservation. This will enable further to plan for appropriate measures for water conservation

Different water conservation measures undertaken in an integrated manner will be useful to manage the available water resources effectively. Thus the activities related to planning, design, construction and

maintenance of different structures associated with soil and water conservation measures will enable the diploma civil engineer to be the professional in that area.

## **Objectives:**

- 1. Understand the concept of watershed and its planning aspects.
- 2. Select suitable site proposing water and soil conservation measure in watershed.
- 3. Apply the suitable measures for soil or water conservation for a watershed.
- 4. To posses social attributes & values.
- 5. Understand the different aspects in preparation of watershed development project.
- 6. To implement watershed development concept so as to reduce water scarcity problems.

## COMPETENCY

Applying knowledge of effective planning and management to conserve the soil and water.

Cognitive: Understanding and applying knowledge of Watershed Management.

Psychomotor: Conducting site visit to conserve the soil and water.

Affective: Attitude of i) precision ii) accuracy iii) safety iv) punctuality v) aesthetic presentation

## **Course Outcomes:**

CEF511 -1 Decide the importance and uses of water resources

CEF511 -2 Decide the methods of runoff and soil erosion.

*CEF511 -3* Describe the methods of water harvesting and ground water recharge.

CEF511 -4 Deciding the various water conserving measures.

CEF511- 5 Management of various watershed works.

CEF511 -6 Role of socio-economic aspects.

# COMPETENCY, COURSE OUTCOMES AND PROGRAMME OUTCOMES (CP-CO-PO) MATRIX

[Note: Correlation levels: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), "-": no correlation]

	Programme Outcomes POs and PSOs												
Competency and COs	PO 1 Basic knowled ge	PO 2 Discipli ne knowled ge	PO 3 Experim ents and practice	PO 4 Enginee ring Tools	PO 5 The engineer and society	PO 6 Environ ment and sustaina bility	PO 7 Ethics	PO 8 Individu al and team work:	PO 9 Commu nication	PO 10 Life- long learning	PSO1 Plan and Design	PSO2 Constru ction and Mainten ance	PSO3 Proble m Solving on field
CEF511 -1 Decide the importance and uses of water resources:	3	3	3	2	3	2	-	1	1	3	3	3	1
CEF511 -2 Decide the methods of runoff and soil erosion	3	3	3	3	2	-	-	1	1	2	2	2	1
CEF511 -3 Describe the methods of water harvesting and ground water recharge	2	3	3	1	1	2	_	1	1	1	3	3	1
CEF511 -4 Deciding the various water conserving measures	3	3	2	2	3	2	-	1	1	2	2	3	1
CEF511- 5 Management of various watershed works	3	2	2	2	2	2	-	1	1	2	3	3	1
CEF511 -6 Role of socio-economic aspects	3	3	2	1	3	2	-	1	1	2	2	2	1

Section	I

Sr. no.	Topics	Teaching (Hours)	Theory evaluation Marks
	Course Outcome CEF511 -1 Decide the importance and uses of	water resource	es
1	Introduction         1.1 Water resources-types and its availability, its use,         Classification of water resources,         1.2 Concept of water shed, watershed characteristics,         Objectives Of watershed management         1.3Watershed management, and practices, factors affecting         watershed management         1.4 Soil degradation ,causes, effects.         1.5 Integrated multi disciplinary approach for watershed ,	08	12
	Course Outcome CEF511 -2 Decide the methods of runoff and so	oil erosion .	
2	<ul> <li>Run off and soil erosion</li> <li>2.1 Run off computation- Rational Method, Runoff formula- Inglis formula for ghat and non ghat area, Time of concentration(simple numerical on runoff computation)</li> <li>2.2 Importance of soil &amp; soil survey, Soil erosion- Definition,erosion problem, types of erosion, factors affecting soil erosion.</li> <li>2.3 Water erosion - factors affecting water erosion, gulley erosion, rain drop erosion, sheet erosion , rill erosion, Mechanics of water erosion</li> </ul>	08	14
Co	ourse Outcome CEF511 -3 Describe the methods of water harvesting and	d ground wate	r recharge.
3	<ul> <li>Water harvesting and Ground water recharge.</li> <li>3.1 Water Harvesting - importance , harvesting principles Water Harvesting techniques- Roof harvesting, Runoff harvesting , and Flood water harvesting</li> <li>3.2 Artificial recharge of ground water –Spreading method Induced recharge method, recharge –well method , subsurface dams, Waste water recharge, recharge by urban storm runoff.</li> </ul>	08	14
	Total	24	40
Semes times only.	ster end exam question paper should be such that total marks of questions the marks allotted above but the candidates are able to attempt questions	on each topic s of the above	is one and half allotted marks

# Section II

Sr. no.	Topics	Teaching (Hours)	Theory evaluation				
	Course Outcome CEF511 -4 Deciding the various water conser	ving measures	Marks s.				
4	Water Conservation Measures.	14	20				
	Agronomic measures						
	4.1 Contour farming, strip cropping and tillage practices.						
	ractices						
	4.3 Mechanical Measures-						
	Bunding- types, contour bunding and graded bunding,						
	Design criteria, alignment & construction, surplus						
	arrangement, Contour trenching-graded trenches and staggered						
	trenches, Grassed water ways –location, selection of suitable grasses,						
	terraces, types design construction limitations maintenance						
	Terraces system-Planning, construction, maintenances, broad based						
	terraces, conservation ditches, Gully control measures-Vegetation,						
	Gully control structures- gully plugging Check dam- classification-						
	temporary check dam, semi permanent check dam and permanent						
	check dams –cement bandhara, earthen bandhara, gabion structure,						
	biological bandhara, underground bandhara, Farm ponds- types,						
	Course Outcome CEE511- 5 Management of various waters	hed works					
	Course Ouicome CEI <sup>5</sup> 511-5 Management ofvarious watersnea works						
5	Planning of watershed works-	06	10				
	5.1 Watershed description, watershed problems, proposed						
	Watershed management programmes, effect of watershed works,						
	5.2 Formulation of project proposal for watershed management work						
	steps of watershed management, evaluation.						
	5.3 Integrated approach, socio economic aspects – needawareness,						
	participation, economical upliftment						
	Course Outcome CEF511-6 Role of socio-economic	aspects.					
6	Socio – Economic Aspects	04	10				
	6.1 Organizational Set-up for irrigation & soil conservation						
	administration in Govt, sector, liason between officers and						
	co-operation amongst various agencies & people.						
	6.2 Role of Engineers, farmers and Govt.						
	6.3 Water charges and Betterment levy						
	6.4 Social attributes and values.						
	Total	24	40				
Seme	ster end exam question paper should be such that total marks of questions	on each topic	is one and half				
times	the marks allotted above but the candidates are able to attempt questions	s of the above	allotted marks				
only.							

Topi		Distribution of marks (Cognitive level-wise)				Total
c No.	Name of topic	Remember	Understand	Applica- -tion	Outcome	Marks
1	Introduction	4	4	4	CCF511-1	12
2	Treatment methods	2	6	6	CCF511-2	14
3	Waste water disposal and reuse	6	4	4	CCF511-3	14
4	Waste management	8	6	6	CCF511-4	20
5	Advanced waste treatment	4	4	2	CCF511-5	10
6	Common effluent treatment plant:	2	4	4	CCF511-6	10
TOTAL		24	26	30		80

## Specification table for setting question paper for semester end theory examination:

Semester end exam question paper should be such that total marks of questions on each topic is one and half times the marks allotted above but the candidates are able to attempt questions of the above allotted marks only.

## Instructional strategies:

- i. Lectures.
- ii. Assignments.
- iii. Site visits
- iv. Group discussion /Seminar

## Teaching and Learning resources, including references:

- 1. Chalk-board.
- 2. LCD projector.
- 3. OHP presentation
- 4. Visits

Reference Books : Sr. No.	Title	Author	Publisher
1	Soil and Water	R. Suresh	Standard Distributer,
	Conservation Engineering		New Delhi
2	Watershed management	J. V. S. Murthy	New Age
			International

			publishers New Delhi.
3	Ground water assessment,	R. K. Karanth	Tata Mc Grahil
	development &		Publication
	management		
4.	Watershed management	N.D.Mani	Saujanya Books, 165-
			E, Kamla Nagar Delhi
			-7
5	Watershed Planning and	Rajveer singh	Yash Publishing
	management		House
6	Watershed management	V.V.Dhruvnarayana	Indian Council
		& G. Shastry	Agriculture Research,
			Krishi anusandhan
			bhavan , PUSA , New
			Delhi
7	Irrigation and I	D.R. Mazumdar	

water management

# 2. Websites:

www.watershedindia.50megs.com

www.watershed.nic.in

www.wotr.org/watersheddevelopment.html

www.indiawaterportal.org/channels/watershed-development

www.raiwaterharvesting.org

www.watershed.org