

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

(An Autonomous Institute of Govt. of Maharashtra)

ODD TERM END EXAM NOV/DEC -2017

EXAM SEAT NO.

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LEVEL: FIFTH

COURSE CODE: MEE508/ME409

MAX. MARKS: 80

PROGRAM: MECHANICAL ENGG.

COURSE NAME: Refrigeration & Air Conditioning

TIME: 3 HRS.

DATE: 23/11/2017

Instruction:-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I

Marks

Q.1 Attempt any FOUR

(08)

- a) Define,- i) Refrigeration. ii) Coefficient of performance.
- b) State any two non-conventional methods of refrigeration.
- c) Represent reversed Carnot cycle on P.V. and T-s charts.
- d) Classify refrigerants.
- e) State the function of capillary tube.
- f) State the purpose of pressure cutouts.

Q.2 Attempt any FOUR

(16)

- a) Obtain the relationship between COP of heat pump and COP of refrigerator.
- b) Represent dry compression and show the refrigerating effect and work input on P-h and T-s diagram.
- c) State any eight desirable properties of refrigerant.
- d) Draw a neat sketch of thermostatic expansion valve and name the parts.
- e) Differentiate between open type and hermetically sealed type compressor.
- f) A refrigerating machine producing 2 tonnes of refrigeration is working on a vapour compression cycle. The enthalpy of refrigerant at compressor inlet, compressor outlet and condenser exit is 190 kJ/kg, 223 kJ/kg and 74.2 kJ/kg respectively. Calculate - i) COP. ii) Refrigerating effect. iii) Mass of refrigerant circulated iv) Power required.

Q.3 Attempt any FOUR

(16)

- a) Draw flow diagrams for heat engine and refrigerator.
- b) State any four applications of refrigeration and four applications of air-conditioning.
- c) Draw P-h and T-s diagram and state the effect of superheating of refrigerant in vapour compression cycle.

P.T.O

- d) Distinguish between vapour compression and vapour absorption cycle.
- e) Draw a neat sketch of Evaporative condenser and name its parts.
- f) Classify condensers. State advantages of water cooled condenser.

Section – II

Marks

Q.4 Attempt any **FOUR**

(08)

- a) Define dew point temperature and dew point depression ?
- b) Define degree of saturation and give its mathematical expression ?
- c) State how humidity affects the comfort of human ?
- d) List the basic elements of air conditioning.
- e) What are the main factors responsible to fall the air pressure in the duct ?
- f) What do you mean by radial perimeter duct system ?

Q.5 Attempt any **FOUR**

(16)

- a) Explain with neat sketch humidifier used in air conditioning ?
- b) Explain the process of “Cooling and dehumidification” briefly and represent it on psychrometric chart ?
- c) Explain how human body control system reach for physiological adjustment with environment ?
- d) Differentiate between central air conditioning system and packaged air conditioning system ?
- e) Write a short note on “Aspect ratio” of duct used in air conditioning ?
- f) With neat sketch explain extended plenum duct system ?

Q.6 Attempt any **TWO**

(16)

- a) Air at 12 °C DBT and 70% RH is to be heated and humidified to 36.5 °C DBT and 21 °C WBT. The air is preheated sensibly before passing to the air washer in which water is recirculated. The relative humidity of the air coming out of the air washer is 70%. This air is again reheated sensibly to obtain the final desired condition. Determine

- 1) The temperature to which air should be heated ?
- 2) Total heating required ?
- 3) Makeup water required in the air washer ?

Represent the process on psychrometric chart. Use psychrometric chart to obtain solution.

- b) What is effective temperature ? Explain briefly effective temperature chart ?
- c) Explain with neat sketch “Window air conditioner”?

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ODD TERM END EXAM NOV. / DEC. 2017

EXAM SEAT NO.

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LEVEL :- FIFTH

PROGRAM : MECHANICAL

COURSE CODE :- MEE509 / ME410

COURSE NAME :- AUTOMOBILE ENGINEERING

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 23 / 11 / 2017

Instruction :-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I

Marks

Q.1 Attempt any FOUR

(08)

- a) List various type of vehicle Body.
- b) Define the terms “ Tractive Effort” & “Tractive Resistance”. List various resistances that have to overcome by automobile.
- c) Write functions of differential.
- d) List various types of rear axles and write application of each.
- e) Write any two requirements of steering system.
- f) Write any four advantages of pneumatic braking system.

Q.2 Attempt any FOUR

(16)

- a) What are the types of vehicle layout? Explain any one of the vehicle layout.
- b) Define clutch. Explain necessity of clutch in automobile.
- c) Why sliding joint & universal joints are provided in propeller shaft explain with neat sketch.
- d) With neat sketch explain the working of recirculating ball type steering gear box.
- e) With neat sketch explain working of epicyclic gear box.
- f) Compare disc brake and drum brake.

Q.3 Attempt any FOUR

(16)

- a) Differentiate between coil spring and diaphragm spring type clutch.
- b) Write classification of automobiles.
- c) Explain with neat sketch working of power steering.
- d) With neat sketch explain construction and working of Hydraulic Braking system.
- e) Explain the necessity of final drive.
- f) With neat sketch explain construction & working of constant mesh Gear Box.

P.T.O.

Q.4 Attempt any **FOUR**

(08)

- a) What are sources of vibration in automobile?
- b) Name six different types of suspension system used in automobiles.
- c) Explain in brief tyre terminology.
- d) Distinguish between tube and tubeless tyre.
- e) What is electronic ignition?
- f) What is function of Dynamo?

Q.5 Attempt any **FOUR**

(16)

- a) Explain with neat sketch hydraulic suspension system.
- b) State advantages of independent front suspension.
- c) What is air suspension? Write its types.
- d) Explain with neat sketch disc wheel.
- e) How tyre, tube and rims are maintained?
- f) Explain factors affecting tyre life?

Q.6 Attempt any **TWO**

(16)

- a) State function of Battery. Explain construction and working with neat sketch.
- b) Explain construction and working of alternator. State its advantages.
- c) Explain with neat sketch Electronic ignition system.

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ODD TERM END EXAM NOV/DEC -2017

EXAM SEAT NO.

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LEVEL: FIFTH

COURSE CODE: MEE504/ME405

MAX. MARKS: 80

PROGRAM: MECHANICAL ENGINEERING

COURSE NAME: INDUSTRIAL ENGINEERING

TIME: 3 HRS.

DATE: 14/12/2017

Instruction:-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I

Marks

Q.1 Attempt any FOUR

(08)

- a) State importance of productivity.
- b) List any four symptoms of a bad plant layout.
- c) State any four factors to be considered while selecting material handling equipments.
- d) Define plant efficiency.
- e) Enlist various types of assembly.
- f) What is progressive control?

Q.2 Attempt any FOUR

(16)

- a) State different types of production system. Explain any one of them.
- b) Explain various government policies for relaxation in backward areas in regards with plant location.
- c) Enlist various types of conveyors. Sketch & explain any one.
- d) Explain factors to be considered while process planning.
- e) Explain sequencing with suitable example.
- f) Explain concept of line balancing with example.

Q.3 Attempt any FOUR

(16)

- a) Plot break even chart and explain different terms in it.
- b) Explain fixed plant layout with suitable example. Also state advantages & disadvantages.

P.T.O.

- c) Name the material handling devices for following activities.
- i) To move and stack material at height.
 - ii) To lift heavy stones at height.
 - iii) To move cement bags at a short & fixed distance.
 - iv) To move chemical from store to storage tank.
- d) Draw a typical operation sheet and describe its detail.
- e) Explain factors governing selection of machine.
- f) Differentiate between routing and scheduling.

Section – II

Marks

Q.4 Attempt any **FOUR**

(08)

- a) Enlist is four objectives of work study.
- b) What is string diagram?
- c) What is lead time in inventory control?
- d) Define inventory.
- e) Write function of ejectors in jigs.
- f) What are '5' S.

Q.5 Attempt any **FOUR**

(16)

- a) Describe two handed process chart and state its requirement.
- b) How ergonomic design can help in improving the productivity? Give example.
- c) Explain EOQ model with sketch.
- d) Differentiate clearly between jigs & fixtures.
- e) Describe the JIT manufacturing system.
- f) Explain the concept of rapid prototyping.

Q.6 Attempt any **TWO**

(16)

- a) Explain the principles of motion economy.
- b) What is EOQ? How it is calculated?
- c) Describe the concept of flexible manufacturing system.

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ODD TERM END EXAM NOV. / DEC. 2017

EXAM SEAT NO.

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LEVEL :- FOURTH

PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEE505

COURSE NAME :- COMPUTER INTEGRATED MANUFACTURING

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 14 / 12 / 2017

Instruction :-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I

Marks

Q.1 Attempt any FOUR

(08)

- a) Enlist the advantages of CAD/CAM system with respect to following points –
Criterion of drawing, visualization of drawing, accuracy and design analysis.
- b) Define the following terms – i) Geometric modeling. ii) Surface modeling.
- c) Define DNC. Enlist the advantages of DNC machines on the basis of
i) Implementation of design changes, ii) Support to FMS.
- d) What are the different components of CAD/CAM system? Explain with a block diagram.
- e) Explain 'sweep' as a geometric construction method.
- f) Explain following components of a NC system –
i) Machine Control Unit (MCU) ii) Machine tool

Q.2 Attempt any FOUR

(16)

- a) Explain absolute and incremental coordinate systems of CNC. Enlist advantages of both the systems.
- b) Why geometric modeling is important? Explain various requirements of a geometric model. List any two properties of a geometric model.
- c) Classify free formed surfaces. Write a note on various characteristics of any one type of free formed surface.
- d) Explain the following terms with respect to CAD/CAM product cycle –
i) Rapid prototyping (RPT) ii) Computer Aided Process Planning (CAPP)
ii) Computer Aided Quality Control (CAQC)
iv) Automatic Storage and retrieval system.
- e) Enlist any two advantages of a solid model. Explain with neat sketches- Boolean Operations Used in solid modeling.
- f) What are the advantages of CNC machines? Do you think CNC machines are cost effective? Justify your answer with suitable examples.

Q.3 Attempt any FOUR

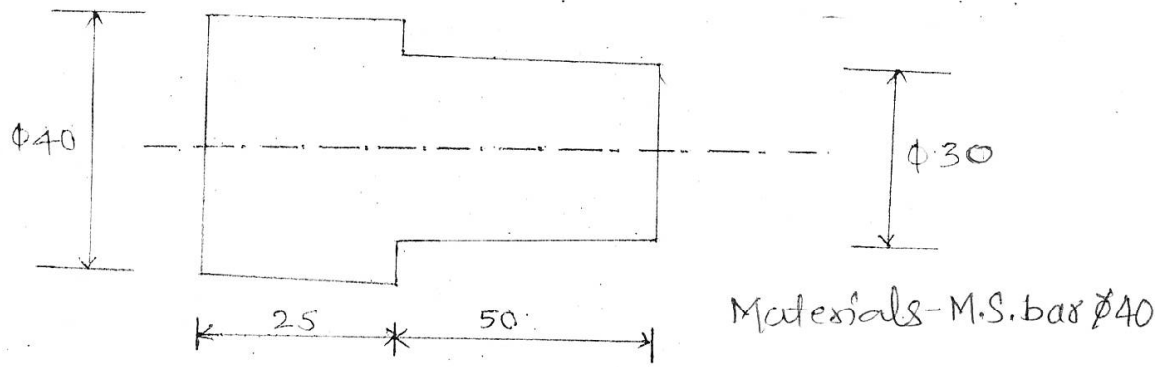
(16)

- a) Differentiate between surface modeling and solid modeling on the basis of following points
i) Required computer space memory. ii) Automatic views generation.
iii) Cross sectioning in view. iv) Ability to calculate physical properties.
v) Optimization of design parameters vi) CAD-CAM-CAE modules.

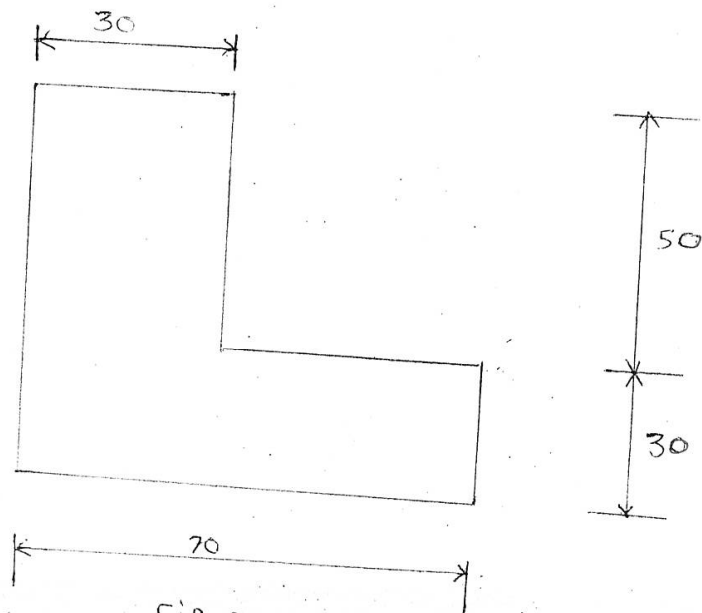
P.T.O.

- b) Classify NC machine based on motion control system. Explain each type with neat sketches.
- c) What is a wire frame model? Explain wire frame modeling in brief with neat sketches. Enlist its advantages and limitations.
- d) Explain the following terms related to CNC machine
 - i) Work zero ii) Zero shift iii) Machine zero iv) Cutter radius compensation.
- e) Is hard disk a storage device? Justify your answer. Explain the necessity of storage devices with suitable examples.
- f) Explain the application of CNC machine for machining. Explain the following parts of CNC machining center- Saddle, tool changer, spindle, MCU.

Section – II		Marks
Q.4	Attempt any FOUR <ul style="list-style-type: none"> a) Define FMS. b) Define automation. c) Enlist any two advantages and disadvantages of robots. d) Explain the following code, i) G03 ii) G81 iii) M30 iv) G21. e) Explain two major degrees of freedom of a robotic system with neat sketch. f) First block of a part programme on CNC is as follows N10 G91, G71, G94, 5800. Explain the term used in programme. 	(08)
Q.5	Attempt any FOUR <ul style="list-style-type: none"> a) Define robotics. Explain the following components of a robotic system. <ul style="list-style-type: none"> i) Manipulator ii) controller. b) Write short note on APT. c) What are end effectors? Explain any two. d) Explain fixed automation. e) State and explain different power sources used for industrial robots. f) Explain the following components of FMS, <ul style="list-style-type: none"> i) Machine tools and related equipments. ii) Material handling equipments. 	(16)
Q.6	Attempt any FOUR <ul style="list-style-type: none"> a) Refer Fig. 1 of a component. Write a part programme for CNC LATHE. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> Refer Fig. 2 of a component. Write a part programme for CNC milling. b) Explain types of FMS. c) Enlist any four functions of sensors used in industrial robots. d) What are the basic elements of automations? Explain them with suitable examples. e) Write benefits of FMS. f) Why do industries are preferring robots for process operations like drilling, grinding, water jet cutting? Enlist any other four applications of industrial robots. 	(16)



Q. 6 (a) \rightarrow Fig-1 (all dimensions are in mm)



Q. 6 (a) \rightarrow Fig-2 Material - m.s. Plate 10 mm thick
(All dimensions are in mm)

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ODD TERM END EXAM NOV. / DEC. 2017

EXAM SEAT NO.

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LEVEL :- FOURTH

PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEE401 / ME301

COURSE NAME :- POWER ENGINEERING

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 29 / 11 / 2017

Instruction :-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
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- 6) Assume additional suitable data necessary.
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SECTION -I

Q.1 Attempt any FOUR

08

- a) State the functions of i) Camshaft ii) Connecting Rod.
- b) Define compression Ratio.
- c) Write down any four additives used in IC engine.
- d) State the factors affecting carburetion.
- e) What is the effect of SO₂ on environment?
- f) Draw a performance curve showing the variation in bsfc & fuel consumption.

Q.2 Attempt any FOUR

16

- a) Derive an expression for efficiency of an otto cycle.
- b) State the reasons and effects of pre-ignition.
- c) How IC engines are classified?
- d) Compare Battery and Magneto ignition system.
- e) Draw a neat sketch of simple carburetor.
- f) Define:- i) BSFC ii) Volumetric efficiency iii) Brake Power.
iv) Thermal efficiency.

Q.3 Attempt any TWO

16

- a) i) Explain Morse Test ii) Draw P-V and T-S diagram of Rankine cycle.
- b) A perfect gas at 1 bar and 290 K undergoes diesel cycle. The maximum pressure is 50 bars. The volume at the begning of compression is 1 m³ and after constant pressure heating is 0.1 m³. Determine the temperature at all salient points of the cycle and also find out cycle efficiency. Take $\gamma = 1.4$.

P.T.O.

- c) The following observations are made during a trial.
- i) Motor power = 10 KW
 - ii) R.P.M. = 1750
 - iii) Brake torque = 327.5 N-m
 - iv) Fuel used = 15 kg/hr.
 - v) Calarific value = 42 MJ/kg
 - vi) Air supplied = 4.75 kg/min
 - vii) Cooling water used = 16 kg/min.
 - viii) Outlet temperature of cooling water = 65.8 °C.
 - ix) Room temperature = 20.8 °C.
 - x) Exhaust gas temperature = 400 °C.
- Take $C_{pw} = 4.2 \text{ KJ/kg K}$ and $C_{pg} = 1.25 \text{ KJ/kg K}$.
- Determine :- i) Brake Power ii) Mechanical Efficiency
 iii) bsfc and iv) Draw a heat balance sheet on KW basis.

SECTION -II

Q.4 Attempt any **FOUR**

08

- a) Define the term “free air delivery” contexting to air compressors.
- b) State the definition of efficiency used to compare work required in reciprocating compressor.
- c) How should be the profile of rotor of Roots blower? Why?
- d) Find work of compression for a single acting reciprocating compressor having cylinder bore and stroke ; 200 mm and 300 mm respectively. The compressor sucks air at 1 bar and 27 °C and delivers at 8 bar. The compression follows the law $PV^{1.25} = C$.
- e) State any two merits of gas turbines over I.C. engine.
- f) Represent on P-V & T-S diagram the theoretical cycle of constant pressure gas turbine. Name the cycle.

Q.5 Attempt any **FOUR**

16

- a) Show the effect of increase of compression ratio for a constant clearance volume in a single stage reciprocating compressor on P-V diagram. State its significance.
- b) Differentiate between reciprocating air compressor and rotary air compressor.
- c) Explain with sketch vane blower.
- d) With neat labeled sketch explain the principle of Ram jet.
- e) Compare closed cycle and open cycle gas turbine.
- f) Explain any one method to improve thermal efficiency of gas turbine with sketch.

Q.6 Attempt any **TWO**

16

- a) A pneumatic rock drill requires 10 kg/min of air at 6 bar pressure. Find the power required to drive the single acting single stage reciprocating compressor receiving air at 1 bar and 27 °C. Mechanical efficiency as 80% and take index ‘n’ as 1.25, take $C_p = 1.00 \text{ KJ/kg K}$ and $C_v = 0.718 \text{ KJ/kg K}$ for air. Also estimate isothermal efficiency of compression.
- b) A two stage air compressor compresses air from 1 bar and 20 °C to 42 bars. If the law of compression is $PV^{1.35} = \text{const}$, and intercooling is perfect. Find per Kg of air
 - i) The work done in compressing air and
 - ii) The mass of water necessary for absorbing the heat in intercooler, if the temperature rise of cooling water is 25 °C.
 Take $R = 287 \text{ J/kg K}$ and $C_p = 1 \text{ KJ/kg K}$.
- c) With neat sketch explain the construction and working of constant volume combustion gas turbine.

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ODD TERM END EXAM NOV/DEC -2017

EXAM SEAT NO.

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LEVEL: FIRST

COURSE CODE: MEE101/0111/0112

PROGRAM: MECHANICAL ENGINEERING

**COURSE NAME: FUNDAMENTAL OF MECHANICAL
ENGINEERING**

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 15/12/2017

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Q.1 Attempt any FOUR

**Marks
(08)**

- a) Define thermodynamics.
- b) Define refrigeration.
- c) State Boyle's law and Charles law.
- d) List components of I.C engine.
- e) Define i) Enthalpy ii) Entropy.
- f) Draw P-V and T-S diagram of diesel engine.

Q.2 Attempt any FOUR

(16)

- a) Explain construction and working of two stroke diesel engine.
- b) Explain concept of air conditioning.
- c) Give the four important statements of second law of thermodynamics.
- d) Write details classification of I.C engine.
- e) Explain vapour absorption refrigeration system. With neat sketch.
- f) State the characteristics of an isothermal and adiabatic expansion.

Q.3 Attempt any FOUR

(16)

- a) Compare SI and CI engines.
- b) Explain water cooling in I.C. engine.

P.T.O.

- c) Give classification of lubricating oil.
- d) Write limitations and applications of first law of thermodynamics.
- e) Explain winter air conditioning.
- f) Explain important refrigerants in refrigeration and air conditioning.

Q.4 Attempt any **FOUR** (08)

- a) Enlist major sources of energy.
- b) What is Bio-Diesel?
- c) Classify belt with their applications.
- d) State the applications of coupling.
- e) Give classification of hydraulic turbine.
- f) What is priming?

Q.5 Attempt any **TWO** (16)

- a) Explain flat plate collector with neat sketch.
- b) Explain thermal power plant with neat sketch.
- c) Explain construction and working of centrifugal pump with neat sketch.

Q.6 Attempt any **FOUR** (16)

- a) Differentiate between renewable and non-renewable energy sources.
- b) Describe tidal power plant with neat sketch.
- c) Explain Epicyclical gear train with neat sketch.
- d) Explain construction and working Kaplan turbine with neat sketch.
- e) Explain construction and working of reciprocating pump with neat sketch.
- f) Explain construction and working of axial compressor with neat sketch.

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ODD TERM END EXAM NOV. / DEC. 2017

EXAM SEAT NO.

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LEVEL :- FIFTH

PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEE503/ ME404

COURSE NAME :- QUALITY MANAGEMENT

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 15 / 12 / 2017

Instruction :-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I

Marks

Q.1 Attempt any FOUR

(08)

- a) State the definition of quality.
- b) List the quality characteristics.
- c) What is concept of maintainability?
- d) Explain in short about quality circles.
- e) What is quality audit?
- f) Explain value of quality.

Q.2 Attempt any FOUR

(16)

- a) State different quality characteristics for product.
- b) State the factors on which quality of product depends.
- c) Describe concept of reliability.
- d) Differentiate between inspection and quality control.
- e) What is quality assurance? State advantages.
- f) Explain the purpose of quality circle.

Q.3 Attempt any FOUR

(16)

- a) Discuss the responsibility of quality assurance.
- b) Describe items to be included in quality report.
- c) Explain Economics of quality design.
- d) Explain external failure cost.
- e) Explain internal failure cost.
- f) What is quality of conformance?

P. T. O.

Q.4 Attempt any **FOUR**

(08)

- Explain the importance of SQC in quality management.
- What is standard deviation?
- What is PDCA cycle?
- Why quality statements are made?
- Define benchmarking.
- What are 5's'?

Q.5 Attempt any **FOUR**

(16)

- Write a common procedure for constructing a frequency distribution.
- Define “process capability”. List the use of process capability.
- A machine shop produce steel shaft. Data is recorded as below.

Dia. in mm 'X'	14.96	14.97	14.98	14.99	15.00
Frequency 'f'	2	1	3	4	2

Calculate arithmetic mean and standard deviation.

- In a capability study of automobile shaft dia. is 13.75 ± 0.1 . Calculate process capability.

Sample No.	1	2	3	4	5	6
Dia.	13.76	13.77	13.77	13.78	13.75	13.78

- Describe any four elements of TQM.
- Discuss the Juran's approach to TQM.

Q.6 Attempt any **FOUR**

(16)

- Explain Poka -Yoke.
- Give Deming's philosophy on TQM.
- Describe Pareto diagram and scatter plots.
- How cause and effect diagram is useful for TQM?
- Give the responsibility of each employee under QS-9000.
- Discuss the benefits of ISO 14001 to organization.

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ODD TERM END EXAM NOV/DEC -2017

EXAM SEAT NO.

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LEVEL: FIRST

PROGRAM: COMMON

COURSE CODE: CCF105/107/CCE105/R107/X104

COURSE NAME: BASIC MATHEMATICS

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 15/12/2017

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

QN	S Q N	Question Text	RU A	Co CCF105-	Mar ks
Q.1		Attempt any FOUR			(08)
	a)	Find 'x' if $\begin{vmatrix} 1 & x & x^2 \\ 1 & 2 & 4 \\ 1 & 3 & 9 \end{vmatrix} = 0$	R	1	
	b)	Resolve in to partial fraction : $1 + \frac{1}{x^2 - 1}$	U	1	
	c)	If $A = \begin{bmatrix} 3 & 2 \\ 1 & -1 \\ 0 & 4 \end{bmatrix}$, $B = \begin{bmatrix} -1 & -1 \\ 3 & 2 \\ 4 & -2 \end{bmatrix}$, verify that $A+B=B+A$	U	3	
	d)	If $\begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -1 \\ 3 & 2 \end{bmatrix}$ verify that $(A+B)' = A' + B'$	U	3	
	e)	If $\begin{bmatrix} 7 & 0 & 2 \\ 1 & 2 & 6 \\ 4 & 5 & 3 \end{bmatrix}$, find whether matrix A is singular or non singular.	R	3	
	f)	If $A = \begin{bmatrix} 3 & -1 \\ 2 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}$, find X such that $2X+3A-4B = I$	A	3	
Q.2		Attempt any FOUR			(16)
	a)	The voltages in an electric circuit are related by following equation. $v_1 + v_2 + v_3 = 9$; $v_1 - v_2 + v_3 = 3$; $v_1 + v_2 - v_3 = 1$. Find v_1, v_2 & v_3	A	1	
	b)	Solve the equations: $x + 2y + 3z = 1$, $2x + 3y + 2z = 2$ & $3x + 2y + 4z = 1$, by using matrix inversion method.	A	3	
	c)	Resolve into partial fractions: $\frac{x-5}{x^3 + x^2 - 6x}$	A	2	
	d)	If $\left\{ \begin{bmatrix} 3 & 1 \\ 3 & 4 & 0 \\ 3 & -3 \end{bmatrix} - 2 \begin{bmatrix} 0 & 2 \\ -2 & 3 \\ -5 & 4 \end{bmatrix} \right\} \begin{bmatrix} -1 \\ 2 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$, find x, y, z.	A	3	
	e)	Resolve into partial fractions : $\frac{x^2 + 23x}{(x+3)(x^2 + 1)}$	A	2	
	f)	Expand using Binomial Theorem $\left(3a - \frac{8}{b}\right)^7$	A	4	

Q.3	Attempt any FOUR			(16)
a)	Solve by Cramer's Rule : $x + y = 3, y + z = 5, z + x = 4$	A	1	
b)	Find inverse of matrix , $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$	A	3	
c)	Resolve into partial fractions : $\frac{2x+1}{x^2.(x+1)}$	A	2	
d)	If $A = \begin{bmatrix} 0 & 1 & -1 \\ 3 & -2 & 3 \\ 2 & -2 & 3 \end{bmatrix}$, show that $A^2 = I$	U	3	
e)	Resolve into partial fractions: $\frac{x^3}{x^2-1}$	A	2	
f)	Show that $(\sqrt{3}+1)^5 - (\sqrt{3}-1)^5 = 152$	U	4	
Q.4	Attempt any FOUR			(08)
a)	Express the following angles in radian measures. i) 75° ii) -270°	R/ U	5	
b)	Evaluate without using calculator $\frac{\tan 85^\circ - \tan 40^\circ}{1 + \tan 85^\circ \tan 40^\circ}$	R/ U	5	
c)	Prove that $\sin\left(\theta + \frac{\pi}{6}\right) - \sin\left(\theta - \frac{\pi}{6}\right) = \cos \theta$	U	5	
d)	If $\sin A = 0.4$ find $\cos 2A$ using multiple angle formula.	R/ U	5	
e)	Prove that $\operatorname{cosec}^2 \theta - \cos^2 \theta \cdot \operatorname{cosec}^2 \theta = 1$	R/ U	5	
f)	Find the value of $\sin\left[\cos^{-1}\left(-\frac{1}{2}\right)\right]$	R/ U	5	
Q.5	Attempt any FOUR			(16)
a)	The difference between two acute angles of a right angled triangle is $\frac{2\pi^c}{5}$. find the angles in degrees	U/ A	5	
b)	Prove that $\sin 20^\circ \cdot \sin 40^\circ \cdot \sin 60^\circ \cdot \sin 80^\circ = \frac{3}{16}$	U/ A	5	
c)	Prove that $\frac{\sin 4\theta + \sin 2\theta}{1 + \cos 2\theta + \cos 4\theta} = \tan 2\theta$	U	5	
d)	Prove that $\cos(A+B) = \cos A \cos B - \sin A \sin B$	U/ A	5	
e)	Show that $\frac{\sin 7x + \sin x}{\cos 5x - \cos 3x} = \sin 2x - \cos 2x \cdot \cot x$	U/ A	5	
f)	Show that $\cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{3}{5}\right) = \tan^{-1}\left(\frac{27}{11}\right)$	A	5	
Q.6	Attempt any FOUR			(16)
a)	If $\tan(x+y) = \frac{3}{4}$ and $\tan(x-y) = \frac{8}{15}$ Then show that $\tan(2x) = \frac{77}{36}$	U/ A	5	
b)	Prove that $\cos A \cos(60-A) \cdot \cos(60+A) = \frac{1}{4} \cos 3A$	U/ A	5	
c)	Prove that $\frac{\sin A - \sin 3A}{\sin^2 A - \cos^2 A} = 2 \sin A$	U/ A	5	
d)	Prove that $\frac{\sin A + \sin 2A + \sin 3A + \sin 4A}{\cos A + \cos 2A + \cos 3A + \cos 4A} = \tan\left(\frac{5A}{2}\right)$	U/ A	5	
e)	Prove that $2 \tan^{-1} x = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$	U/ A	5	
f)	Show that $\tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{13}\right) = \tan^{-1}\left(\frac{2}{9}\right) = \cot^{-1}\left(\frac{9}{2}\right)$	A	5	

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ODD TERM END EXAM NOV. / DEC. -2017**EXAM SEAT NO.**

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LEVEL :- FIRST**PROGRAM : COMMON****COURSE CODE :- CCF110/X111/CEE110/R112****COURSE NAME :- APPLIED MECHANICS****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 12/12/2017****Instruction :-**

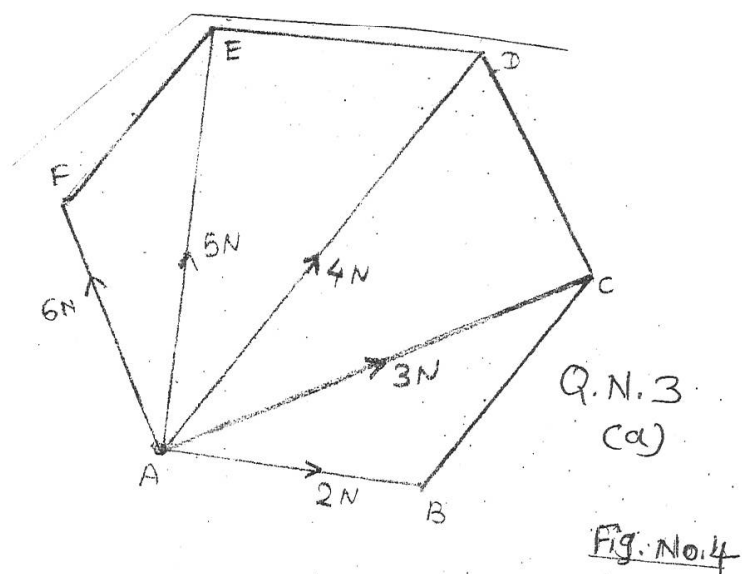
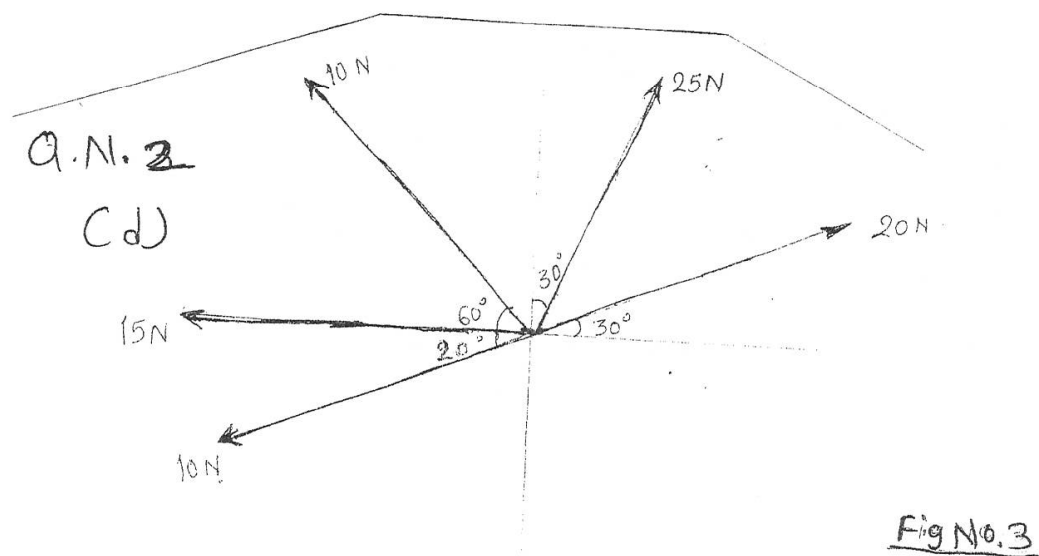
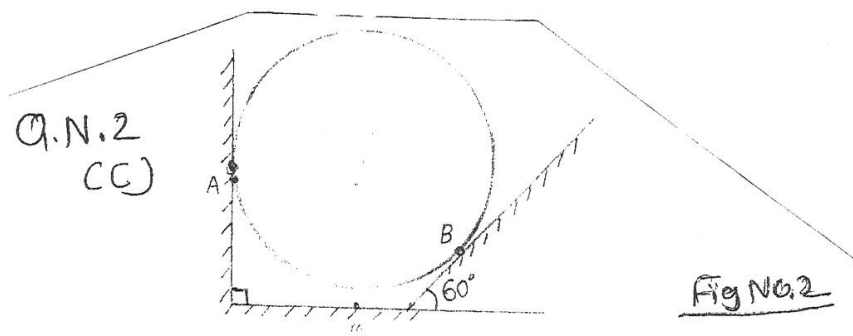
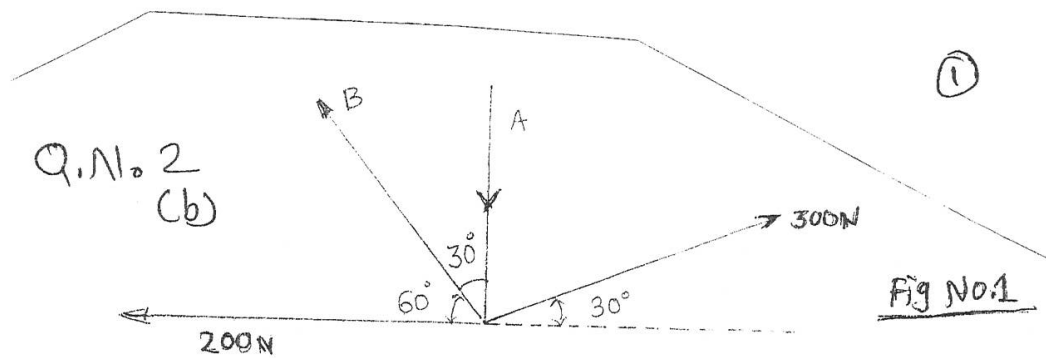
- 1) Answers must be written in the main answer book provided.(and supplements if required)
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN > Question No.. SQN> Question No. R> Remembering, U> Understanding, A> Application.

QN	S Q N	Question Text	R/ U/ A	Cod e CCF110	Marks
Q.1		Attempt any FOUR			08
	a)	Differentiate between weight and mass.	U	1	
	b)	Define force system and enlist any four types of force systems.	R	1	
	c)	Define composition of forces.	R	1	
	d)	State Lami's theorem.	R	2	
	e)	State any two advantages and any two limitations of graphical methods.	R	3	
	f)	Define friction.	R	3	
Q.2		Attempt any FOUR			16
	a)	Two forces 6 KN and 8 KN acting on a particle and their lines of action are inclined to each other at an angle of 70° . Determine the resultant force & its inclination.	A	1	
	b)	Determine the forces A & B. Shown in Figure No.1. If resultant of this concurrent force system is zero.	A	2	
	c)	A smooth sphere weighing 500 N is resting in a trough as shown in Figure No.2. Determine the reactions at points of contact A & B.	A	2	
	d)	Determine graphically the resultant of concurrent force system shown in figure No.3.	U	3	
	e)	A block weighing 500 N is resting on a plane inclined at 30° with the horizontal. Determine the force P that can be applied on the block at an angle of 10° to the inclined plane so that the block is just on the point of moving up the plane. Take coefficient of friction between body and inclined plane is 0.22.	A	2	

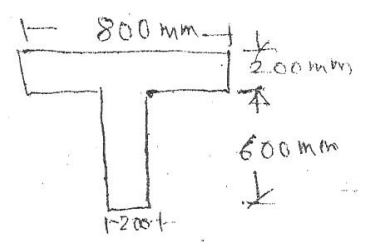
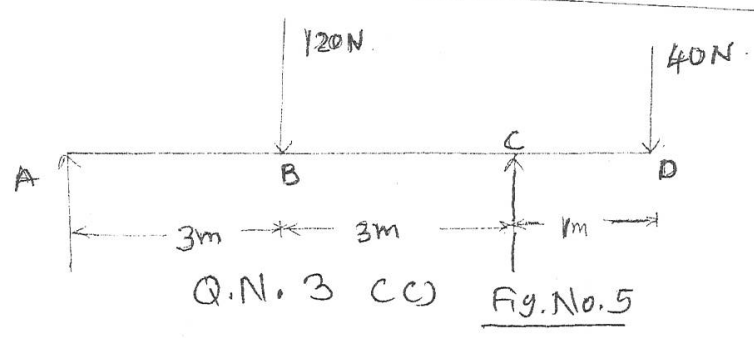
P.T.O

QN	S Q N	Question Text	R/ U/ A	Code CCF110	Marks
	f)	A wooden block is resting on a rough inclined plane whose inclination to the horizontal is 10° . The smallest force acting parallel to the inclined plane is 2 N due to which block moves down the plane. If the coefficient of friction between block and plane is 0.32. Determine the weight of the block.	A	2	
Q.3		Attempt any TWO			16
	a)	Forces 2N, 3N, 4N, 5N & 6N acts at one of the angular point of a regular hexagon towards the other five angular points taken in order. Find the resultant of the system. Refer Figure No.4	A	2	
	b)	i) A beam of 6m in span is simply supported at the ends. It carries a point load of 8 KN at the distance 2 m from the left hand support and a concentrated clockwise moment of intensity 10KN.m. at a distance 2 m from right hand support and u.d.l. of intensity 5 KN/m over the distance 4 m from the left hand support. Calculate reactions at the end supports analytically. ii) One end of a uniform ladder weighing 30 N rests against a smooth wall and the other end on a rough horizontal floor, coefficient of friction being 0.24. Find the inclination of ladder to the horizontal when it is on the point of slipping.	A	2	
	c)	A beam is as shown in Figure No. 5. Find support reaction graphically.	U	3	
Q.4		Attempt any FOUR			08
	a)	State the position of \bar{X} & \bar{Y} for a triangle having 'B' as base and 'H' as height.	R	4	
	b)	Locate the centroid of semi circle of radius 'R'.	A	4	
	c)	State any two equations of motion under gravity with meaning of them.	R	5	
	d)	Differentiate between distance and displacement.	U	5	
	e)	Define angular motion and give 5.1 unit of angular velocity.	R	5	
	f)	Define Ideal Machine.	R	6	
Q.5		Attempt any FOUR			16
	a)	Locate the position of centroid for T-beam as shown in figure.	A	4	
	b)	From a solid cylinder 300mm diameter and 600mm height a co-axial cylinder of 100mm diameter is 200mm height is cut off from the top locate the center of gravity (C.G) with respect to bottom .	A	4	
	c)	A body is projected vertically upward from a height of 25m above the ground calculate the time required for the body to reach the ground take initial velocity $\mu = 20\text{m/s}$.	A	5	

	d)	A stone is released from a height of 15m. Determine its velocity when it strikes the ground.	A	5	
	e)	A fly wheel is rotating at 400rpm. If the radius of rotation is 1.5m. Calculate the i) Angular velocity ii) Linear velocity.	A	5	
	f)	A turbine runs at 3000rpm. It is brought to rest in i) 30 min and ii) 300 revolutions. Calculate the retardation in rad / s^2 in each Phase.	A	5	
Q.6		Attempt any FOUR			16
	a)	For a lifting M/C VR=50.00. An effort of 100 N lifts load of 1800N and effort of 150N lifts a load of 3200N. Determine law of M/C and maximum efficiency of machine.	R	5	
	b)	In a differential axle & wheel machine which has velocity ratio is 10 & a load of 12 KN is lifted by an effort of 2KN then determine efficiency of machine and state type of machine reversible or non-reversible.	A	6	
	c)	Draw the nature of graph for a lifting machine i) Load Vs effort ii) Load Vs ideal effort iii) Load Vs MA iv) Load Vs effort cost in friction.	U	6	
	d)	An body of mass of 10kg is moving with velocity of 100 m/s at height of 150m from ground find the total energy possessed by the body.	A	5	
	e)	How many litres of water can be raised in 10 minutes to a height of 20m by means of pump of 3.0 KW power and efficiency is 75%?	A	5	
	f)	An oil tank of 10m diameter and height 5m has its bottom 6m above the ground. Determine the work done in lifting this tank.	A	5	



②



Q.N. 5 (a)

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ODD TERM END EXAM NOV. / DEC. 2017

EXAM SEAT NO.

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LEVEL :- FIFTH

PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEE502/ME403

COURSE NAME :- INDUSTRIAL ORGANIZATION & MANAGEMENT

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 13 / 12 / 2017

Instruction :-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I		Marks
Q.1	Attempt any FOUR a) State the factors considered for establishing objectives? b) Write any four functions of top level management. c) Define the terms: i) Business ii) Industry. d) Define “Motivation”. e) State four characteristics of a good personal policy. f) What are the basic elements of good house keeping?	(08)
Q.2	Attempt any FOUR a) Briefly explain various types of planning. b) Explain the forms of communication. c) Differentiate between public limited and private limited companies. d) Explain the steps involved in the process of “organizing”. e) Write a short note on “Recruitment”. f) Explain the factors responsible for accidents in industry.	(16)
Q.3	Attempt any TWO a) Explain various safety measures helpful for preventing accidents in any manufacturing organization. b) What is a joint stock company? State its characteristics. Explain the types of joint stock company. c) Write a short note on “scope and importance” of management.	(16)

P.T.O.

Q.4 Attempt any **FOUR** (08)

- a) Enlist four duties of purchasing officer.
- b) What is budget?
- c) What is over capitalization?
- d) What are safety codes?
- e) Enlist four causes of accidents.
- f) Explain MRP.

Q.5 Attempt any **FOUR** (16)

- a) What are duties of material manager?
- b) What are various methods of purchasing? Explain in brief.
- c) Explain function of financial management.
- d) Write a note on ESI act.
- e) Explain CPM and basic steps involved in it.
- f) Write a note on various time estimates involved in modern management techniques.

Q.6 Attempt any **FOUR** (16)

- a) Write a note on objectives of material management.
- b) What are advantages and disadvantages of material management?
- c) What are various factors affecting working capital?
- d) Write a note on Remedies, reporting and investigation in case of accidents.
- e) Write a note on lean manufacturing.
- f) Explain features, advantages & disadvantages of ERP.

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ODD TERM END EXAM NOV/DEC -2017**EXAM SEAT NO.**

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LEVEL: FIRST**PROGRAM: MECHANICAL ENGINEERING/
METALLURGY****COURSE CODE: CCF107/CCE107/X105/109 COURSE NAME: ENGINEERING DRAWING -I****MAX. MARKS: 80****TIME: 4 HRS.****DATE: 13/12/2017****Instruction:-**

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

QN	SQ N	Question Text	R U A	Co CCF107-	Marks
Q.1	AJ	Attempt any TWO			(08)
	a)	Write any four principles (Rules) of dimensioning. (2 mark)	R	1	
	b)	Draw conversion of following line with application (2 mark) i) Cutting plane line ii) Hidden line	R	1	
	c)	With the help of suitable diagram. Show the method of chain dimensioning. (2 mark)	R	1	
	BJ	Attempt any ONE			
	a)	A 2 cm long line on a drawing represents a distance of 1 m. Construct a plane scale to measure upto 5 meter and indicate on it a distance 2.6 meters.(4 mark)	A	1	
	b)	Construct a diagonal scale of 1:50 to rear meter, decimeter and centimeter to measure up to 5 meters and show on it 2.18 meters.(4 mark)	A	1	
Q.2		Attempt any TWO			(16)
	a)	Length of major axis of an ellipse is 120 mm and minor axis is 90 mm. Determine the distance between foci and construct an ellipse by Arc's of circle method.	U	2	
	b)	A thread of length 140 mm is wound on regular hexagon of side 25 mm. Draw a curve traced by end point 'P' Name the curve.	U	2	
	c)	A circle of 50 mm diameter rolls along a circumference of another circle of 150 mm diameter from inside it. Trace the locus of a point 'P' on circumference of rolling circle for one complete revolution and name the curve.	U	2	
Q.3		Attempt any TWO			(16)
	a)	A front view of a line AB is parallel to XY, 10 mm above it and 60 mm in length. If A and B are 15 mm and 55 mm in front of V.P respectively. Find the true length and inclination of line with V.P.	A	3	

P.T.O

	b)	The projection through the ends of line PQ are 60 mm apart. End 'P' is 30 mm above H.P and 15 mm in front of V.P. Draw its projections when the line is parallel to V.P. Determine its true length and inclination with H.P. Assuming point 'Q' 50 mm above H.P..	A	3	
	c)	Draw a helix on a cylinder of 50 mm diameter of two turns, given pitch equal to 40 mm.	A	3	
Q.4		Attempt any TWO			(08)
	a)	A regular pentagon of 30 mm side has one side in H.P. Its plane is inclined at an angle of 30^0 to H.P. & perpendicular to V.P. Draw the projection of the pentagon.	U	4	
	b)	A compass has its legs 60 mm long. The angle between them is 45^0 . It is resting on H.P on the ends of its legs with line Joining those legs being perpendicular to V.P. & its head 30 mm above H.P. Draw its F.V & T.V. Determine the angle made by the plane of compass with H.P.	U	4	
	c)	A rhombus having diagonals 70 mm & 40 mm is resting on V.P on a corner contained by the longer diagonal in such a way that it appears as a square in elevation. Plane of rhombus is perpendicular to H.P. Draw F.V. & T.V & find its inclination with V.P.	U	4	
Q.5		Attempt any TWO			(16)
	a)	A cube of 60 mm long edges is held on one of its corners on H.P. such that one of its solid diagonal is parallel to H.P. Draw the three views of the cube when its axis is parallel to V.P.	U	5	
	b)	A pentagonal prism, base 30 mm side and axis 60 mm long has one of its rectangular faces in V.P. with its axis inclined at 60^0 to H.P. Draw its three views.	U	5	
	c)	A hexagonal pyramid base 25 mm & axis 55 mm long has a triangular face in V.P. & axis parallel to H.P. Draw its three views.	U	5	
Q.6		Attempt any TWO			(16)
	a)	A cone with base diameter 50 mm & axis height 60 mm rests with its base on H.P. It is cut by a plane inclined to H.P in such a way that the true shape of the section is a parabola with 30 mm base. Draw i) F.V. & ii) Sectional T.V. & iii) True shape of section.	U	6	
	b)	A tetrahedron of 70 mm edges stands on the face on H.P with an edge contained by that face parallel to V.P. A vertical section plane inclined at 30^0 to V.P & 10 mm away from the axis cuts the tetrahedron. Draw its i) Top view ii) Sectional Front view & iii) True shape of section.	U	6	
	c)	A pentagonal prism, side of base 40 mm & axis length 70 mm is kept on H.P on its base with a side of base perpendicular to V.P. It is cut by an Auxiliary inclined plane (AIP) such that the true shape of section is an isosceles triangle of maximum base & altitude 60 mm. Draw i) F.V ii) Sectional T.V & iii) True shape of section.	U	6	

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ODD TERM END EXAM NOV/DEC -2017

EXAM SEAT NO.

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LEVEL: FOURTH

COURSE CODE: MEE406/M306

MAX. MARKS: 80

PROGRAM: MECHANICAL ENGINEERING

COURSE NAME: HYDRAULIC MACHINERY

TIME: 3 HRS.

DATE: 09/12/2017

Instruction:-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I

Marks

Q.1 Attempt any FOUR

(08)

- a) Define mass density. Write its SI unit.
- b) Define pressure. What is fluid pressure?
- c) Define dynamic viscosity with SI unit.
- d) State Bernoulli's theorem.
- e) Define surface tension with SI unit.
- f) Define vapour pressure.

Q.2 Attempt any FOUR

(16)

- a) One litre petrol weights 7.02 N. Calculate the specific weight, density, specific volume and relative density.
- b) Draw pressure terminology.
- c) What are the various types of flow?
- d) Calculate the power transmitter by 250 mm diameter pipe of length 500 m carrying water under a head of 100 meter. Take friction factor = 0.0015. Also calculate efficiency of power transmission if the discharge through the pipe is 500 lps.
- e) Explain pressure measurement using differential U-tube manometer.
- f) The discharge through a horizontal pipe is 400 lps. If the diameter of the pipe increases from 100 mm to 20 mm, find the pressure at the larger end and if the pressure at the smaller end is 5.2 bar.

Q.3 Attempt any FOUR

(16)

- a) A rectangular plate 4 m x 3 m is suspended vertically inside an oil of S.G 1.4 with 4 m side parallel to the FSL (free surface of liquid) and at a distance of 1.5 m from it. Calculate total pressure and depth of center pressure.
- b) The actual discharge through a horizontal venturimeter is 250 lps when oil of S.G 0.8 flows through it. The deflection in the mercury mercury manometer is 20 cms. Calculate the diameter of the pipe if the throat diameter is 150 mm and $C_d = 0.6$
- c) What are the various minor losses in pipe?

P.T.O.

- d) A differential U –tube manometer is connected to a pipe carrying oil of S.G 1.2. The difference in Hg level is 350 mm and the level of mercury in the left and right limb is 400 mm and 500 mm below the pipe respectively. Calculate the absolute pressure at B, if the absolute pressure at A is 69 kPa.
- e) Explain construction and working of orifice meter.
- f) State the laws of fluid friction for turbulent flow.

Section – II

Marks

Q.4 Attempt any **FOUR**

(08)

- a) Define NPSH.
- b) Enlist four industrial applications of reciprocating pump.
- c) State meaning of positive displacement pump.
- d) Define Impact of jet.
- e) Define specific speed of a turbine.
- f) What is priming in case of centrifugal pump.

Q.5 Attempt any **FOUR**

(16)

- a) A jet of water of diameter 100 mm moving with a velocity of 30 m/s strikes a curved fixed symmetrical plate at center. Find the force exerted by jet of water in the direction of jet. If the jet is deflected through an angle of 120° at the outlet of the curved plate.
- b) Draw indicator diagram of single acting reciprocating pump with effect of acceleration and friction in pipe.
- c) What is cavitation in case of centrifugal pumps? What precaution is required to take to avoid cavitation?
- d) The inward flow reaction turbine has external and internal diameters as 1 m and 0.5 m respectively. The velocity of flow through runner is constant and is equal to 1.5 m/s. Determine i) discharge through turbine ii) width of turbine at outlet if the width of turbine at inlet is 200 mm.
- e) Differentiate between impulse turbine & reaction turbine.
- f) What is the function of draft tube? Sketch various types of draft tubes.

Q.6 Attempt any **TWO**

(16)

- a) i) Draw sketch of any two types of casing of centrifugal pump.
ii) Define suction head, delivery head, static head & manometric head for centrifugal pump.
- b) i) Differentiate between centrifugal pump & Reciprocating pump.
ii) A single acting reciprocating pump running at 30 rpm delivers $0.012 \text{ m}^3/\text{s}$ of water. The diameter of the piston is 25 cm and stroke length 50 cm. Determine i) Theoretical discharge ii) slip & percentage of slip of pump iii) coefficient of discharge .
- c) A Kaplan turbine runner is to be designed to develop 7357.5 kW shaft power. The net available head is 5.50 m. Assume that the speed ratio is 2.09, flow ratio 0.68 and overall efficiency 60%. The dia of boss is $1/3$ rd of the diameter of the runner. Find dia. of runner, its speed & specific speed.

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ODD TERM END EXAM NOV/DEC -2017**EXAM SEAT NO.**

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LEVEL: THIRD**PROGRAM: CE/ME/MT****COURSE CODE: CEE313/R228/MEE313/ME214 /MG228****COURSE NAME: HIGHER MATHEMATICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 24/11/2017**

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Q.1 Attempt any FOUR**Marks
(08)**

With usual notations of symbol prove that

- a) $\Delta^3 y_2 = \nabla^3 y_5$
- b) $e^x = \left(\frac{\Delta^2}{E} \right) e^x \cdot \frac{E e^x}{\Delta^2 e^x}$
- c) $E \nabla = \Delta$
- d) Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ if $z = \tan^{-1} \left(\frac{x^2 + y^2}{x + y} \right)$
- e) If $u = \frac{x^{1/3} + y^{1/3}}{x^{1/4} + y^{1/4}}$ prove by Euler's Theorem that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{12} u$
- f) If $x = r \cos \theta$, $y = r \sin \theta$ show that $\frac{\partial(x, y)}{\partial(r, \theta)} = r$

Q.2 Attempt any FOUR**(16)**

- a) Show that $\Delta^2 \cos 2x = -4(\sinh)^2 \cos(2x + 2h)$
- b) Express $f(x) = x^4 + 3x^3 - 5x^2 + 6x - 7$ in terms of factorial polynomials. Hence find $\Delta^2 f(x)$ at $x = 2$
- c) Applying Newton's forward Interpolation formula compute the value of $\sqrt{5.5}$ given that
 $\sqrt{5} = 2.236$, $\sqrt{6} = 2.449$
 $\sqrt{7} = 2.646$, $\sqrt{8} = 2.828$
- d) Using Newton's Backward Interpolation formula evaluate $e^{0.38}$ give that

x	0.0	0.1	0.2	0.3	0.4
e ^x	1	1.1052	1.2214	1.3494	1.4918

- e) Find the missing term in the following table

x	100	101	102	103	104
f(x)	2	2.0043	---	2.0128	2.0170

- f) Using Lagrange's Interpolation formula express f(x) by a polynomial of degree 2 given that

x	1	2	-4
f(x)	3	-5	4

P.T.O

Q.3 Attempt any FOUR**(16)**

- a) Verify $JJ^{-1} = 1$ if $x = uv$, $y = \frac{u}{v}$
- b) If z is a Homogenous function of degree n show that $x \frac{\partial^2 z}{\partial x \partial y} + y \frac{\partial^2 z}{\partial y^2} = (n-1) \frac{\partial z}{\partial y}$
- c) If $u = \sin^{-1} \left(\frac{x+y}{\sqrt{x} + \sqrt{y}} \right)$ show by Euler's Theorem that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \tan u$
- d) Verify Euler's Theorem for the function $u = \sin^{-1} \frac{x}{y} + \tan^{-1} \frac{y}{x}$
- e) If $u = e^{xyz}$ find $\frac{\partial^3 u}{\partial x \partial y \partial z}$
- f) Find $\frac{\partial u}{\partial r}$ and $\frac{\partial u}{\partial \theta}$ if $u = e^{r \cos \theta} \cos(r \sin \theta)$

Q.4 Attempt any FOUR**(08)**

- a) Find $L \left\{ \left(\frac{3t^2 + t}{t^2} \right)^2 \right\}$
- b) Find $L^{-1} \left\{ \frac{2(s+1)}{s^2 + 2s + 10} \right\}$
- c) Find Laplace transform of $\frac{1}{t}(1 - e^t)$
- d) Solve : $2 \frac{d^2 y}{dx^2} + 5 \frac{dy}{dx} - 12y = 0$
- e) Solve : $\frac{d^3 y}{dx^3} - 3 \frac{d^2 y}{dx^2} + 4y = 0$
- f) Solve $(D^2 + 4)y = 0$

Q.5 Attempt any FOUR**(16)**

- a) Find $L \{ t^2 (1 - \cos t) \}$
- b) Find $L^{-1} \left\{ \frac{s^2 + 1}{s^3 + 3s^2 + 2s} \right\}$
- c) Apply convolution theorem to evaluate $L^{-1} \left\{ \frac{s^2}{(s^2 + a^2)^2} \right\}$
- d) Solve using Laplace transform method, $\frac{dy}{dt} + y = e^{-3t}$, $y(0) = 1$
- e) Find $L \{ 2e^{4t} \sinh 2t \}$
- f) Solve : $\frac{d^2 y}{dx^2} - 3 \frac{dy}{dx} + 2y = 3 + x$

Q.6 Attempt any FOUR**(16)**

- a) Find $L \{ \sin 2t \cdot \cos 3t \}$
- b) Find $L^{-1} \left\{ \frac{e^{3-2s}}{(s+4)^5} \right\}$
- c) Find $L^{-1} \left\{ \frac{2s^2 - 6s + 5}{s^3 - 6s^2 + 11s - 6} \right\}$
- d) Using Laplace transform method solve $R \frac{dQ}{dt} + \frac{Q}{C} = V$, $Q = 0$ when $t = 0$
- e) Solve : $(D^3 - 3D^2 + 3D - 1)y = 0$
- f) Solve: $\frac{d^3 y}{dx^3} - 5 \frac{d^2 y}{dx^2} + 8 \frac{dy}{dx} - 4y = 0$

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ODD TERM END EXAM NOV./ DEC. -2017

EXAM SEAT NO.

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LEVEL :- THIRD PROGRAM : ALLIED

COURSE CODE :- MEE312/IEE/ETE311/MTE311/MG227/R227

COURSE NAME :- NON CONVENTIONAL ENERGY SOURCES

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 24 / 11 / 2017

Instruction :-

- 1) Answers must be written in the main answer book provided.(and supplements if required)
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Marks

Q.1 Attempt any FOUR

(08)

- a) What do you meant by fossiel fuels?
- b) Define solar constant.
- c) State the merits of solar energy. (any four)
- d) What are the causes of wind?
- e) State the advantages of wind energy. (any four)
- f) What is biomass energy?

Q.2 Attempt any FOUR

(16)

- a) Briefly explain the challenges to explore non conventional energy sources.
- b) Explain briefly flat plate collector.
- c) What are the various solar energy utilization methods?
- d) Draw block diagram of control panel of wind energy system and explain it.
- e) State the classifications of wind turbine? Explain any one in brief.
- f) Explain various biomass types.

Q.3 Attempt any TWO

(16)

- a) With neat sketch explain the working of sunshine recorder.
- b) What is the future of wind energy in India? Explain the environmental effects of wind energy.
- c) Explain with neat sketch the working of floating drum type biogas plant.

P.T.O.

Q.4 Attempt any **FOUR**

(08)

- a) State the four advantages of ocean energy.
- b) Enlist the basic components of a tidal power plant.
- c) State four limitations of geothermal energy.
- d) State four applications of fuel cell.
- e) State the objectives of energy conservation.
- f) Define i) ROI ii) Life cycle cost.

Q.5 Attempt any **FOUR**

(16)

- a) State the requirement for site selection of ocean thermal power plant.
- b) Draw a neat sketch of Dry steam system geothermal power plant and explain its working.
- c) Enlist the components of small mini hydroelectric plant and state the function of each component.
- d) Define energy management. Write four objectives of it.
- e) What is energy audit? Explain detailed energy audit methodology.
- f) State the ways of improving boiler efficiency.

Q.6 Attempt any **FOUR**

(16)

- a) Describe single basin tidal power plant.
- b) State the main components of fuel cell and the function of each component.
- c) State the principle of Magneto-hydro dynamic power generation. State its advantages.
- d) State the factors affecting site selection for geothermal power plant.
- e) Draw a neat sketch of gas turbine co-generation plant and explain its working.
- f) State four waste heat recovery devices. State advantages of waste heat utilization.

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ODD TERM END EXAM NOV. / DEC. -2017**EXAM SEAT NO.**

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LEVEL :- FIRST PROGRAM : COMMON**COURSE CODE :- CCF202 / CCE202****COURSE NAME :- COMMUNICATION SKILLS****MAX. MARKS : 40 TIME : 2 HRS. DATE :- 24 / 11 / 2017**

Instruction :-

- 1) Answers to each section must be written in separate answer book.
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN > Question No., SQN > Question No. R > Remembering, U > Understanding, A > Application, CO > Course Outcome

Q.N.	S Q N	Question Text	U R A	CO CCF202	Ma rks
Q.1		Answer the following questions in 3-5 sentences (attempt any FOUR)			08
	a)	Define communication. Give an example of communication event.	R	1	
	b)	Explain any two principles of written communication.	R	3	
	c)	Define encoding and decoding.	R	1	
	d)	Enlist any four advantages of over Head projector (OHP)	U	5	
	e)	Enlist any four tips of prepared speech.	U	2	
	f)	Write any four examples in which oral communication is used.	A	2	
Q.2		Answer the following questions in 12-14 sentences (attempt any FOUR)			16
	a)	Explain any four principles of effective communication.	U	1	
	b)	Distinguish between oral and written communication.	A	2/3	
	c)	State any four precautions one should take while making presentation.	A	5	
	d)	Explain any four interview techniques.	U	6	
	e)	State the importance of communication for the development of an engineer.	A	1	
	f)	Explain the various aspects of body language.	U	4	
Q.3		Attempt any TWO			16
	a)	Write an application letter along with your resume to 'Infosys' software Bangalore -05 for the post of engineer.	A	3	
	b)	Explain the types of communication.	U	1	
	c)	The following is the age wise readership of 'The Times of India' a daily newspaper.			
		Age Group Readership (%)			
		16 25 10			
		26 35 27			
		36 45 17			
		46 55 22			
		56 65 24			
		Present the above data in the form of pie graph.	A	4	

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ODD TERM END EXAM NOV./ DEC. -2017

EXAM SEAT NO.

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LEVEL :- THIRD PROGRAM : MECHANICAL

COURSE CODE :- MEE306/M206/ME206

COURSE NAME :- MACHINE TOOLS

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 21 / 11 / 2017

Instruction :-

- 1) Answers must be written in the main answer book provided.(and supplements if required)
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Marks

Q.1 Attempt any TWO

(08)

- a) Why chip breakers are used? Describe various types of chip breakers with neat sketch.
- b) Explain Knurling Operation with neat sketch.
- c) Give detail specifications of Radial Drilling Machine.

Q.2 Attempt any FOUR

(16)

- a) Define cutting speed, feed, depth of cut and machining time with respect to drilling machine.
- b) Draw neat sketch of tail stock and label the parts.
- c) Define and describe parting off operation performed on lathe machine.
- d) What are the desirable characteristics of coolants?
- e) Differentiate between orthogonal cutting and oblique cutting with neat sketch.
- f) Explain counterboring and countersinking operation of drilling machine with suitable sketch.

Q.3 Attempt any TWO

(16)

- a) Describe the elements and angles of single point Cutting Tool Nomenclature.
- b) Classify lathe machines. State the specifications of lathe machine.
- c) Explain the various types of drills with neat sketch.

P.T.O.

Q.4 Attempt any **TWO**

(08)

- a) How do you specify a shaper?
- b) Sketch a double housing planes and label it.
- c) Describe the principal parts of a slotting machine.

Q.5 Attempt any **FOUR**

(16)

- a) 'Return stroke of a shaper is fast' comment and justify.
- b) Describe the terms grade, grain and structure of a grinding wheel.
- c) Describe variable factors responsible for grinding wheel selection.
- d) Sketch a centre type grinder and label it.
- e) Write about manufacturing of silicon carbide as an abrasive.
- f) Sketch various shapes of grinding wheels. State their use.

Q.6 Attempt any **FOUR**

(16)

- a) Describe honing process. Give its applications.
- b) State advantages and limitations of lapping.
- c) Describe lapping machines with a neat sketch.
- d) Sketch a broach and describe various angles provided on it.
- e) Describe various broaching methods.
- f) Enlist various broaching applications.

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ODD TERM END EXAM NOV/DEC -2017

EXAM SEAT NO.

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LEVEL: FOURTH

COURSE CODE: MEE407/ME307

MAX. MARKS: 80

PROGRAM: MECHANICAL ENGINEERING

COURSE NAME: METROLOGY

TIME: 3 HRS.

DATE: 20/11/2017

Instruction:-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I

Marks

Q.1 Attempt any FOUR

(08)

- a) Define i) Sensitivity ii) Readability
- b) Define i) Reproducibility ii) Traceability.
- c) Define i) Accuracy ii) Precision.
- d) List any four instruments used for angular measurement.
- e) List any four sources of errors in measurement.
- f) What is fit? What are different types of fit?

Q.2 Attempt any FOUR

(16)

- a) What are the requirements of good comparator?
- b) Explain working of differential type pneumatic comparator.
- c) State the precautions that should be taken while using an instrument for getting higher precision and accuracy.
- d) Elaborate need of inspection.
- e) State Taylor's principle and explain design of plug gauge with suitable example.
- f) Explain concept of multi gauging with suitable example.

Q.3 Attempt any TWO

(16)

- a) Explain working of the Universal Bevel protector with the help of neat labeled sketch. Also State uses of it.
- b) Explain Hole basis system and Shaft basis system with neat sketch. Also state where Shaft basis system is preferred.
- c) Differentiate between line standard and end standard.

P.T.O

Q.4 Attempt any FOUR**(08)**

- a) State effect of pitch error on effective diameter of a screw thread.
- b) Name the different elements of gear tooth which are measured for accuracy of the gear.
- c) List various types of errors on screw thread components.
- d) Define the terms 'Backlash' & 'Runout' related to gear.
- e) Define Roundness. State methods for measurement of roundness.
- f) Why calibration of instrument is important?

Q.5 Attempt any FOUR**(16)**

- a) Name various types of thread errors found in screw thread. State their causes.
- b) Explain the principle of measurements of gear tooth thickness using a gear tooth vernier.
- c) Define the terms- Ra, CLA, RMS & Rz values with respect to surface finish.
- d) Define the terms i) primary texture & ii) secondary texture related to surface.
- e) Why alignment test is carried on machine tools? List various alignment checks generally carried out on machine tools.
- f) Explain calibration procedure for vernier caliper.

Q.6 Attempt any TWO**(16)**

- a) Explain Two Wire method for thread measurement.
- b) With neat sketch, explain measurement of tooth thickness by constant cord method.
- c) What is Lay? Draw & explain symbols used to indicate the direction of Lay with respect to surface finish.

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ODD TERM END EXAM NOV./ DEC. -2017

EXAM SEAT NO.

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LEVEL :- THIRD

PROGRAM : MECHANICAL

COURSE CODE :- MEE307/M207/ME207

COURSE NAME :- APPLIED ELECTRONICS

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 22/ 11 / 2017

Instruction :-

- 1) Answers must be written in the main answer book provided.(and supplements if required)
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Marks

Q.1 Attempt any **FOUR**

(08)

- a) Define extrinsic semiconductor.
- b) Draw symbol of P-N junction diode and zener diode.
- c) List configuration of BJT.
- d) Give any two applications of P-N junction diode.
- e) Classify rectifier.
- f) Define line regulation.

Q.2 Attempt any **FOUR**

(16)

- a) Explain single stage common emitter amplifier with diagram.
- b) Draw a diagram of N-channel JFET and explain its working.
- c) Describe working of full wave bridge rectifier with circuit diagram.
- d) Compare full wave and half wave rectifier with any four point.
- e) Draw & explain block diagram of online UPS.
- f) Give principle of operation, block diagram of switch mode power supply.
(SMPS)

Q.3 Attempt any **FOUR**

(16)

- a) Define i) Constant current limiting. ii) Fold back current limiting.
iii) Constant voltage source. iv) Constant current source.
- b) Describe operation of zener diode as a voltage regulator.
- c) Explain working of LC filter with diagram.
- d) Compare L & C filter with any four points.
- e) Explain characteristic of P-N junction diode.
- f) Draw and explain V-I characteristics of common base transistor.

PTD

Q.4 Attempt any **FOUR**

(08)

- a) Write OR laws in Boolean algebra.
- b) Convert the following into canonical SOP form. $Y=AB+BC+AC$.
- c) What are the different triggering methods in digital circuit?
- d) Convert $(29)_{10}=(\text{-----})_{16}$.
- e) Write the expression and truth table for half subtractor.
- f) Draw RS latch using NAND gate only.

Q.5 Attempt any **FOUR**

(16)

- a) Write symbol, truth table and Boolean expression for i) NOR gate ii) X-OR gate.
- b) Compare combinational and sequential circuit (any 4 points)
- c) Draw clocked RS flip-flop using NAND gate and write its truth table.
- d) Simplify the following expressions by K-map.

$$f(A,B,C,D) = \sum m(0,1,2,4,8,9,11,12)$$

- e) Design three bit asynchronous down counter.
- f) Draw circuit diagram of 4:1 multiplexer. Explain its working.

Q.6 Attempt any **FOUR**

(16)

- a) Draw and explain working of four bit left shift SISO register.
- b) Draw a block diagram of full adder. Write truth table. Draw logic diagram of it.
- c) State and prove De-Morgan's theorems.
- d) Explain JK flip-flop with the help of neat diagram. Write its truth table.
- e) What is decoder? Explain two to four line decoders.
- f) Differentiate synchronous and asynchronous counter. (any four points)

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ODD TERM END EXAM NOV/DEC -2017

EXAM SEAT NO.

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LEVEL: FOURTH

COURSE CODE: MEE402/M302/ME302

MAX. MARKS: 80

PROGRAM: MECHANICAL ENGINEERING.

COURSE NAME: MACHINE DESIGN

TIME: 3 HRS.

DATE: 05/12/2017

Instruction:-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I

Marks

Q.1 Attempt any FOUR

(08)

- a) Enlist four advantages of ergonomic design.
- b) Explain the importance of preferred sizes.
- c) What is the need of factor of safety ?
- d) Give maximum shear stress theory and its applications.
- e) Classify various forms of threads.
- f) Explain self locking of screw.

Q.2 Attempt any FOUR

(16)

- a) How aesthetics is involved in design of various components ?
- b) Compare stress-strain diagram for ductile & brittle material.
- c) How collar friction affects the design ?
- d) Explain the bolts of uniform strength with neat sketch.
- e) Why bolts are preloaded ?
- f) A bolted assembly of two components has preload of 2 kN in the bolt. The external force is 5 kN. The bolt has yield strength 400 N/mm² and F.O.S. is 2. The effective stiffness of members held together by the bolt is 2 times the stiffness of bolt. Specify the size of bolt.

Q.3 Attempt any TWO

(16)

- a) Design a Knuckle joint for a load of 50 kN with $f_t = 90 \text{ N/mm}^2$, $f_c = 160 \text{ N/mm}^2$, and $f_s = 60 \text{ N/mm}^2$. Assume suitable data if required and mention.
- b) Classify various theories of failure and give the applications of each.
- c) A power screw having doublestart square thread of 25 mm nominal diameter and 20 mm core diameter and 5 mm pitch is acted upon by an axial thrust of 10 kN. The outer diameter of collar is 50 mm and inner diameter of collar is 20 mm. The coefficient of friction at collar and screw is 0.15. The screw rotates about at 15 r.p.m. calculate-
 - i) Stresses in screw.
 - ii) Torque required to rotate screw.
 - iii) Power required to drive it.
 - iv) Overall efficiency and efficiency of screw.

(P.T.O.)

Q.4 Attempt any **FOUR**

(08)

- a) Sketch S.N. curve and define endurance limit.
- b) Classify shafts.
- c) What is stress concentration ? List its any two causes.
- d) Classify radial ball bearing.
- e) Draw Soderberg diagram.
- f) How do you express life of bearings ?

Q.5 Attempt any **FOUR**

(16)

- a) Find the diameter of solid shaft to transmit 20 KW at 200 r.p.m. The ultimate shear stress for steel may be taken as 360 MPa. and F.S.=8. If a hollow shaft is used in place of solid shaft, find inside and outside diameter. Ratio of outside to inside diameter for hollow shaft is 2.
- b) A 45 mm diameter shaft is transmitting 30 kw at 600 rpm. A key of size 14 mm wide and 9 mm thick made of steel with yield strength of 340 N/mm² is to be used. Find the required length of key, if the shaft is loaded to transmit the maximum permissible torque. Assume a factor of safety of 2.
- c) State functions of spring.
- d) Define : i) Spring index. ii) Spring stiffness. iii) Free length. iv) Solid length.
- e) State advantages and disadvantages of gear drive.
- f) Explain materials used for gears.

Q.6 Attempt any **FOUR**

(16)

- a) A mild steel shaft transmits 20 kW at 200 mm. It carries a central load of 900 N and is simply supported on bearing 3 meters apart. Determine the size of the shaft, if the allowable shear stress is 42 MPa.
- b) Write down classification of coupling.
- c) A closed coil helical spring is made of 10 mm diameter of steel wire. The coil consists of 10 complete turns with a mean diameter of 120 mm. The spring carries an axial pull of 200 N. Determine the shear stress induced in the spring. Determine also the deflection in the spring, its stiffness and strain energy stored by it, if the modulus of rigidity of the material is 60 KN/mm².
- d) A rail wagon of mass 2000 kg is moving with a velocity of 9 kmph. It is brought to rest by using two buffer spring. The maximum deflection of springs is 300 mm. An allowable shear stress for spring material is 800 MPa. Design the spring for buffers. Assume spring index '8' modulus of rigidity = 82500 N/mm² and ends are square and ground.
- e) State design considerations of gear drive.
- f) State the applications of following bearing with suitable reasons (any Four)
 - i) Deep groove ball bearing. ii) Taper roller bearing. iii) Thrust roller bearing
 - iv) Needle roller bearing. v) Solid bush type journal bearing.

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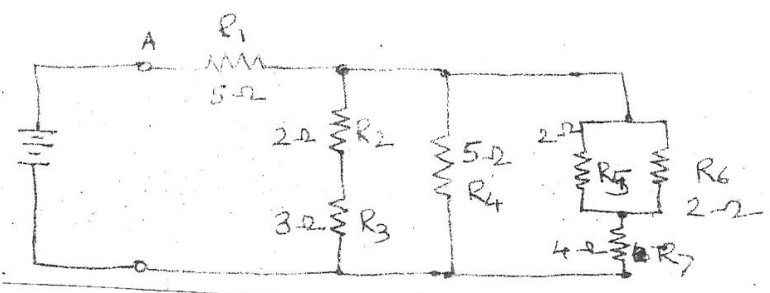
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ODD TERM END EXAM NOV. / DEC. -2017**EXAM SEAT NO.**

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LEVEL :- THIRD**PROGRAM : MECHANICAL ENGINEERING****COURSE CODE :- MEF309/ME209/MEE309****COURSE NAME :- ELECTRICAL TECHNOLOGY****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 06/12/2017****Instruction :-**

- 1) Answers must be written in the main answer book provided.(and supplements if required)
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN > Question No., SQN> Question No. R> Remembering, U> Understanding, A> Application.

Q N	S Q N	Question Text	R/ U/ A	CO Cod e MEF309	Mark s
Q.1		Attempt any FOUR			08
	a)	Define the terms i) RMS value ii) Peak value.	R	2	
	b)	State the use of clip-on-meter.	R	2	
	c)	Define the term 'balanced load' in three phase system.	R	3	
	d)	State ohms law of electric network.	U	1	
	e)	Define Kirchhoff's current law.	R	1	
	f)	List various types of measuring instruments.	U	2	
Q.2		Attempt any FOUR			16
	a)	Explain voltage current and power relation in 'star' connection of 3-phase A.C. circuits.	U	3	
	b)	Define reactance and impedance and state its units.	R	2	
	c)	Explain in brief 'Generation of three phase voltages'	U	3	
	d)	Simplify the circuit shown in fig. and obtain the value of equivalent resistance between point A &B	A	1	
					
	e)	Explain with help of circuit diagram purely Resistive A.C. circuit.	A	2	
	f)	State and compare the properties of the series and parallel circuits.	U	1	

P.T.O.

Q.3	Attempt any TWO			16
	a) Show that the current in purely capacitive circuit leads the applied voltage by 90° and the current in a purely inductive circuit lags the applied voltage by 90° .	U	2	
	b) Draw and explain i) 3-phase 3-wire system ii) 3-phase 4-wire system.	U	3	
	c) Explain the concept of inductance and capacitance. State their units	U	1	
Q.4	Attempt any FOUR			08
	a) Define transformation ratio.	R	4	
	b) Define transformer, state on which principle it works.	R	4	
	c) Classify DC motors.	R	6	
	d) Define Illumination.	R	5	
	e) State the application of servo motor.	R	6	
	f) How the direction of rotation of 3-phase induction motor be reversed?	R	7	
Q.5	Attempt any FOUR			16
	a) State the types of rotors used in 3-phase induction motor. Describe any one in detail	U	7	
	b) Compare stepper motor and servo motor.	A	6	
	c) Describe with neat sketch working of any one type of induction furnace.	U	5	
	d) Explain in brief Dielectric heating. State its principle and application.	U	5	
	e) Derive an emf equation of transformer.	A	4	
	f) Explain various losses taken place in a transformer.	U	4	
Q.6	Attempt any FOUR			16
	a) Compare ideal and practical transformer.	A	4	
	b) State industrial applications of 3-phase induction motors.	A	7	
	c) State two applications of induction heating and explain any one in brief.	U	5	
	d) Explain laws of illumination.	U	5	
	e) Explain the starter used for slip ring induction motor with neat diagram.	U	7	
	f) Draw and explain Torque-Speed characteristics of 3-phase induction motor.	U	7	

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EXAM SEAT NO.

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LEVEL :- FOURTH

PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEE403

COURSE NAME :- ADVANCED MACHINING PROCESSES

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 07 / 12 / 2017

Instruction :-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I

Marks

- | | |
|--|-------------|
| Q.1 Attempt any TWO | (08) |
| a) Explain side milling operation with neat sketch. | |
| b) Describe main parts of transfer machines. | |
| c) What are the advantages and limitations of wire cut EDM? | |
| Q.2 Attempt any FOUR | (16) |
| a) What is the rule for differential indexing? Index 83 divisions by differential indexing. | |
| b) Describe the principle of operation of Gear Hobbing process, with suitable sketch. | |
| c) Describe face milling operation with neat sketch. | |
| d) Explain rotary indexing table transfer machine with block diagram. | |
| e) State the functions of dielectric fluid used in EDM. | |
| f) State the applications of ECM. | |
| Q.3 Attempt any TWO | (16) |
| a) Draw the neat sketch of column and Knee type universal milling machine and label the parts. Describe the main parts of it with functions. | |
| b) Describe the set up of EBM with neat sketch. | |
| c) What are the commonly used gear finishing processes? Describe them in brief. | |

P.T.O

Q.4 Attempt any **FOUR**

(08)

- a) Give the advantages of CNC machine.
- b) Define CNC machine and draw its block diagram.
- c) Write the meaning of following codes i) M03 ii) M30 iii) G91 iv) G28.
- d) Explain the machine zero term.
- e) Define the term housekeeping.
- f) What are the objectives of TPM?

Q.5 Attempt any **FOUR**

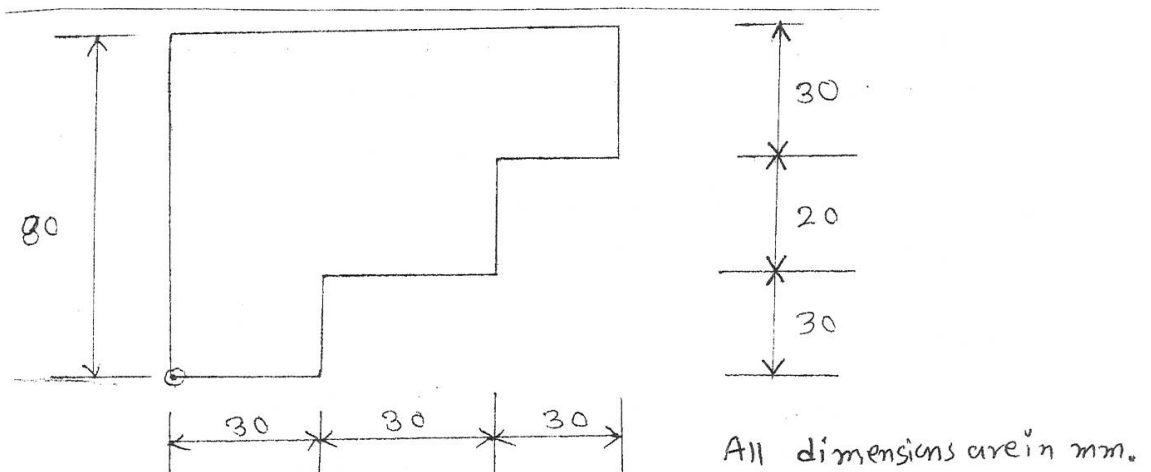
(16)

- a) Explain vertical machining center with block diagram.
- b) Write advantages and limitation of CNC machines.
- c) Explain open loop control system used in CNC machines.
- d) Explain thumb rule for axis identification.
- e) Explain the need of repair cycle analysis in maintenance of machine tools.
- f) Write the maintenance procedure of pulley.

Q.6 Attempt any **TWO**

(16)

- a) With the help of suitable figure explain absolute dimensioning with respect to CNC machines. Also write difference between absolute and incremental co-ordinate system.
- b) Prepare a part programme for machining of the component shown in fig. The material is M.S. with thickness of 5 mm.



- c) Write short note on i) Maintenance records ii) Housekeeping.

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ODD TERM END EXAM NOV/DEC -2017**EXAM SEAT NO.**

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LEVEL: THIRD**COURSE CODE: MEF303/MEE303****MAX. MARKS: 80****PROGRAM: MECHANICAL ENGINEERING****COURSE NAME: MACHINE DRAWING****TIME: 4 HRS.****DATE: 30/11/2017**

Instruction:-

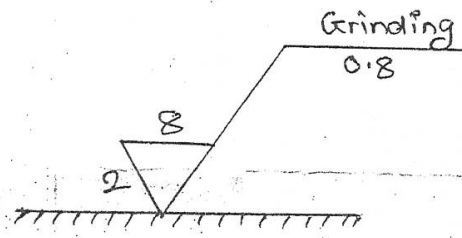
- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

QN	S. Q. N	Question Text	Marks	
			R U A	CO- MEF 303
Q.1		Draw the conventional representation for the following (Attempt any FOUR)		
	a)	Petrol.	R	2
	b)	Marble.	R	2
	c)	Splined shoft.	R	2
	d)	External screw thread.	R	2
	e)	Bevel gear.	R	2
	f)	Counter Bore.	R	2
Q.2		Attempt any TWO		
	a)	A vertical cylinder of base diameter 55 mm, axis length 80 mm is horizontally penetrated by another cylinder of base diameter 45 mm and axis length 90 mm such that its axis is parallel to V.P. and bisects the axis of vertical cylinder. Draw the projections of solids showing curves of intersection.	U A	3
	b)	A right circular cylinder with base diameter 60 mm, axis length 60 mm stands vertically on its base in the H.P. A square prism with side of base 25 mm, axis length 80 mm penetrates horizontally, such that its axis is parallel to V.P. and 10 mm away (in front of) the axis of vertical cylinder and is 30 mm above the base of cylinder. The faces of square prism are equally inclined with H.P. Draw the projections of solids with curve of intersection.	U A	3
	c)	I) Draw symbols of the following i) Circularity ii) Surface profile iii) Symmetry iv) Parallelism. II) Refer fig. 2.1 and state the meaning of the symbol drawn.	R U	4 4
Q.3		Attempt any TWO		
	a)	Fig. 3.1 shows the incomplete F.V., Top view and partial auxiliary front view. Draw the given views and complete the front view.	U	1
	b)	Fig. 3.2 shows the working drawing of a flange from the drawing answers the following questions, i) What is the meaning of symbol at 'a'. ii) What is the meaning of symbol at 'd'.	A	4

P.T.O

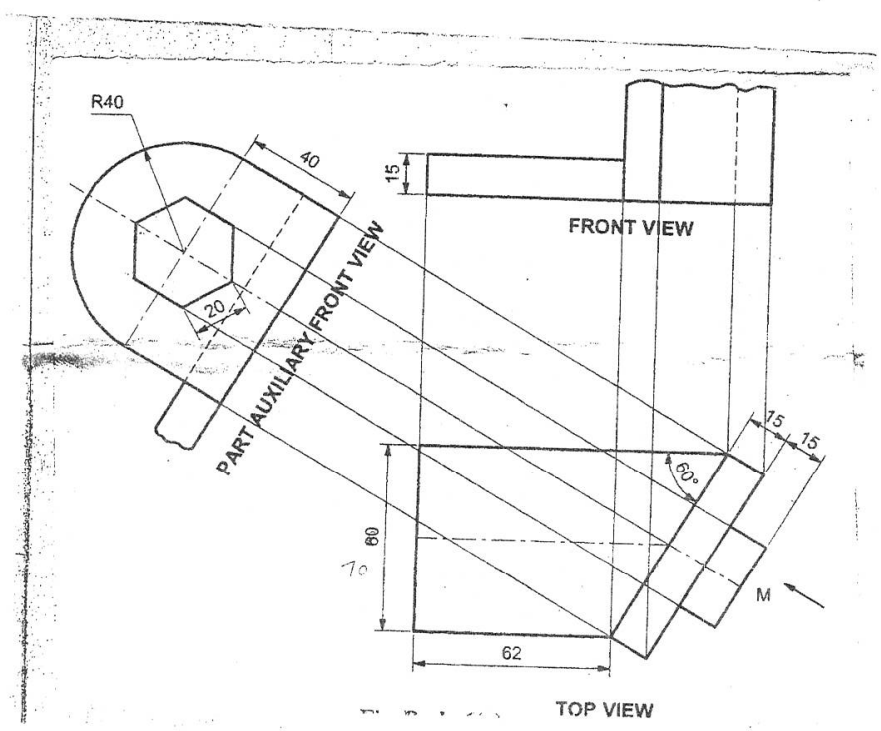
	c)	a) The shaft has $\varnothing 9^{-0.025, -0.047}$ and mole size is $\varnothing 9^{+0.022, +0}$. Determine the type of fit between them. b) Give the classification of fits, with neat sketches & label the sketches.	A U	4 4	
Q.4		Attempt any ONE of the following.			(08)
	a)	Fig. 4.1 shows assembly of PEDESTAL BEARING. Draw the following details.,- i) Brass ii) CAP	A	5	
	b)	Fig. 4.2 shows assembly of TAIL STOCK. Draw the following details., i) Body sectional F.V ii) Centre			06 02
Q.5		Fig. 5.1 shows assembly of DRILL JIG. Draw the following details. i) Base plate – Sectional F.V. and T.V. ii) Jig plate – Sectional F.V. and T.V.	A	5	(12)
Q.6		Attempt any ONE of the following,			(20)
	a)	Fig. 6.1 shows the details fo Universal coupling. Draw the following views of the assembly. i) Sectional Front view. ii) Top view. iii) Prepare bill of material.	A	5	10 08 02
	b)	Fig. 6.2 shows details of Machine vice. Draw assembly and Indicate necessary fits and tolerances. *****	A	5	

①



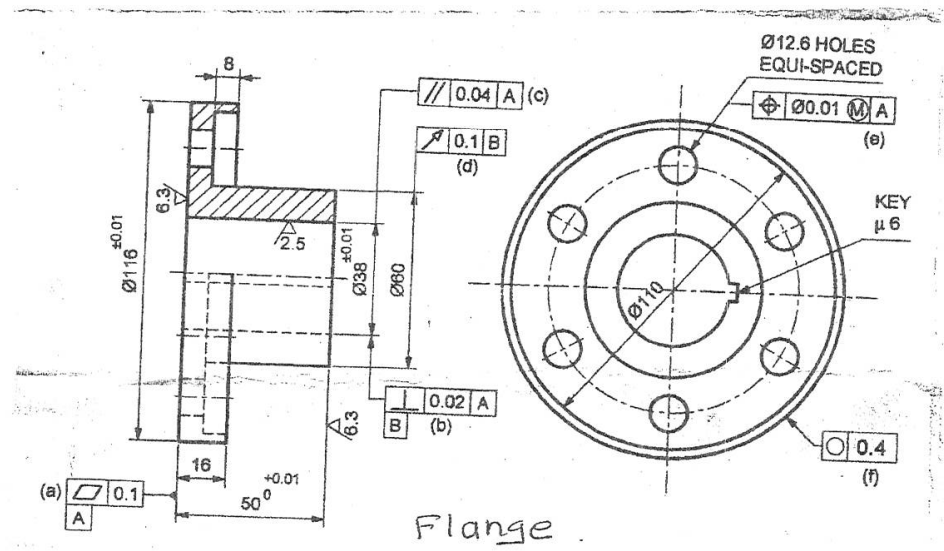
Q.2 C) IV)

Fig. 2.1.



Q.3 a)

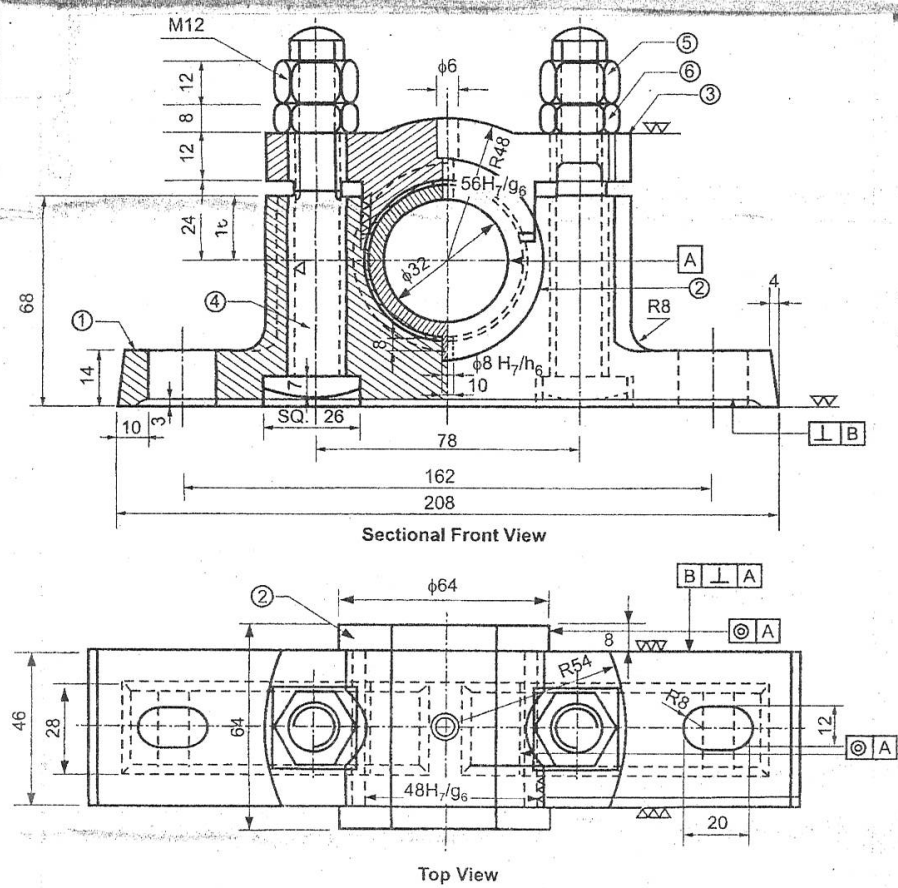
Fig. 3.1.



Q.3 b)

Fig. 3.2

P.T.O.



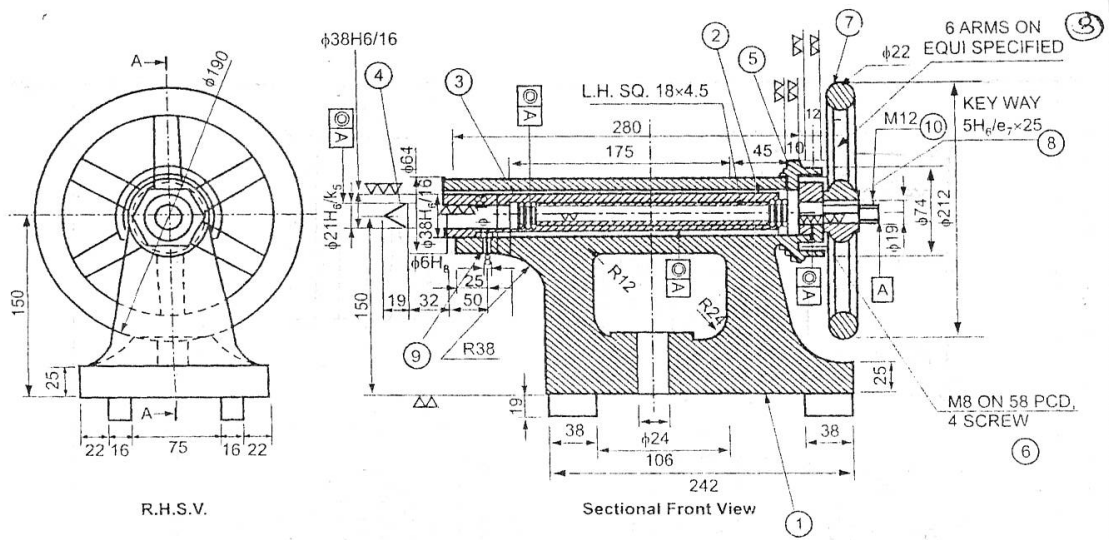
FIT CHART

$8H_7/h_6$ = Clearance FIT
$48H_7/g_6$ = Clearance FIT
$46H_7/h_6$ = Clearance FIT
$56H_7/g_6$ = Clearance FIT

PART LIST

Part No.	Part Name	Material	Quantity
1.	BODY	C.I.	1
2.	BRASS	G.M.	1
3.	CAP	C.I.	1
4.	BOLT	M.S.	2
5.	NUT	M.S.	2
6.	LOCK NUT	M.S.	2

Fig. 4.1 (a.4-a.)



R.H.S.V.

Sectional Front View

PART LIST

PART NO.	PART NAME	MATERIAL	QUANTITY
1.	BODY	C.I.	1
2.	BARREL	M.S.	1
3.	SPINDLE	M.S.	1
4.	CENTER	C.S.	1
5.	SPINDLE BEARING	C.I.	1
6.	SCREW	M.S.	1
7.	HANDAL WHEEL	C.I.	1
8.	KEY	M.S.	1
9.	FEATHER	M.S.	1
10.	NUT	M.S.	1

FIT CHART

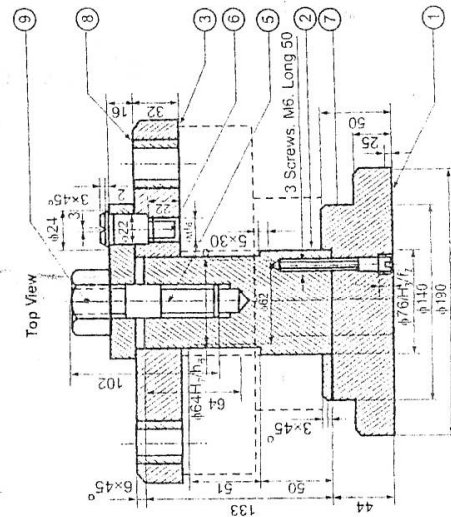
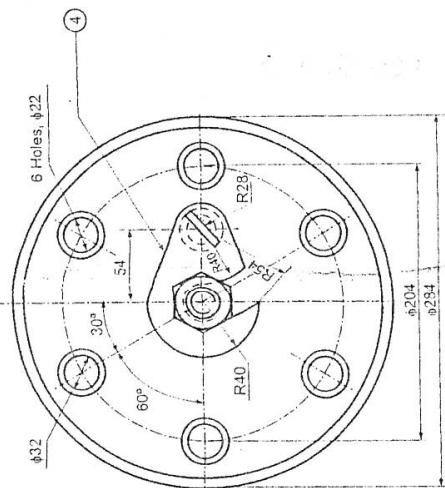
21H6/k5	TRANSITION FIT
5H6/e7	CLEARANCE FIT
38H6/f6	CLEARANCE FIT
6H6/e7	CLEARANCE FIT

TOLERANCE CHART

38H6 = +0.016	21H6 = +0.013
38H6 = +0.000	21H6 = +0.000
38f6 = -0.025	21k5 = +0.011
38f6 = -0.040	21k5 = +0.002
6H6 = +0.08	5H6 = +0.008
6H6 = +0.000	5H6 = +0.000
6e7 = -0.020	5e7 = -0.020
6e7 = -0.032	5e7 = -0.032

Fig. 4.2 (Q. 4.b.)

Bill of Material			Quantity
Sr. No.	Part Name	Material	
1.	Base plate	C.I.	1
2.	Locating peg	M.S.	1
3.	Jig-plate	C.I.	1
4.	Latch washer	M.S.	1
5.	Stud	M.S.	1
6.	Pin	M.S.	3
7.	Cap screw	C.S.	6
8.	Bush	C.S.	1
9.	Nut	M.S.	1



Sectional Front View

Fig. 5.1 (Q. 5.)

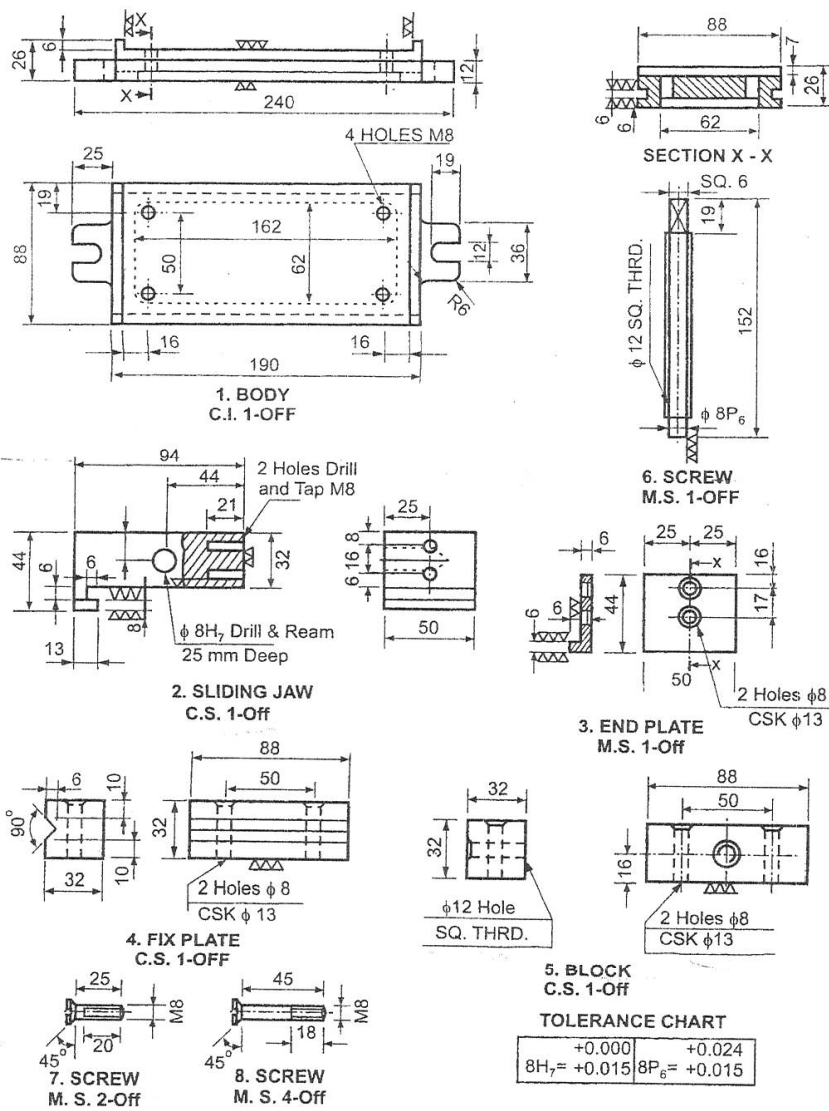


Fig. 6.2 (Q. 6.b.)

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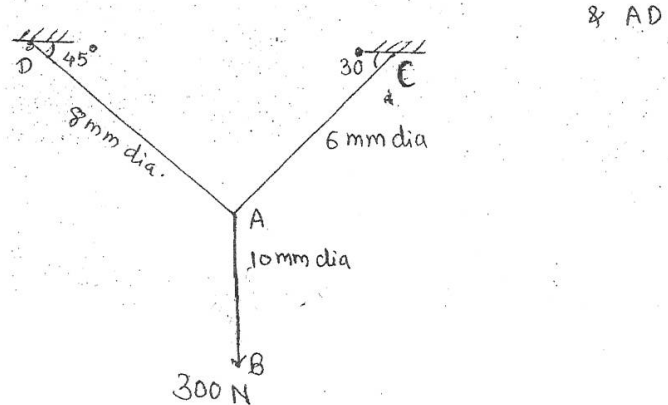
LEVEL: THIRD**PROGRAM: MECHANICAL ENGINEERING****COURSE CODE: MEF305/M205/ME205/MEE305 COURSE NAME: THEORY OF ENGINEERING DESIGN****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 04/12/2017**

Instruction:-

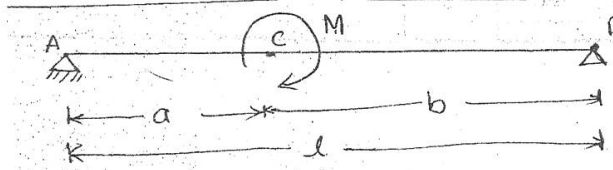
- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

QN	S Q N	Question Text	R U A	Co MEF30 5-	Mark s
Q.1		Attempt any FOUR			(08)
	a)	Define modulus of rigidity.	R	1	
	b)	Define strain energy.	R	1	
	c)	Determine strain energy stored per unit volume for the mild steel when it is axially stressed upto proportional limit 247 N/mm^2 . $E=2 \times 10^5 \text{ N/mm}^2$.	A	1	
	d)	State mathematical relation between shear force & rate of loading.	U	2	
	e)	Determine polar moment of inertia of an equilateral triangle of side 'a' & height $0.87a$.	A	3	
	f)	Define radius of gyration & also state its S.I. unit.	R	3	
Q.2		Attempt any FOUR			(16)
	a)	A lamp of 300 N weight is supported as shown in Figure 1. Determine stresses in the rods, AB, AC & AD.	A	1	
	b)	A tube of aluminum 40 mm external diameter & 20 mm internal diameter is snugly fitted on to a solid steel rod of 20 mm diameter. The composite bar is loaded in compression by axial load P. Determine the stress in aluminum when the load is such that stress in steel is 70 N/mm^2 & also determine value of load P.	A	1	
	c)	A vertical suspended steel tie bar is subjected to a load 12 KN which falls by 12 mm on the rigid collar provided at the lower end of the bar. The bar is 2.5 m long. If the ratio of the instantaneous extension to the original length shall not exceed $1/1800$. Determine minimum cross sectional area of the bar. Take $E=2 \times 10^5 \text{ N/mm}^2$.	A	1	
	d)	Draw SFD & BMD for the Beam shown in Figure 2 with calculations	A	2	
	e)	Draw SFD & BMD for the beam shown in Figure 3 with calculations.	A	2	
	f)	Determine moment of inertia of the section shown in Figure 4 about centroidal axes x-x only.	A	3	
Q.3		Attempt any FOUR			(16)
	a)	A bar of 20 mm diameter & 1 m long is subjected to direct pressure of 100 N/mm^2 , during the tensile test. It is found that longitudinal strain is 4 times the lateral strain. Then determine modulus of rigidity & bulk modulus, if elastic modulus is $1 \times 10^5 \text{ N/mm}^2$. Also determine change in volume.	A	1	

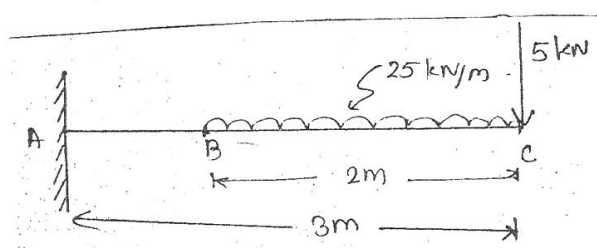
	b)	A brass bar is rigidity clamped in lathe. The portion of the bar between the clamps is 875 mm long & turned down to a uniform diameter 112 mm. At the beginning of the turning operation, The temperature of the bar is 18.5 °C. At the end of the operation the heat generated raises the temperature to 87.5 °C. Determine stress in bar if - i) Lathe is considered rigid. ii) Lathe is considered fully deformable.	A	1	
	c)	A uniform metal bar has cross sectional area 750 mm ² & length 1.75 m with an elastic limit of 160 N/mm ² . Determine the maximum value of an applied load which may be suddenly applied without exceeding the elastic limit. And also find the value of the gradually applied load which will produce the same extension as that by the above suddenly applied load. Take $E = 2 \times 10^5 \text{ N/mm}^2$	A	1	
	d)	Draw SFD & BMD for the beam shown in Figure 5 with calculations.	A	2	
	e)	Figure 6 shows shear force diagram for a simply supported beam. Assuming that there is no couples act on the beam, determine the loading on the beam.	A	2	
	f)	Determine moment of Inertia of the section shown in Figure 7 about centroidal axis y-y. Only.	A	2	
Q.4		Attempt any FOUR			(08)
	a)	State flexural formula and meaning of each term.	R	4	
	b)	Define eccentric loading & state its effect on the members.	R	4	
	c)	State relation between maximum and average shear strain for rectangular body of width B & depth D.	R	4	
	d)	Define Obliquity.	R	5	
	e)	At a point in a strained body $\sigma_x = \sigma_y = 6$ both are tensile, Draw Mohr's circle.	U	5	
	f)	State any two assumptions in theory of torsion.	U	6	
Q.5		Attempt any TWO			(16)
	a)	A rectangular beam of 150 mm width and 250 mm depth is subjected to maximum bending moment of 750 KN-m. Determine the maximum stress in the beam. If $E = 200 \text{ GN/m}^2$, Determine the radius of curvature for that portion of the beam where the bending is maximum.	A	4	
	b)	A load of 750 KN is carried by shaft made of cast iron. The external and internal diameters are 200 mm and 180 mm respectively. If the eccentricity of the load is 35 mm determine maximum and minimum stress intensities.	A	4	
	c)	An I-section has following dimensions Flanges : 150 mm x 20 mm, Web : 300 mm x 10 mm, overall depth 340 mm. Find the maximum shear stress developed in the beam for a shear force of 100 KN.			
Q.6		Attempt any TWO	A	5	(16)
	a)	The normal stresses on two planes at right angles are 60 MPa and 30 MPa, both tensile. They are associated with a shear stress of 45 MPa. Find the principal planes and stresses. Also find the maximum shear stress.	A	6	
	b)	A solid shaft of circular in cross section transmits 75 KW at 200 rpm. Calculate the shaft diameter, if the twist in the shaft is not exceeds 1° in 2 meter length of shaft, and the shear stress is limited to 50 MN/m ² . Take $C = 100 \text{ GN/m}^2$	A	6	
	c)	A hollow shaft, having an inside diameter 60 % of its outer diameter, is to replace a solid shaft transmitting the same power at the same speed. Calculate the percentage saving in material, if the material to be used is also the same.	A	6	



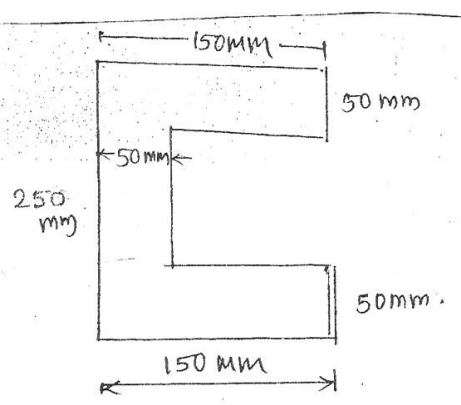
Que 2. (a) Fig. 1.



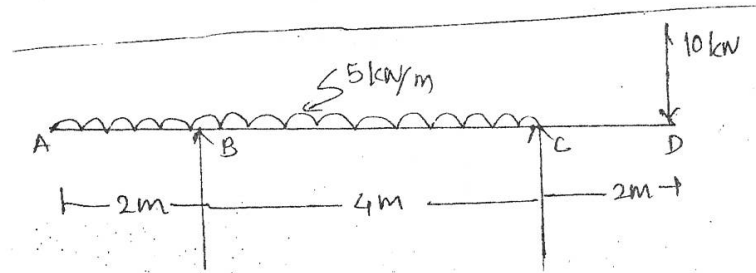
Que 2. (d) Fig. 2



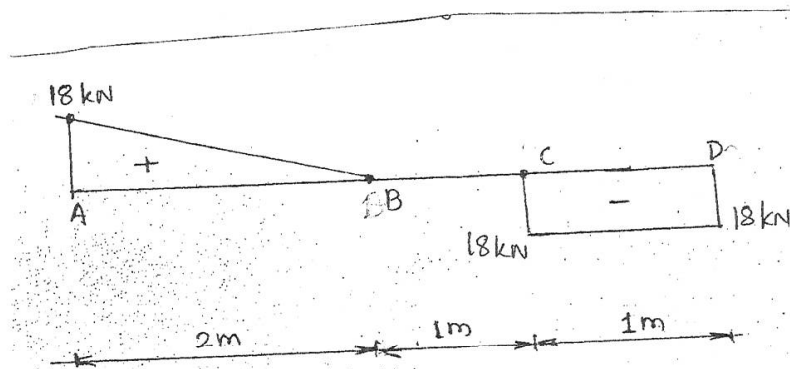
Que 2. (e) Fig. 3



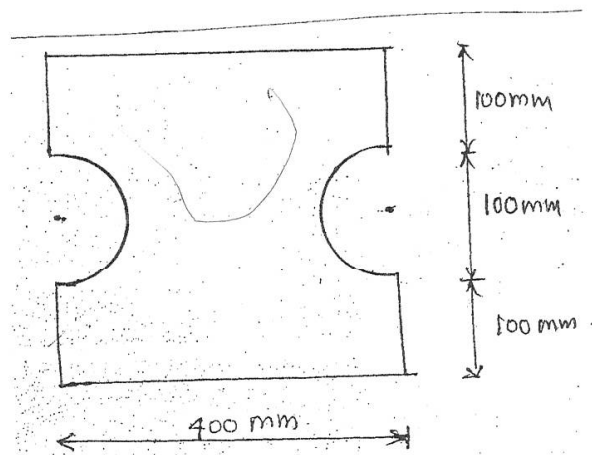
Que 2 (f) Fig. 4



Que 3 (d) Fig. 5



Que 3 (e) Fig. 6



Que 3 (f) Fig. 7

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EXAM SEAT NO.

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LEVEL :- FIFTH

PROGRAM : MECHANICAL

COURSE CODE :- MEE 510 /ME411

COURSE NAME :- INDUSTRIAL HYDRAULICS & PNEUMATICS

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 27 / 11 / 2017

Instruction :-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I		Marks
Q.1	Attempt any FOUR a) Write merits & limitations of oil hydraulic systems. b) Define Viscosity Index (VI) c) Define any four important properties of hydraulic fluid. d) Give the classification of Actuators used in hydraulic system. e) What is actuator? f) Write functions of seals and gaskets.	(08)
Q.2	Attempt any FOUR a) Explain with neat sketch Bleed-off circuit. b) Draw the symbols for i) 4/3 D.C. valve with all ports open to each other at centre position. ii) Pressure Unloading valve. c) Explain what are the components of hydraulic system? d) Explain telescopic cylinder with neat sketch. e) Give the classification of filters used in hydraulic system. Explain any one of them. f) Name any eight pipe & tube fittings. Write their function in brief.	(16)
Q.3	Attempt any TWO a) Explain with neat sketch the working of sequencing circuit for the two double acting cylinders. b) What is flow control valve? Explain non-pressure compensated flow control valve with neat sketch. c) With a neat sketch explain briefly working of stationary cylinder Radial piston pump.	(16)

Q.4 Attempt any **FOUR** (08)

- a) Enlist various components used in pneumatic systems (any four)
- b) Draw symbol of i) Check valve ii) 2/2 Direction control valve.
- c) State functions and seals in pneumatic system.
- d) Classify pneumatic actuators.
- e) How a reciprocating compressor specified?
- f) State any four material used in pneumatic system piping?

Q.5 Attempt any **FOUR** (16)

- a) State merits and limitations of pneumatic system.
- b) Explain with neat sketch Time delay valve.
- c) Explain with neat sketch Double acting actuator.
- d) Explain with neat sketch-Air filter.
- e) Draw pneumatic circuit diagram to operate a double acting cylinder.
- f) Draw pneumatic circuit to operate a single acting cylinder using 3/2 D.C. valve.

Q.6 Attempt any **FOUR** (16)

- a) State applications and pneumatic system.
- b) Explain with neat sketch working of shuttle valve. Show its application in a pneumatic circuit.
- c) State advantages and limitations of Air motors.
- d) Compare Hydraulic systems with pneumatic system.
- e) Explain with neat sketch working of sequencing circuit for two double acting air cylinders.
- f) Explain with neat sketch air lubricator.

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EXAM SEAT NO.

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LEVEL: THIRD

PROGRAM: MECHANICAL ENGINEERING

COURSE CODE: MEE310/ME210

COURSE NAME: ENGINEERING METALLURGY AND MATERIALS

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 27/11/2017

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Q.1 Attempt any FOUR

**Marks
(08)**

- a) What is the need of metallurgy in industry?
- b) What is polymorphism?
- c) Sketch the unit cell of HCP.
- d) What is cooling curve?
- e) Write properties of cast iron.
- f) What is pearlite?

Q.2 Attempt any FOUR

(16)

- a) State types of metallurgy & explain any one.
- b) What are Hume Rothery's rules?
- c) Explain the process of construction of a binary equilibrium diagram with neat sketch.
- d) Draw Iron-Iron carbide diagram. Show various reaction & phases in it.
- e) Explain the effect of Mn, W, Cr and Si addition on properties of steel.
- f) Explain the effect of alloying elements on Fe-C diagram.

Q.3 Attempt any FOUR

(16)

- a) Explain Nucleation & growth of a crystal.
- b) Explain the changes in the mechanical properties with changes in the carbon content of steel.
- c) Explain lever arm principle with neat sketch.
- d) Explain various defects in crystal formation.
- e) Explain partial eutectic system with neat sketch.
- f) What are the allotropic transformations in pure iron? Give the required names, structures and temperatures.

P.T.O

Q.4 Attempt any **FOUR** (08)

- a) State and define the structure formed during rapid cooling of steel, while transformation of austenite.
- b) Sketch and show normalizing temperature range in iron carbon diagram with various structural phases.
- c) State any four purposes of Heat treatment.
- d) Write composition of babbitts and state its two properties.
- e) Select non-destructive test for finding any defect in welding and casting product.
- f) Compare Magnaflux test and Penetrant test in two points, from application point of view.

Q.5 Attempt any **FOUR** (16)

- a) Describe isothermal transformation of austenite.
- b) Construct TTT diagram of eutectoid steel and show various structural phases.
- c) Compare Flame hardening and Induction hardening in eight points.
- d) Describe full annealing process with temperature range in iron carbon diagram.
- e) Distinguish between carburizing and nitriding in four points.
- f) Select heat treatment process required to reduce quenching stresses, occurred in hardened steel and explain process.

Q.6 Attempt any **FOUR** (16)

- a) State composition of Magnesium alloy AZ81, phosphor bronze, Duralumin, and Gun metal.
- b) Write any four properties and applications of aluminum alloy.
- c) Select non-ferrous alloy suitable for marine application. Write its two properties and composition.
- d) State four properties and applications of super alloy.
- e) Describe Ultrasonic test with neat sketch.
- f) Explain working principle in Eddy current test. Write its application.

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EXAM SEAT NO.

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LEVEL: THIRD

PROGRAM: CIVIL / MECHANICAL ENGINEERING

COURSE CODE: CEF301/MEF301/1201/C201/CE201/CEE301/2201/M201/ME201/MEE301

COURSE NAME: APPLIED MATHEMATICS

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 28/11/2017

Instruction:-

- 1) Answer to each section must be written in separate answer book.
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN>Question No, SQN>Sub-Question No, R> Remembering, U>Understanding, A>Application CO>Course outcome

QN	S Q N	Question Text	R U A	Co CEF/ MEF301	Mark s
Q.1		Attempt any FOUR			(08)
	a)	Evaluate $\int \frac{dx}{\sqrt{4x^2 + 9}}$	R	1	
	b)	Evaluate $\int \cos 3x \cdot \cos 4x \, dx$	R	1	
	c)	Evaluate $\int \frac{1}{(x+3)(x+2)} dx$	R	1	
	d)	Evaluate $\int e^x \cdot \sin(e^x) \, dx$	R	1	
	e)	Evaluate $\int_2^3 x \cdot e^{2x} \cdot dx$	U	1	
	f)	Evaluate $\int_0^2 \frac{x}{x+3} dx$	R	1	
Q.2		Attempt any FOUR			(16)
	a)	Find R.M.S value of $E = 2.75 \sin 80\pi t$ over a period of $t = 0$ to $t = \frac{1}{80}$	A	1	
	b)	Evaluate $\int_0^{\pi/2} \frac{1}{1 + \sqrt{\cot x}} dx$	A	1	
	c)	Evaluate $\int_0^{\pi/2} \frac{dx}{3 + 4 \sin x}$	A	1	
	d)	Evaluate $\int x^2 \cdot \tan^{-1} x \, dx$	U	1	
	e)	Evaluate $\int \frac{1}{4 - 2x - 2x^2} dx$	U	1	
	f)	Evaluate $\int \frac{dx}{2x^2 - 5x + 2}$	U	1	
Q.3		Attempt any FOUR			(16)
	a)	Find the area enclosed by the curve $y = 4 - x^2$ and the x-axis.	A	1	
	b)	Find the area enclosed between the parabola $y^2 = 4x$ and line $2x - y = 4$	A	1	
	c)	The instant value of an alternating current in amperes is given by, $i = 40 \sin \omega t + 8 \sin \omega t$. Find the mean value of the current over the range $t = 0$ to $t = \frac{\pi}{\omega}$	A	1	
	d)	Evaluate $\int_0^{\pi} x \cdot \sin^3 x \cdot \cos^2 x \, dx$	A	1	

P.T.O

e)	Evaluate $\int x^2 \cdot \sin^2 x \, dx$	U	1													
f)	Evaluate $\int \frac{(x-1)e^x}{x^2 \cdot \cos^2(\frac{e^x}{x})} dx$	-U	1													
Q.4	Attempt any FOUR			(08)												
a)	Solve: $x dx - y dy = 0$	R	2													
b)	Show that $y = a \sin x + b \cos x$ is a solution of $\frac{d^2 y}{dx^2} + y = 0$	U	2													
c)	Define: i) Standard Derivation. ii) Coefficient of variation	R	3													
d)	Show that the mean deviation about mean for the following data: 25, 17, 14, 26, 22, 21, 15 is 4	U	3													
e)	Define complement of an event	R	4													
f)	From a pack of 52 card's , if one card is drawn at random then prove that, probability of getting a king is $\frac{1}{13}$	U	4													
Q.5	Attempt any FOUR			(16)												
a)	Find the mean deviation about mean for the following data: <table><tr><td>Marks obtained</td><td>0-10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td></tr><tr><td>No. of Students</td><td>12</td><td>18</td><td>27</td><td>23</td><td>20</td></tr></table>	Marks obtained	0-10	10-20	20-30	30-40	40-50	No. of Students	12	18	27	23	20	A	3	
Marks obtained	0-10	10-20	20-30	30-40	40-50											
No. of Students	12	18	27	23	20											
b)	Calculate standard deviation & variance of the following distribution <table><tr><td>x_i</td><td>30</td><td>40</td><td>50</td><td>60</td><td>70</td></tr><tr><td>f_i</td><td>2</td><td>7</td><td>8</td><td>3</td><td>5</td></tr></table>	x_i	30	40	50	60	70	f_i	2	7	8	3	5	A	3	
x_i	30	40	50	60	70											
f_i	2	7	8	3	5											
c)	The two sets of observations are given below: Set-I Set-II $\delta = 4.5$ $\delta = 4$ $\bar{x} = 35$ $\bar{x} = 40$ Which of the two sets is more consistent?	U	3													
d)	If two dice are thrown simultaneously. Then prove that, the probability of getting the sum of numbers is shown is 9 or product is 18 is $\frac{1}{9}$.	U	4													
e)	Show that, the differential equation $(4x^3 y^2 + y \cos y) dx + (2x^4 y + x \cos y) dy = 0$ is exact & find its solution.	U	2													
f)	Solve: $\frac{dy}{dx} + \sqrt{\frac{a^2 - y^2}{b^2 - x^2}} = 0$	A	2													
Q.6	Attempt any FOUR			(16)												
a)	Solve: $(x+1) \frac{dy}{dx} - y = e^x (x+1)^2$	A	2													
b)	Solve: $y dx = x dy + \sqrt{xy} \, dx$	A	2													
c)	Solve: $x(1+y^2) dx + y(1+x^2) dy = 0$	A	2													
d)	The mean & standard deviation of 100 observations were calculated as 40 & 51 respectively by a student who took by mistake 50 instead of 40 for one observation. What are the values of correct mean & correct standard deviation?	A	3													
e)	Find the standard deviation using step deviation method. <table><tr><td>Class intervals</td><td>0-10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td></tr><tr><td>Frequenc y</td><td>2</td><td>3</td><td>5</td><td>6</td><td>4</td></tr></table>	Class intervals	0-10	10-20	20-30	30-40	40-50	Frequenc y	2	3	5	6	4	A	3	
Class intervals	0-10	10-20	20-30	30-40	40-50											
Frequenc y	2	3	5	6	4											
f)	Three cards are drawn at random from a well-shuffled pack of 52 cards. find the probability that the cards draw contain i) All three spades ii) 2 kings & a ace iii) A king, queen & jack	A	4													

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ODD TERM END EXAM NOV/DEC -2017**EXAM SEAT NO.**

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LEVEL: FIRST**PROGRAM: COMMON****COURSE CODE: CCF106/0108/R108/X110/CCE106** **COURSE NAME: ENGINEERING MATHEMATICS****MAX. MARKS: 80****TIME: 3 HRS.****DATE: 21/11/2017**

Instruction:-

- 1) Answer to each section must be written in separate answer book.
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application

QN	S. Q. N	Question Text	Cognition Level R/U/A	Co Code	Marks
Q.1		Attempt any FOUR			(08)
	a)	Find 'k' if the points (4, k), (2, 0) and (-4, -9) are collinear.	R	CCF106-1	
	b)	Show that the roots of the equation $x^3 - 9x + 1 = 0$ lies between 2 and 3.	U	CCF106-4	
	c)	Find the distance between the two parallel lines $3x - 2y + 26 = 0$ and $3x - 2y + 11 = 0$	R	CCF106-2	
	d)	Find the perpendicular distance of the point (-1,-8) from the line $4x + 3y + 28 = 0$. What is the conclusion?	R	CCF106-2	
	e)	Find the slope and the intercepts made by the line $\frac{3x}{5} + \frac{2y}{7} = 11$ on both axes.	U	CCF106-2	
	f)	Find out which of the following circles is bigger. $x^2 + y^2 - 4x - 2y - 35 = 0$ and $x^2 + y^2 - 4x - 14y + 28 = 0$	U	CCF106-3	
Q.2		Attempt any FOUR			(16)
	a)	Find the area of quadrilateral whose vertices are (1, 5), (8, 2), (11, 3), (4, 6)	A	CCF106-1	
	b)	Find the equation of straight line passing through (5, 4), (3, -2). Also find slope and intercepts made by that line on both axes.	A	CCF106-2	
	c)	Find the equation of the perpendicular bisector of the join AB where A(3,-4) & B(-4,3)	A	CCF106-2	
	d)	Evaluate $\sqrt[3]{60}$ using Regula Falsi method, using 2 iterations.	A	CCF106-4	
	e)	Find a positive root of $f(x) = x^3 - 2x + 0.5$ using Bisection method, upto 3 iterations	A	CCF106-4	
	f)	Use Gauss Seidel method to solve the following simultaneous equations: $8x + 4y - 2z = 3$, $2x - 6y + z = 15$, $4x + 5y + 15z = 37$ up to 3 iteration.	A	CCF106-5	
				P.T.O	

Q.3	Attempt any FOUR			(16)
a)	Show that the following circles touch each other $x^2 + y^2 + 4x - 12y + 4 = 0$; $x^2 + y^2 - 2x - 4y + 4 = 0$	U	CCF106-3	
b)	Find the equation of circle which has its center at (4, 3) and touches the line $5x - 12y - 10 = 0$	A	CCF106-3	
c)	Solve by Jacobi's method (3 iterations only) $25x + 6y - z = 82$; $6x + 15y + 5z = 75$; $x + 4y + 40z = 66$	A	CCF106-5	
d)	Find approximate root of the equation $x^3 + x - 1 = 0$ by using bisection method (3 iteration only).	A	CCF106-4	
e)	Find the root of the equation $2x - \log_{10} x = 7$ using Regula Falsi method (3 iterations).	A	CCF106-4	
f)	Solve by Jacobi's method (Take 3 iterations) $2x + 20y - 3z = 19$; $3x - 3y + 25z = 22$; $15x + 2y + z = 18$	A	CCF106-5	
Q.4	Attempt any FOUR			(08)
a)	If $f(x) = x^2 + x + 1$ then find $f(x-1)$.	R	CCF106-3	
b)	Show that $f(x) = x^4 + 2x^2 + \cos x$ is an even function.	U	CCF106-3	
c)	Evaluate $\lim_{x \rightarrow 0} \frac{\sin 4x}{\tan 3x}$	R	CCF106-3	
d)	Evaluate $\lim_{x \rightarrow 5} \frac{x^3 - 125}{x^2 - 3x - 10}$	R	CCF106-3	
e)	Find $\frac{dy}{dx}$, if $y = e^{2x} + \log_5 x + \log_7 7$	R	CCF106-4	
f)	Find $\frac{dy}{dx}$, if $y = e^{\sin x + \cos x}$	R	CCF106-4	
Q.5	Attempt any FOUR			(16)
a)	If $f(x) = \frac{1}{1-x}$ show that , $f\{f[f(x)]\} = x$	U	CCF106-3	
b)	Evaluate $\lim_{x \rightarrow 1} \frac{\sqrt{3+x} - \sqrt{5-x}}{x^2 - 1}$	A	CCF106-3	
c)	Evaluate $\lim_{x \rightarrow \pi/4} \frac{\sin x - \cos x}{x - \pi/4}$	A	CCF106-3	
d)	If $y = \sin^{-1} \left[\frac{1-x^2}{1+x^2} \right]$ find $\frac{dy}{dx}$	A	CCF106-4	
e)	If $y = x^x + (\cos x)^x$ find $\frac{dy}{dx}$	A	CCF106-4	
f)	Find the equation of tangent and normal to the curve $y = x(2-x)$ at point (2,0)	A	CCF106-4	
Q.6	Attempt any FOUR			(16)
a)	Find $\frac{dy}{dx}$, if $\sin y = \log(x+y)$	A	CCF106-4	
b)	Find $\frac{dy}{dx}$, if $x = a[\cos t + t \sin t]$ and $y = a[\sin t - t \cos t]$	A	CCF106-4	
c)	If $y = (\sin^{-1} x)^2$ prove that , $(1-x^2) \frac{d^2 y}{dx^2} - x \frac{dy}{dx} - 2 = 0$	U	CCF106-4	
d)	If $y = \tan^{-1} \left[\frac{5x}{1-6x^2} \right]$ find $\frac{dy}{dx}$	A	CCF106-4	
e)	If $y = \sqrt{4x^2 - 3} \cdot (7x^2 + 6)^6$ find $\frac{dy}{dx}$	A	CCF106-4	
f)	Find the maximum and minimum value of $x^3 - 18x^2 + 96x$	A	CCF106-4	

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ODD TERM END EXAM NOV. / DEC. 2017

EXAM SEAT NO.

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LEVEL :- FOURTH

PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEE410 / ME309

COURSE NAME :- MECHANICAL MEASUREMENT AND MECHATRONICS

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 12 / 12/ 2017

Instruction :-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I		Marks
Q.1	Attempt any FOUR a) What do you mean by Threshold in measuring instruments? b) State the meaning of Dead time and Dade zone of instrument. c) Draw block diagram of zero order instrument and give two examples of it. d) State the working principle of Stroboscope. e) State four distinguishing points between Resistance thermometer and Thermistor. f) How humidity is measured by Absorption hygrometer?	(08)
Q.2	Attempt any FOUR a) Distinguish between first order and second order instruments with block diagrams and examples. b) Write the role of various functional elements in generalized measurement system, along with its block diagram. c) Explain the working of Bimetallic thermometer with sketch. d) Describe various errors in instruments, with the causes, examples and remedies, in short. e) Write any eight factors to be considered in selection of motor. f) Write the working of induction pick up tachometer, with sketch, in short.	(16)
Q.3	Attempt any FOUR a) Explain the working of LVDT, with its sketch. b) What are the various types of Strain gauge? Explain any one. c) Explain the working of hot wire Anemometer with sketch. d) Write the construction and working of Eddy current dynamometer, in short. e) Explain the working of float operated Rheostat with sketch, to measure the liquid level. f) Write the working of Electrodynamic Microphone.	(16)

P.T.O

Q.4 Attempt any **FOUR**

(08)

- a) What are the component of pneumatic system?
- b) State the function of data loggers.
- c) What is rotary actuator?
- d) Draw neat sketch of Microprocessor system.
- e) State the principle of working of solenoid.
- f) What is PLC?

Q.5 Attempt any **FOUR**

(16)

- a) State the selection factors for PLC.
- b) Explain with neat sketch the working of mercury wetted reed relay.
- c) Draw following directional control valves i) 5/2 way valve ii) 4/2 way valve.
- d) Compare microcontroller with microprocessor.
- e) State the principle of operation of successive Approximation A/D converter.
Draw its neat sketch.
- f) Explain the basic structure of PLC.

Q.6 Attempt any **TWO**

(16)

- a) i) Draw architecture of 8051 microcontroller.
ii) State and explain various types buses in microprocessor system.
- b) Draw neat block diagram of a generalized data acquisition system and explain it in detail.
- c) Explain with neat sketch principle and working of D.C. motor. Also state types of D.C. motors.

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO.

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LEVEL :- FIFTH

PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEE505

COURSE NAME :- COMPUTER INTEGRATED MANUFACTURING

MAX. MARKS : 80 TIME : 3 HRS. DATE: - 05 / 12 / 2016

Instruction :-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I

Marks

Q.1 Attempt any FOUR

(08)

- a) What are the advantages of CAD/CAM?
- b) List the major input/output devices used in CAD/CAM.
- c) Give classification of various types of surfaces used in geometric modelling.
- d) What is meant by automated entry?
- e) What are the advantages of DNC?
- f) Give the classification of CNC machine.

Q.2 Attempt any FOUR

(16)

- a) Write short note on printers (any two)
- b) Write short note on LCD display.
- c) Give comparison between line model with surface model.
- d) Explain with figure surface modelling.
- e) What are the advantages and limitations of CNC systems?
- f) Compare straight line control and contouring control

Q.3 Attempt any FOUR

(16)

- a) What is wireframe modelling? Explain its advantages, drawbacks and its applications.
- b) What is solid modelling?
- c) Write any four properties desired in any geometric modelling (solids) system.
- d) Compare open loop and closed loop NC systems.
- e) How CNC is classified based on axes of motion and co-ordinate system?
- f) Write a short note on DNC.

Q.4 Attempt any **FOUR**

(08)

- a) First block of a part programme on CNC is as follows:- N0001 P121 G90 G71 G94 M03 S800 EOB. Explain various terms in this programme.
- b) Explain six major degrees of freedom of a robotic system with neat sketch.
- c) Define automation. What is the need of automation with respect to productivity, labour cost and product quality?
- d) Explain the terms preparatory function and Miscellaneous function stating where these are used in a part programme.
- e) Enlist any two advantages and disadvantages of cartesian co-ordinated robot.
- f) Define FMS. Explain the necessity of adopting flexibility in production on the basis of change of product and change in demand of product.

Q.5 Attempt any **FOUR**

(16)

- a) What are the different statements used to write a part programme using Automatically Programmed Tools (APT)? Discuss each statement with the help of suitable examples.
- b) Define robotics. Explain the following components of a robotic system.
 - i) Manipulator, ii) Power supply, iii) Controller.
- c) Explain following components of FMS – i) Machine tools and related equipments ii) material handling equipments. iii) Computer control system. iv) Human labour.
- d) State and explain different power sources used for industrial robots.
- e) What are the advantages of using interchangeable fingers in end effectors over fingers integrated with end effectors? Explain the two ways of constraining a part in end effectors.
- f) Differentiate between fixed automation and flexible automation based on – production rate, flexibility to product design variation, Reprogramming ability.

Q.6 Attempt any **FOUR**

(16)

- a) Write a part programme for a job as shown in Fig. 1 Take only finish cut. Spindle Speed= 1200rpm, feed rate = 150mm/min. Assume suitable machining data if required.
OR
Refer Fig. 2 of a component. Direction of cut is in anticlockwise. Z=0 is at the top of surface of workpiece. Take feed = 65mm/min, speed=1000rpm and depth of cut= 10mm. Write a part programme for CNC milling.
- b) Why do industries are preferring robots for process operations like drilling, grinding, water jet cutting, riveting? Enlist any other four applications of industrial robots and explain any one of them.
- c) What are the basic elements of automation? Explain them with suitable examples and sketches.
- d) Enlist any four functions of sensors used in industrial robots. Classify the sensors based on functions performed.
- e) Explain following types of FMS :
 - i) Flexible manufacturing units. ii) Flexible manufacturing transfer line.
- f) What are the benefits of FMS related to i) Machine utilization ii) Work in progress iii) Manufacturing lead times. iv) Labour productivity. v) Production scheduling.

Q. 6 a)

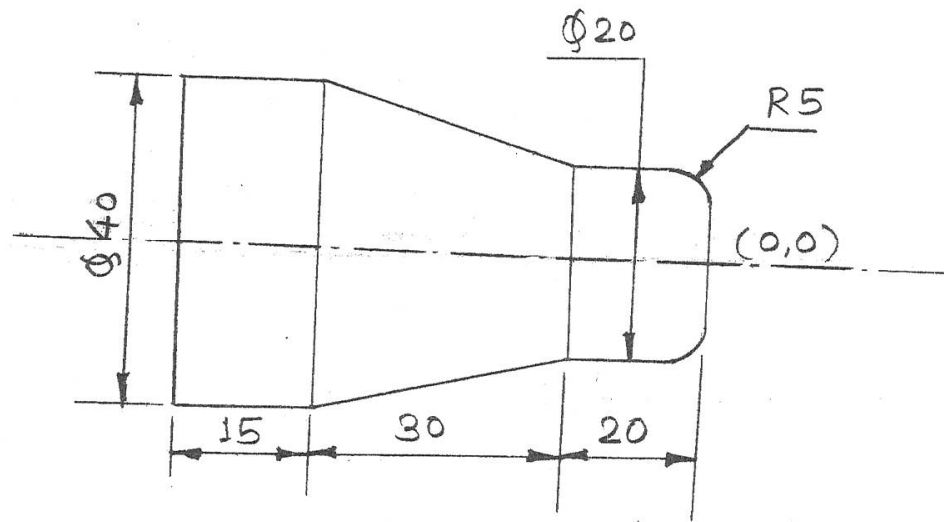


fig. 1

All dimensions are in mm

Q. 6 a)

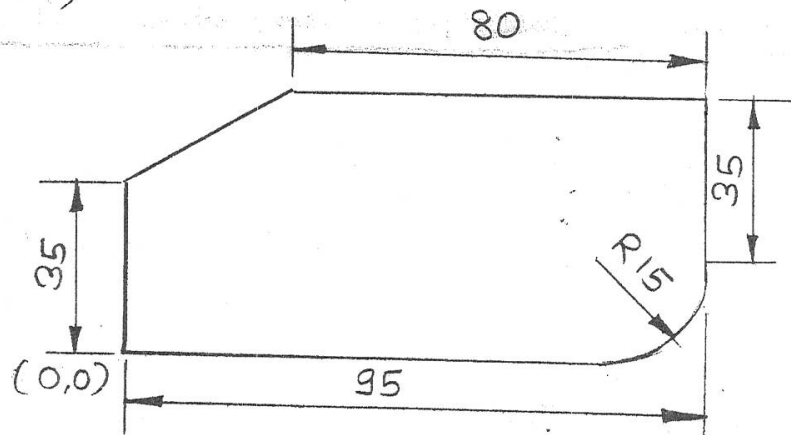


fig. 2

All dimensions are in mm

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO.

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LEVEL: FOURTH

COURSE CODE: ME409

MAX. MARKS: 80

PROGRAM: MECHANICAL ENGINEERING

COURSE NAME: REFRIGERATION & AIR CONDITIONS

TIME: 3 HRS.

DATE: 30/11/2016

Instruction:-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

	Section – I	Marks
Q.1	Attempt any FOUR	(08)
	a) Define refrigeration.	
	b) Draw neat labelled T-S diagram of reversed Carnot cycle.	
	c) Draw schematic representation of a Heat pump.	
	d) Classify refrigeration based on working principle.	
	e) Define unit of refrigeration.	
	f) Name types of refrigeration compressors.	
Q.2	Attempt any FOUR	(16)
	a) Explain Bell Coleman air refrigeration.	
	b) Explain ICE refrigeration with neat sketch.	
	c) Explain screw compressor with neat sketch.	
	d) Explain Electrolux refrigeration system,(Domestic)	
	e) Describe Evaporative condenser with neat labeled diagram.	
	f) Write desirable thermodynamic properties of the refrigerants.	
Q.3	Attempt any FOUR	(16)
	a) Compare vapour compression system with vapour absorption system.	
	b) Explain vortex tube refrigeration system with neat sketch.	
	c) Explain concept of Green House effect.	
	d) Draw neat labelled diagram of automatic expression valve.	

- e) Draw basic Aircraft cycle
- f) Explain dry expansion evaporator with neat sketch.

Section – II

Marks

Q.4 Attempt any **FOUR**

(08)

- a) Define sensible heating & sensible cooling.
- b) State major sources of heat-load for cold storage.
- c) List different types of outlets used in air distribution.
- d) Write advantages of central Air-conditioning system.
- e) Define effective temperature.
- f) State different types of unitary air-conditioning system

Q.5 Attempt any **FOUR**

(16)

- a) Define i) Air-Conditioning ii) Psychrometry
- b) Explain factors affecting human comfort.
- c) Classify air conditioning systems. Write applications air conditioning system.
- d) Write neat-sketch describe radial perimeter duct system used in Air-conditioning.
- e) Compare viscous filters with dry filters.
- f) State various type of losses occur in air conditioning system. Explain any one type of loss.

Q.6 Attempt any **TWO**

(16)

- a) With neat sketch, explain construction & working of central Air-conditioning system.
- b) Air is dehumidified from an initial condition of 32°C DBT & 80% RH to 25°C DBT & 15°C WBT. Find moisture removed, drop in enthalpy per kg of dry air, show process on psychometric chart.
- c) State methods of applying insulation. Explain any one type of method with neat sketch.

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO.

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LEVEL :- THIRD PROGRAM : MECHANICAL ENGG.

COURSE CODE :- MEE302/ME202/M202/2202

COURSE NAME :- THERMAL ENGINEERING

MAX. MARKS : 80 TIME : 3 HRS. DATE: - 23 / 11 / 2016

Instruction:-

- 1) Answers must be written in the main answer book provided.(and supplements if required)
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Marks

USE STEAMTABLE MOLLIER CHART IS PERMITTED.

Q.1 Attempt any FOUR (08)

- a) Define thermodynamic work with unit.
- b) Define extensive properties of system with suitable example.
- c) Explain term internal energy with unit.
- d) Define C.O.P. for heat pump.
- e) Define zeroth law of thermodynamics.
- f) State Charle's law.

Q.2 Attempt any FOUR (16)

- a) Explain the concept of thermodynamic system with its types.
- b) Write steady flow energy equation and apply it to boiler and condenser.
- c) Draw P-V & T-S diagram for Isothermal and Adiabatic gas process.
- d) 1Kg of gas is heated from 18°C to 93°C assuming $R=0.264\text{KJ/kgK}$ and $\gamma=1.18$ for the gas Find :- 1) Specific heats 2) Change in internal energy
3) Change in enthalpy.
- e) Write the applications of heat exchangers.
- f) A wall of refrigerator of 1.5mm of steel sheet at outer surface, 10mm plywood at inner surface and 2cm of glass wool in between. Calculate the rate of heat flow if the temperature of the inside and outside surfaces are -15°C & 24°C .
Take K (for steel) $=23.3 \text{ W/m}^{\circ}\text{K}$.
 K (for glass) $=0.14 \text{ W/m}^{\circ}\text{K}$.
 K (for plywood) $=0.052 \text{ W/m}^{\circ}\text{K}$.

Q.3 Attempt any FOUR (16)

- a) Write the differences between heat and internal energy.
- b) Define second law of thermodynamics according to Kelvin planks and Clausius statement.
- c) Define first law of thermodynamics with its limitations.
- d) Explain with neat sketch the heat engine and heat pump.
- e) Write the values of polytropic index (n) for various gas processes.
- f) Define i) Stefan Boltzman's Law ii) Black body. iii) Gray body iv) Fourier Law.

[P.T.O.]

Q.4 Attempt any **FOUR**

(08)

- a) Determine the dryness fraction of the steam of 0.8kg of water is in suspension with 35kg of dry steam.
- b) Classify the boilers.
- c) Sketch a Bourdon tube pressure gauge.
- d) Write the principle of steam turbine.
- e) Give the objectives of condenser.
- f) What is the need of cooling towers in steam power plant?

Q.5 Attempt any **FOUR**

(16)

- a) Internal energy of 1kg mass of steam at 10 bar absolute pressure is 2400KJ.
Calculate the dryness fraction of the steam at 10bar pressure, data from steam table:
Saturation Temperature, $T_{sat} = 179.91^{\circ}\text{C}$.
Enthalpy of water $h_f = 762.82 \text{ KJ/kg}$.
Enthalpy of Saturated steam $h_g = 2778.1 \text{ KJ/kg}$.
Latent heat $h_{fg} = 2015.3 \text{ KJ/kg}$.
Specific volume of steam $v_g = 0.1944 \text{ m}^3/\text{kg}$.
- b) Draw H-S chart and show on it. i) Constant pressure process
ii) Constant dryness fraction line.
iii) Constant temperature line.
iv) constant volume line.
- c) Differentiate between water tube boiler and fire tube boiler (any four points).
- d) Draw a neat sketch of economiser and name its parts.
- e) Show the steam pressure and steam velocity distribution for an Impulse turbine.
- f) Distinguish clearly between Jet condenser and surface condenser.

Q.6 Attempt any **TWO**

(16)

- a) Why compounding of steam turbine is required? Give different methods. Explain any one method.
- b) Describe in detail formation of steam from water at 0°C with the help of temperature enthalpy diagram.
- c) i) Draw a neat sketch of Loeffler boiler.
ii) Give the sources and effects of air leakage in the condenser.

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO.

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LEVEL: FIRST

COURSE CODE: CCE108/X107/R110

MAX. MARKS: 80

PROGRAM: COMMON

COURSE NAME: ENGINEERING DRAWING-II

TIME: 4 HRS.

DATE: 15/11/2016

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Q.1 Attempt the following

**Marks
(16)**

- a) Fig. No.1 shows the pictorial view of an object. Using first angle method, draw
- i) Front view looking in the direction X - (05 Marks)
 - ii) Top view (05 Marks)
 - iii) Side view from the right (04 Marks)
 - iv) Dimensioning (02 Marks)

Q.2 Attempt any **ONE**

(16)

- a) Fig. No. 2 shows the pictorial view of an object, Using first angle method, draw the following views
- i) Sectional front view, section on A-A (06 Marks)
 - ii) Top view (06 Marks)
 - iii) Side view from left (04 Marks)
- b) Fig. No. 3 shows the pictorial view of an object. Using first angle method. Draw the following views
- i) Sectional front views, section on A-A (06 Marks)
 - ii) Top view (06 Marks)
 - iii) Side view from left (04 Marks)

Q.3 Attempt any **FOUR** of the following

(08)

- a) Square thread
- b) Acme thread
- c) Capstan nut
- d) Wing nut
- e) Lewis foundation bolt
- f) Hook headed bolt.

P.T.O

Q.4 Attempt any TWO**(08)**

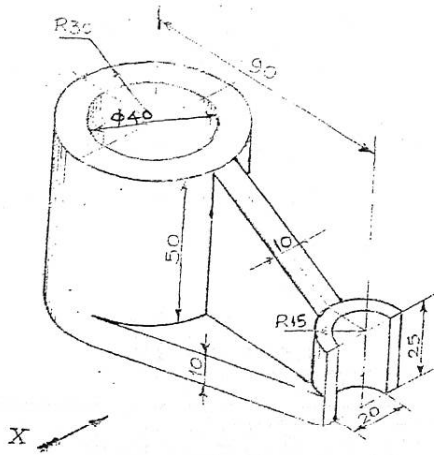
- a) Draw the development of the lateral surface of the frustum of the square pyramid, as shown in figure No.4
- b) Draw the development of lateral surface of a cone, whose base diameter is 60mm and height is 70mm.
- c) Draw the development of the surface of the part P of the cube, the front view of which is shown in figure No.5

Q.5 Attempt any TWO**(16)**

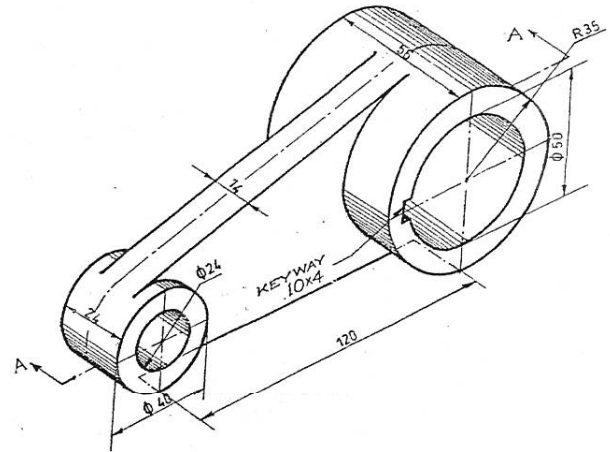
- a) A cylinder having base diameter 50mm and axis length 70mm, has its base in H.P. A square hole of side equally inclined with H.P and its axis being perpendicular to V.P and bisecting the axis of cylinder. Length of side of square hole is 25. Draw the development of the lateral surface of the cylinder with the hole.
- b) Figure No.6 shows front view and top view of an object. Draw its only left hand side view show necessary dimensions in it.
- c) Figure No.7 shows front view and top view of an object. Draw its only left hand side view. Show necessary dimension in it.

Q.6 Attempt any TWO**(16)**

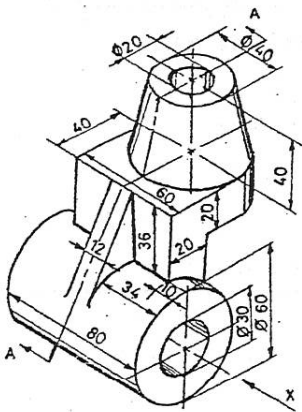
- a) Figure no.8 shows front view and top view of an object. Draw its isometric view, taking 'O' as an origin.
- b) Figure No.9 shows front view and right hand side view of an object. Draw its isometric projection, taking 'O' as an origin. Use isometric scale.
- c) Figure No.10 shows front view and top view of an object. Draw its isometric view, taking 'O' as an origin



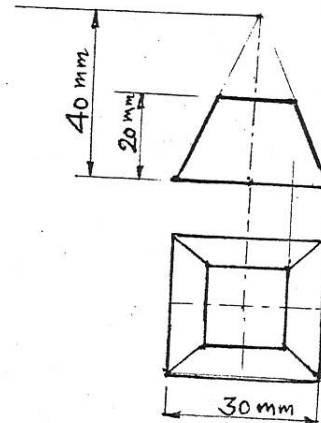
Que 1 (a) Fig. No: 1



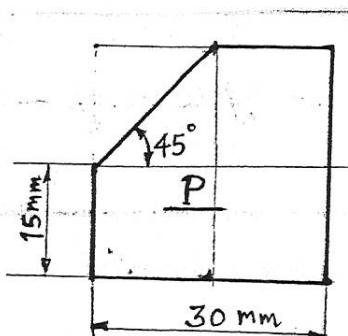
Que 2 (a) Fig. No: 2



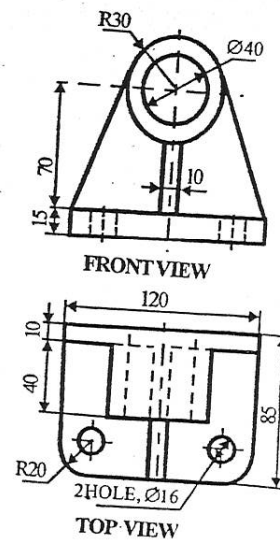
Que 2 (b) Fig. No: 3



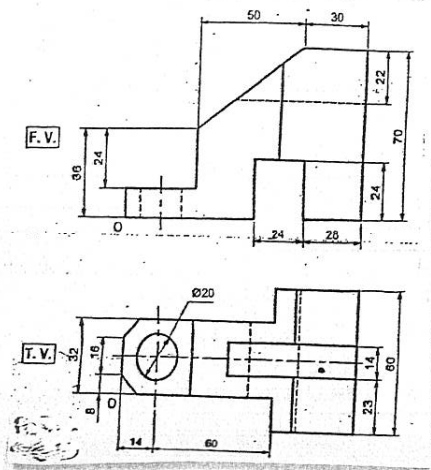
Que 4: (a) Fig. No: 4



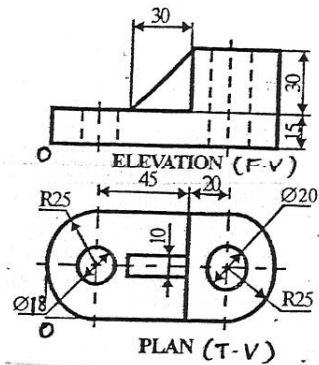
Que 4: (c) Fig. No: 5



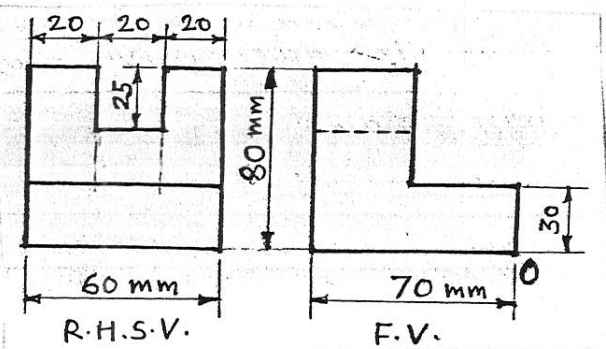
Que 5: (b) Fig. No: 6



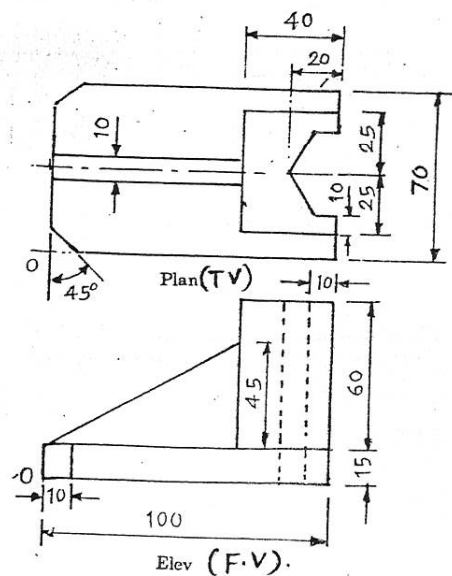
Que 5:(c) Fig.No: 7



Que 6:(a) Fig.No: 8



Que 6. (b) Fig.No: 9



Que 6 (c) Fig.No: 10

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO.

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LEVEL :- THIRD

PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEE306/ME206/M206

COURSE NAME :- MACHINE TOOLS

MAX. MARKS : 80 TIME : 3 HRS. DATE: - 01 / 12 / 2016

Instruction:-

- 1) Answers must be written in the main answer book provided.(and supplements if required)
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Marks

Q.1 Attempt any TWO

(08)

- a) List the types of chips and explain them with neat sketches.
- b) How will you classify lathe machines?
- c) Define cutting speed, feed, depth of cut and machining time with respect to drilling machine with formula.

Q.2 Attempt any FOUR

(16)

- a) Describe the taper turning method by ^w/_Λivelling compound rest with neat sketch.
- b) What do you mean by Grooving? Explain various grooving operations with neat sketches.
- c) Differentiate between orthogonal cutting and oblique cutting with neat sketch sketches.
- d) Show the following elements and angles on a single point cutting tool.
i) Flank ii) Side Cutting Edge Angle iii) Side rake angle iv) Shank
- e) Explain the following operations with neat sketch i) Drilling ii) Boring.
- f) How will you specify Radial Drilling machine?

Q.3 Attempt any TWO

(16)

- a) Describe various elements and angles of a twist drill nomenclature with neat sketches.
- b) i) Explain the types of cutting fluids. (04)
ii) What are the purposes to use cutting fluids? (04)
- c) i) Describe with functions the following lathe parts 1) The Bed 2) Carriage. (06)
ii) List the remaining Basic Parts of Lathe Machine. (02)

(P.T.O.)

Q.4 Attempt any **FOUR**

(08)

- a) How slotting machine is specified?
- b) Enlist basic parts of planners.
- c) Define grit and grade.
- d) Clasify various super finishing processes.
- e) What is butting process?
- f) Enlist atleast four broaching operations.

Q.5 Attempt any **FOUR**

(16)

- a) Enlist basic parts of shapers and explain the specifications.
- b) Explain honing process with it's set up required.
- c) Describe the burnishing process with advantages and applications.
- d) Differentiate between polishing and buffing process.
- e) Enlist basic parts of horizontal broaching machine and give the functions.
- f) Explain any two broaching methods.

Q.6 Attempt any **TWO**

(16)

- a) Describe the working of Quick return mechanism used for shaping machine with sketch.
- b) Explain the working and applications of tool and cutter grinder with sketch.
- c) Explain the various factors considered for selection of grinding wheels.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO.

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LEVEL: FIFTH.

COURSE CODE: MEE510/ME411.

PROGRAM: MECHANICAL ENGG.

COURSE NAME: INDUSTRIAL HYDRAULIC & PNEUMATICS.

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 03/12/2016.

Instruction:-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I

Marks

Q.1 Attempt any FOUR

(08)

- a) What is a function of accumulator?
- b) Enlist four industrial applications of hydraulic system.
- c) What are the basic components of hydraulic system?
- d) Classify hydraulic fluids.
- e) Enlist at least four pumps used in hydraulic system.
- f) What is positive displacement pump?

Q.2 Attempt any FOUR

(16)

- a) Draw a neat sketch of sequencing circuit and give its application.
- b) Explain the working of gear pump with simple sketch.
- c) Draw a general layout of oil hydraulic system.
- d) Enlist and explain at least eight properties of good hydraulic oil.
- e) Draw a neat sketch of $\frac{3}{2}$ D.C.V. and explain.
- f) Classify various oil filters used in hydraulic system and explain any one with sketch.

Q.3 Attempt any TWO.

(16)

- a) 1) Hydraulic circuit for shaper machine. Draw and explain workings.
2) What care and maintenance required in hydraulic system? Explain in brief.
- b) Explain meter in meter out circuit. Draw & give their specific application in industries.
- c) Why accumulator is used in hydraulic circuit? What are types of accumulator? Explain diagram type accumulator.

P.T.O.

Q.4 Attempt any **FOUR**

(08)

- a) Enlist various components of pneumatic system.
- b) Draw symbols of following components.
1) FRL unit 2) Shuttle valve.
- c) Why is compressed air costly?
- d) Classify compressors used in pneumatic systems.
- e) Draw symbol of time delay valve.
- f) Enlist different pipe materials used in pneumatic systems.

Q.5 Attempt any **FOUR**

(16)

- a) State any four merits and demerits of pneumatic systems.
- b) Explain with neat sketch construction and working of screw compressor.
- c) Draw and explain pneumatic circuit to operate single acting cylinder using $\frac{3}{2}$ direction control valve.
- d) Draw and explain working of variable type flow control valve.
- e) Draw labelled diagram of air cylinder.
- f) Draw a simple pneumatic circuit to operate single acting cylinder using a shuttle valve and two $\frac{3}{2}$ D.C. valves.

Q.6 Attempt any **FOUR**

(16)

- a) Compare Hydraulic and pneumatic systems.
- b) Explain with neat sketch working of time delay valve.
- c) Explain with neat sketch working of air filter.
- d) State advantages of air motors.
- e) Draw speed control circuit for double acting cylinder.
- f) Draw position based sequencing circuit.

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO.

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LEVEL : - THIRD PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEE309/ME209/M209/2209

COURSE NAME :- ELECTRICAL TECHNOLOGY

MAX. MARKS : 80 TIME : 3 HRS. DATE: - 30 / 11 / 2016

Instruction:-

- 1) Answers must be written in the main answer book provided.(and supplements if required)
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Marks

Q.1 Attempt any FOUR

(08)

- a) Define active and passive networks.
- b) State advantage of using Clip-on-Meter.
- c) Define average value of alternating quantity.
- d) Define capacitance reactance. State its unit.
- e) What is earthing?
- f) Draw circuit for 3phase, 4wire star connected supply system.

Q.2 Attempt any FOUR

(16)

- a) Find equivalent resistance between terminals AB.
- b) State and explain Kirchoff's laws.
- c) Draw symbol and state the use of Wattmeter and ammeter.
- d) For R-L series circuit.
 - 1) Draw the circuit diagram.
 - 2) Write the voltage and current equations.
 - 3) Draw vector diagram.
 - 4) Draw impedance triangle.
- e) Explain generation of three phase voltages in brief.
- f) Draw neat sketch for plate earthing.

Q.3 Attempt any FOUR

(16)

- a) State relation between line voltage and phase voltage of star and delta connected system. Also state the active and reactive power relations in both loads.
- b) Define the following terms:
 - i) Wave form ii) Crest Value iii) periodic time iv) Instantaneous value.
- c) Draw diagram, vector diagram and state current voltage relations for purely capacitive circuit.
- d) State and explain the laws of electromagnetic induction.
- e) Define i) Inductance ii) Resistance.

Also state their units.
- f) Compare series and parallel circuits.

(P.T.O.)

Q.4 Attempt any **FOUR**

(08)

- Define transformer, state on which principle it works.
- Classify d.c. motors.
- State any two applications of induction heating.
- State inverse square law of illumination.
- How direction of rotation of 3-phase induction motor be reversed?
- State illumination level for i) Study room ii) Workshop.

Q.5 Attempt any **FOUR**

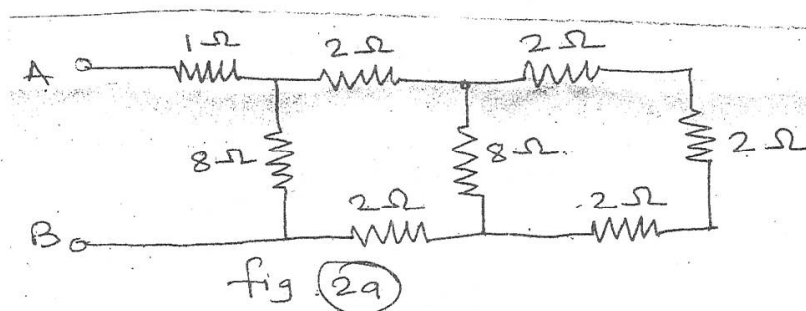
(16)

- State types of rotors used in 3- phase induction motor. Describe any one in detail.
- State various losses taken place in transformer.
- Give classification of d.c. motor and draw their schematic diagram.
- Describe with neat sketch, working of any one type of induction furnace.
- Draw and explain D.O.L starter.
- Explain in brief Dielectric heating, state its principle and applications.

Q.6 Attempt any **TWO**

(16)

- Explain with neat circuit diagram, the procedure to find efficiency of a given single phase transformer by direct loading method.
- State working principle of stepper motor, explain its constructional details. State its applications.
- Explain with neat sketch star-delta starter used for 3-phase induction motor.



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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO.

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LEVEL: FIRST

PROGRAM: COMMON

COURSE CODE: CCE106/X110/R108/0108 COURSE NAME: ENGINEERING MATH'S

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 23/11/2016

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Q.1 Attempt any FOUR

**Marks
(08)**

- a) Find the centroid of the triangle whose vertices are (2, -1) (8, -2) & (8, 6)
- b) Find the slope, x intercept and y- intercept of the line $2x+y-5=0$
- c) Find the perpendicular distance from the point (3,4) on the line $3x+4y=7$
- d) Find the acute angle between the lines whose slopes are $-\frac{1}{3}$ and $\frac{1}{2}$
- e) Find the center and radius of a circle $x^2 + y^2 + 6x - 4y - 12 = 0$
- f) Find the equation of a circle whose diameter is seg AB where A(2, 4) & B(-3, 5)

Q.2 Attempt any FOUR

(16)

- a) Find the area of $\triangle ABC$ where $A \equiv (2,3)$, $B \equiv (4,1)$, $C \equiv (-1,2)$
- b) Find the equation of straight line through (3, 4) and parallel to a line with x intercept 5 and y intercept 10.
- c) Find the equation of a straight line passing through the point of intersection of the lines $4x+3y=8$ and $x+y=1$ and perpendicular to the line $2x-3y+5=0$
- d) Find k if the line joining the points (-4, k) and (5, 2) is parallel to the line joining the points (0, k+1) and (6, 1)
- e) Find the equation of the circle which passes through the points (-2, -1), (2, 3) and whose center lies on the line $2x+y+1=0$
- f) Find the equation of tangent and normal to the circle $x^2 + y^2 + 4x - 12y + 15 = 0$ at (1,2)

Q.3 Attempt any TWO

(08)

- A]** i) Find $\sqrt[3]{10}$ by Bisection method (upto 4 iterations)
- ii) using Regula falsi method find the root of the equation $xe^x - 3 = 0$ (upto 3 iterations only)
- iii) Find $\frac{1}{\sqrt[3]{67}}$ by Newton-Raphson method (upto 3 iterations only)

B] Attempt any TWO

- i) Solve the equation $5x-2y+z=4$, $7x+y-5z=21$ and $3x+7y+4z=-16$ by Gauss- Elimination method. **(08)**

- ii) Solve the following equations by Gauss-seidel method
 $25x + 6y - z = 82$, $6x + 15y + 5z = 75$, $x + 4y + 40z = 66$ (Three Iterations only)
- iii) Use Jacobi's method to solve the equations
 $5x - 2y + z = 4$, $x + 4y + z = 12$, $x + 2y + 5z = 20$

Q.4 Attempt any FOUR

(08)

- a) If $f(x) = 16^x + \log_2^x$, find the value of $f(1/4)$
- b) Evaluate $\lim_{x \rightarrow \infty} \left(\frac{x-1}{x} \right)^x$
- c) Find the point on the curve $y = 3x - x^2$ at which slope is -5
- d) If $y = \sqrt{\frac{1 - \cos 2x}{1 + \cos 2x}}$ find $\frac{dy}{dx}$
- e) Find $\frac{dy}{dx}$ if $x = r \cdot \cos \theta$, $y = r \cdot \sin \theta$
- f) Find $\frac{dy}{dx}$, if $y = x \cdot \sin x + \cos x$

Q.5 Attempt any FOUR

(16)

- a) A manufacturer can sell x items at price of RS $(380 - x)$ each. The cost of productions x items in RS is $x^2 + 10x + 12$. How many items must be sold so that his profit is maximum?
- b) If $f(x) = \frac{x-4}{4x-1}$, then show that $f[f(x)] = x$
- c) Evaluate $\lim_{x \rightarrow \infty} (\sqrt{x^2 + 1} - x)$
- d) If $e^x + e^y = e^{x+y}$, find $\frac{dy}{dx}$
- e) If $x = 3 \sin \theta - 2 \sin^3 \theta$, $y = 3 \cos \theta - 2 \cos^3 \theta$ find $\frac{dy}{dx}$ at $\theta = \pi/4$
- f) Differentiate $\cos^{-1} \left(\frac{1-x^2}{1+x^2} \right)$ w.r.t $\sin^{-1} \left(\frac{2x}{1+x^2} \right)$

Q.6 Attempt any FOUR

(16)

- a) A particle starting with velocity 6 m/s has an acceleration $(1-t^2)$ m/s². When does it first come to rest? How far has it then travelled?
- b) If $f(x) = \log(1 + \tan x)$ show that $f\left(\frac{\pi}{4} - x\right) = \log 2 - f(x)$
- c) Evaluate $\lim_{x \rightarrow a} \frac{\sin x - \sin a}{\sqrt{x} - \sqrt{a}}$
- d) If $y = a \cdot \cos(\log x) + b \sin(\log x)$, prove that $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = 0$
- e) Find $\frac{dy}{dx}$ if $y = x^{\sin x} + (\tan x)^x$
- f) If $\log \sqrt{x^2 + y^2} = \tan^{-1} \left(\frac{y}{x} \right)$, find dy/dx

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ODD TERM END EXAM NOV. / DEC 2016

EXAM SEAT NO.

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LEVEL :- FOURTH

PROGRAM : MECHANICAL ENGINEERING

COURSE CODE :- MEE403/ME303/M303/2303

COURSE NAME :- ADVANCED MACHINING PROCESSES

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 25 / 11 / 2016

Instruction :-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I		Marks
Q.1	Attempt any TWO	(08)
	a) Explain with neat sketch basic parts of column and knee type vertical milling machine.	
	b) Write, what is plain type and Pallet type transfer machine?	
	c) Explain with figure, how gears are manufactured on milling machine.	
Q.2	Attempt any FOUR	(16)
	a) Explain in brief why non-conventional machining processes are necessary.	
	b) How milling machines are specified? Write in detail.	
	c) Explain with neat sketch working of 'Electron Beam Machining'.	
	d) Write different methods of gear finishing and explain gear-shaving process in it.	
	e) Differentiate between Up milling and Down milling operation	
	f) What are the different methods of indexing in case of gear manufacturing and explain direct indexing method?	
Q.3	Attempt any FOUR	(16)
	a) What are the different operations performed on milling machine? Explain side milling operation with figure.	
	b) What are the functions of dielectric fluid used in EDM process?	
	c) With neat sketch, explain working of wire cut EDM process.	
	d) Explain with neat sketch Pinion cutter generating process of gear on shaping machine.	
	e) What are the advantages of EDM process?	
	f) State the advantages and disadvantages of transfer machines.	

Q.4 Attempt any **TWO** (08)

- a) Define CNC. How it differs from DNC?
- b) Describe principal parts of Horizontal machining center with a neat sketch.
- c) Enlist advantages and limitations of CNC.

Q.5 Attempt any **FOUR** (16)

- a) Describe CNC systems based on control system features.
- b) Describe incremental coordinate system with an example.
- c) How will you identify axes in CNC machines?
- d) Define n words, G words, S words, F word and T words used in CNC programming.
- e) Describe Miscellaneous Functions with suitable codes. (any four)
- f) Describe threading canned cycle with an example.

Q.6 Attempt any **FOUR** (16)

- a) Describe subroutines with an example.
- b) What do you know about cutter radius compensation? Describe with G codes used for it.
- c) Describe fixed block format and tab sequential format with suitable example.
- d) Write about Repair Cycle analysis.
- e) State the importance of maintenance. Enlist the various types.
- f) What you know about maintenance record?

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO.

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LEVEL : - THIRD PROGRAM : MECHANICAL ENGG.

COURSE CODE :- MEE304/ME204/M204

COURSE NAME :- MANUFACTURING PROCESSES

MAX. MARKS : 80 TIME : 3 HRS. DATE: - 24 / 11 / 2016

Instruction:-

- 1) Answers must be written in the main answer book provided.(and supplements if required)
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Marks

Q.1 Attempt any TWO

(08)

- a) What is pattern? What are the common pattern making materials?
- b) Draw the neat sketch of green sand mould and label its principal parts.
- c) List the various forging operations. Explain Bending Operations by forging with neat sketch.

Q.2 Attempt any FOUR

(16)

- a) Explain the following casting defects with their causes and remedies.
 - i) Shift ii) Drop.
- b) Explain shell Moulding with neat sketches.
- c) Describe Dry Sand Moulding with neat sketches.
- d) Explain Machine Forging with neat sketch.
- e) List the various forgeable materials with their forgeability.
- f) What are the types of patterns? Explain with neat sketch Sweep Pattern.

Q.3 Attempt any TWO

(16)

- a) Draw the neat sketch of Cupola Furnace and Label the parts. Show the various zones on it and explain them in brief.
- b) Give the classification of Moulding Machines. Explain the working principle of squeezer machine with neat sketch.
- c) Why allowances are provided on pattern? Describe with neat sketches the various pattern allowances.

[P.T.O.]

Q.4 Attempt any **FOUR**

(08)

- a) Sketch a pilot. State its use.
- b) Show a bending operation with a neat sketch.
- c) What is a coated welding electrode?
- d) Define hot rolling.
- e) List different types of plastics.
- f) State the advantages of plastic moulding.

Q.5 Attempt any **FOUR**

(16)

- a) Sketch a power press and label it.
- b) Sketch a stripper. State its use.
- c) Write about welding defects.
- d) What do you know about gas welding techniques?
- e) Describe shielded metal arc welding process.
- f) Define soldering and brazing. Give examples of each.

Q.6 Attempt any **FOUR**

(16)

- a) Describe indirect extrusion with a neat sketch.
- b) State the advantages of cold rolling.
- c) Sketch different types of mills used in rolling.
- d) State the limitations of extrusion.
- e) Describe compression moulding process.
- f) What is blow moulding?

GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO.

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LEVEL: FOURTH

COURSE CODE: MEE410/ME309

PROGRAM: MECHANICAL ENGINEERING

**COURSE NAME: MECHANICAL MEASUREMENT &
MECHATRONICS**

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 01/12/2016

Instruction:-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I

Marks

Q.1 Attempt any FOUR

(08)

- a) Define Accuracy and precision
- b) State Seebeck effect
- c) Define overshoot and fidelity.
- d) Distinguish between Threshold and Resolution
- e) Define Gauge factor
- f) Define force and torque

Q.2 Attempt any FOUR

(16)

- a) Describe classification of methods of measurements.
- b) Explain the construction and working of potentiometer.
- c) Describe Hot wire anemometer with neat sketch.
- d) Explain Drag cup tachometer with neat diagram.
- e) Explain Generalized measurement system.
- f) Explain absorption hygrometer.

Q.3 Attempt any FOUR

(16)

- a) State the various sources of errors.
- b) Explain photo-electric pick-up tachometer.
- c) Explain Radiation pyrometer.
- d) Explain with a neat sketch the capacitive system for liquid level measurement.
- e) Write selection and installation of strain gauge.
- f) Explain Electrodynamic microphone.

P.T.O

Q.4 Attempt any **FOUR****(08)**

- a) State the significance of mechatronics in mechanical engineering field.
- b) What are buses in microprocessor system?
- c) What do you understand by microcontroller?
- d) State the role of EPROM and ALU in microprocessor.
- e) Write any four applications of solenoids.
- f) State any four features of mercury Reed Relay.

Q.5 Attempt any **FOUR****(16)**

- a) Draw block diagram of 8051 microcontroller. State its any four specific features in its architecture.
- b) What are the common types of Register in microprocessor? State their functions.
- c) What is microprocessor? Compare microprocessor with microcontroller in any three points.
- d) Define PLC. Draw block diagram of PLC.
- e) Explain data acquisition system with its general block diagram.
- f) Explain the working of successive Approximation A/D converter.

Q.6 Attempt any **FOUR****(16)**

- a) Explain data logger system with its block diagram.
- b) Write working of stepper motor with its sketch.
- c) State any eight parameters in the selection of motor and explain them in short.
- d) Explain field current interaction principle and working of D.C motor.
- e) Draw hydraulic system and state the function of its various components.
- f) State Electromagnetic principle. Draw neat sketch of Electromagnetic Relay and explain its working in short.

GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.

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ODD TERM END EXAM NOV./ DEC -2016

EXAM SEAT NO.

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LEVEL : - THIRD PROGRAM : MECHANICAL ENGG.

COURSE CODE :- MEE308/ME208/M208

COURSE NAME :- THEORY OF MACHINES AND MECHANISM

MAX. MARKS : 80 TIME : 3 HRS. DATE: - 18 / 11 / 2016

Instruction:-

- 1) Answers must be written in the main answer book provided.(and supplements if required)
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Marks

Q.1 Attempt any FOUR

(08)

- a) Explain with a sketch incompletely constrained motion.
- b) Compare between machine and structure.
- c) What are the properties of instantaneous centres?
- d) What are applications of single slider crank chain?
- e) State different types of instantaneous centres.
- f) What is pantograph? State its two applications?

Q.2 Attempt any TWO

(16)

- a) i) Explain with neat sketch working of Whitworth quick return mechanism.
ii) Classify Kinematic pairs based on the type of relative motion between the elements, suggest one example for each.
- b) i) What is condition for correct steering? Sketch and explain any one type of Steering gear mechanism.
ii) Classify followers according to the surface in contact. Draw suitable sketches.
- c) A single slider mechanism is shown below. It has crank OA = 200mm, AP = 700mm & angular velocity of crank OA is 10 rad/sec. Find velocity and acceleration of Piston P, angular velocity of link PA and the velocity of point B at a distance of 25cm from A on link AP when angle of crank is 45° .

[P.T.O.]

Q.3 Attempt any **TWO**

(16)

- a) Construct the profile of Cam to suit the following specification.
- i) Cam shaft diameter = 40mm
 - ii) Least radius of Cam = 25mm.
 - iii) Diameter of roller = 25mm.
 - iv) Angle of lift = 120° .
 - v) Angle of fall = 150° .
 - vi) Lift of the follower = 40mm.
 - vii) Number of dwells are two of equal interval between motions during the lift motion is S.H.M. during the fall the motion is uniform acceleration and deceleration. The speed of cam shaft is uniform the line of stroke of the follower is offset 12.5 mm from the centre of cam.
- b) i) Sketch & explain working of bull engine.
ii) Sketch and explain Scott Russell's mechanism in detail.
- c) In a slider crank mechanism, crank OA is 30mm long and length of connecting rod is 120mm. The crank makes an angle of 30° with IDC and rotates with uniform speed of 200 rpm clockwise.
Determine i) Angular acceleration of connecting rod. ii) Acceleration of slider.

Q.4 Attempt any **FOUR**

(08)

- a) What is the effect of centrifugal tension on power transmission? State the condition for maximum power to be transmitted by belt drive.
- b) State the expression for power transmitted by belt drive.
- c) Two shafts with centre to centre distance between them as 3 metre, are having two pulleys with radii equal to 240mm and 320mm respectively. Find the length of belt required for cross belt drive.
- d) What do you understand by gear train? Define train value.
- e) State the functional difference between governor and flywheel.
- f) Define sensitiveness of governor.

Q.5 Attempt any **FOUR**

(16)

- a) Derive an expression for the ratio of tight side tension to slack side tension in case of belt drive.
- b) Compare flat belt and 'V' belt drive in eight points.
- c) V belt is used on a set of pulleys running at 15m/sec.
The maximum tension is 1350N, designed for maximum power condition. Angle of contact is 160° and coefficient of friction as 0.25. The groove angle is 45° .
Calculate the power transmitted.
- d) Describe with neat sketch, the working of multiplate clutch in short.
- e) Derive an expression for torque by uniform wear consideration, in case of single plate clutch.
- f) A single plate clutch, with both sides effective, has outer and inner diameters 300mm and 200mm respectively. The maximum intensity of pressure at any point in the contact surface is not to exceed 0.1 N/mm^2 . If the coefficient of friction is 0.3, determine the power transmitted by a clutch at a speed of 2500rpm.

- a) Explain various terminologies of gear with neat labelled sketch.
- b) The gearing of a machine tool is shown in figure no.1 the motor shaft is connected to A and rotates at 975rpm. The gear wheels B, C, D and E are fixed to parallel shafts rotating together. The final gear F is fixed on the output shaft G. What is the speed of F? the number of teeth on each wheel are as given below

Gear	A	B	C	D	E	F
No. of Teeth	20	50	25	75	26	65

- c) Explain the difference between simple gear train and compound gear train with neat sketch.
- d) Explain the working of Pickering governor with neat sketch.
- e) Draw a neat sketch of Hartnell governor and explain it.
- f) Explain the principle of working of centrifugal governor with neat sketch.

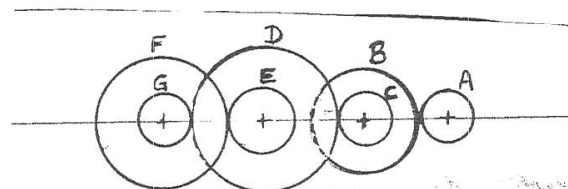
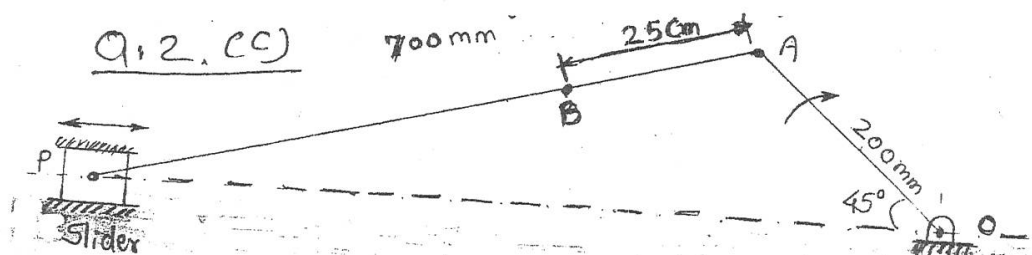


Fig. No. 1. (Que. No. G. b)

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ME-02
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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO.

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LEVEL: THIRD

PROGRAM: MECHANICAL ENGINEERING

COURSE CODE: MEE310/ME210/2213/M211 COURSE NAME: ENGINEERING METALLURGY & MATERIALS

MAX. MARKS: 80

TIME: 3 HRS.

DATE:02/12/2016

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Q.1 Attempt any FOUR

**Marks
(08)**

- a) What is an extractive metallurgy?
- b) How the study of physical metallurgy is important for mechanical engineering student?
- c) State the role of metallurgist in engineering field.
- d) State the peritectoid reaction.
- e) State two properties and applications of Heat Resisting steel
- f) Write any two effects of alloying elements like nickel, manganese and copper on Fe-C diagram.

Q.2 Attempt any FOUR

(16)

- a) What are the space lattice and unit cell. State the various crystal structures of metal, along with the relationships between various parameter in their unit cell.
- b) Determine the packing factor of B.C.C lattice structure. State the metals processes BCC lattice structure.
- c) Distinguish between substitutional and interstitial solid solution in eight points.
- d) Draw a phase diagram of Eutectic system and explain it.
- e) Describe the dendritic structure formation during solidification of metal.
- f) How the equilibrium diagram is constructed? Draw it for solid solution system.

Q.3 Attempt any TWO

(16)

- a) i) Explain eutectoid reaction and peritectic reaction. State their general equation and draw the nature of appearance of their phase diagram.
ii) Write the various types of plain carbon steel, their composition and applications.

- b) i) Explain allotropic transformation of pure iron, along with cooling curve.
ii) Draw Iron-Iron carbide equilibrium diagram. State and explain briefly, the peritectic and eutectoid reaction in it.
- c) i) Draw and explain various changes in microstructures during slow cooling of hyper eutectoid steel.
ii) Write the various types of cast iron, their properties and applications.

Q.4 Attempt any FOUR

(08)

- a) Write any two uses of TTT diagram.
- b) Define Hardenability. How it is measured?
- c) State purpose of heat treatment
- d) Give four advantages of Nickel & its alloys.
- e) What are different non destructive testing?
- f) Enlist four advantages of Brasses.

Q.5 Attempt any FOUR

(16)

- a) Explain the construction of a TTT diagram for Eutectoid steel.
- b) Explain normalising process with respect to microstructure changes advantages & limitations.
- c) What is surface hardening? Write limitations of induction hardening.
- d) Give the composition, properties and applications of aluminum and its alloys.
- e) Explain difference between brass & bronze and write its applications.
- f) Explain Dye Penetrant method of non destructive testing with neat sketch.

Q.6 Attempt any FOUR

(16)

- a) Draw a schematic TTT diagram and superimpose various heating & cooling curve to represent different heat treatment processes on the diagram.
- b) What is Austempering & martempering? What are the microstructure changes involved in the process?
- c) Describe the process of carbonitriding with reference to process details, advantages and limitations.
- d) Give the composition, properties, and applications of magnesium and its alloys.
- e) What is a super alloy? Give its properties and applications.
- f) Explain ultrasonic method of non destructive testing with neat sketch.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO.

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LEVEL: FOURTH

PROGRAM: MECHANICAL

COURSE CODE: MEE401/ME301/M301/2301

COURSE NAME: POWER ENGINEERING

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 18/11/2016

Instruction:-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I

Q.1 Attempt any FOUR

**Marks
(08)**

- a) Define (i) Bore (ii) Compression ratio related to I.C. Engine.
- b) Draw P-V and T-S chart for Otto cycle.
- c) Enlist any four flues used in I.C engine.
- d) State any two effects of pre-ignition.
- e) Define (i) Indicated power (ii) Volumetric efficiency related to I.C Engine.
- f) Enlist four pollutants in exhaust gases of C.I engines.

Q.2 Attempt any FOUR

(16)

- a) Draw actual valve timing diagram of 4-stroke petrol engine.
- b) State the purpose of scavenging. Explain any one method of scavenging with neat sketch.
- c) A petrol engine working on Otto cycle has compression ratio 8 and consumes 1 kg of air per minute. If the maximum temperature during the cycle is 2000k and minimum temperature is 300k, find the air standard efficiency of the cycle.
- d) Draw a neat sketch of battery ignition system and state function of any two components.
- e) Distinguish between Air and water cooling system.
- f) An engine uses 7kg of fuel per hour of calorific value 28000KJ/kg. If the break power of the engine is 25KW and mechanical efficiency is 85% calculate
 - 1) Indicated thermal efficiency.
 - 2) Brake thermal efficiency.

Q.3 Attempt any FOUR

(16)

- a) Distinguish between C.I and S.I engine on the basis of
 - i) Thermodynamic cycle.
 - ii) Fuel used
 - iii) Air fuel ratio
 - iv) Application
- b) State two objectives of super charging. Enlist any two effects of supercharging.
- c) If compression ratio of Otto cycle is changed from 5 to 6, What is the percentage increase in efficiency?
- d) Draw a neat sketch of simple carburetor & name its parts.
- e) State the effects of pollutants on human body and environment.

[P.T.O.]

- f) A single cylinder 4 stroke diesel engine gave following results on maximum load.

Speed of engine = 400 rpm

Net Load on brake = 400 N

Diameter of break drum = 1.2 m

Fuel consumption = 3 kg/hr

Calorific value of fuel = 42000 KJ/kg.

Dia. Of cylinder = 160 mm

Stroke of piston = 200 mm

Calculate (i) Brake Power

(ii) Break specific fuel consumption.

Section – II

Marks

Q.4 Attempt any **FOUR** (08)

- Write function of air compressor & define the term “Free Air Delivered”.
- Write any four applications of Gas Turbine.
- State principle of working of Jet propulsion & write classification of Jet propulsion system.
- Write any four advantages of rotary compressor.
- State the factors affecting volumetric efficiency of air compressor.
- Write industrial uses of compressed air.

Q.5 Attempt any **FOUR** (16)

- Compare reciprocating compressor with rotary compressor.
- With neat sketch, describe construction & working of two stage reciprocating air compressor with inter-cooler.
- With neat sketch, explain working of closed cycle gas turbine.
- Draw only a labelled sketch of liquid propellant rocket engine.
- Compare closed cycle gas turbine with open cycle gas turbine.
- A single stage reciprocating air compressor delivers air at 5 bar. The suction temperature & pressure is at 20°C & 1 bar respectively. Volume of air entering the compressor is $2\text{ m}^3/\text{min}$. The index of compression is 1.2. Calculate
 - Indicated power
 - Isothermal power.

Q.6 Attempt any **TWO** (16)

- Explain with neat sketch working of ramjet. .
 - Explain with neat sketch regeneration method to improve thermal efficiency of gas turbine.
- Explain any four methods of energy saving in compressor
 - Write advantages of multistage compressor.
- A two stage single acting reciprocating air compressor with complete intercooling delivers 9 kg/min of air at 15 bar. The suction occurs at 1 bar & 15°C . The index of compression is 1.25. Calculate isothermal efficiency if compressor runs at 400 rpm.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO.

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LEVEL: FIRST

PROGRAM: CE/ME/SM/MT

COURSE CODE: CCF101/CCE101/X102/X108/R103/R104

COURSE NAME: ENGINEERING PHYSICS

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 09/12/2016

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Q.1 Attempt any FOUR

**Marks
(08)**

- a) Define i) specific mass ii) specific weight of a liquid
- b) What is the effect of temperature and impurity on surface tension?
- c) Define i) viscous drag (force) ii) viscosity
- d) Define i) molecular range ii) sphere of influence
- e) State any two applications of nanotechnology in the field of environment.
- f) Define i) nanometer ii) nanoscale

Q.2 Attempt any FOUR

(16)

- a) State and explain Hooke's law. Define bulk modulus and write down its unit.
- b) Explain the molecular theory of surface tension.
- c) i) State and explain Stoke's law of viscosity.
ii) Define velocity gradient & give its SI unit.
- d) What is capillary action? Give any three examples of capillary action.
- e) Define longitudinal wave. State any three of its characteristics.
- f) A weight extends a force of 120N on a steel wire of diameter 0.4mm. Find the extension produced in the wire if original length of wire is 5m. Given $Y = 2 \times 10^{12} \text{ N/m}^2$

Q.3 Attempt any FOUR

(16)

- a) Explain the behavior of wire under continuously increasing load.
- b) Derive an expression for coefficient of viscosity using Stoke's method.

P.T.O

- c) Define angle of contact. Explain the significance of angle of contact.
- d) Define linear SHM mention any three of its characteristics.
- e) Give any four applications of nanotechnology in the field of medicine.
- f) Define resonance. Mention any three examples of resonance.

Q.4 Attempt any FOUR

(08)

- a) Define echo & reverberation.
- b) Give full form of laser.
- c) Give the statement of Ohm's law.
- d) State any two applications of X-rays.
- e) Define ultrasonic wave.
- f) Define refraction of light.

Q.5 Attempt any FOUR

(16)

- a) A concrete hall of volume 2500m^3 has total surface absorption of 205. Find reverberation time.
- b) State four properties of laser.
- c) Explain with neat diagram the construction & working of photoelectric cell.
- d) Derive expression for equivalent resistance when number of resistance are connected in parallel.
- e) Describe spontaneous emission & population inversion in case of laser.
- f) Explain with neat ray diagram, the refraction of light through a glass prism.

Q.6 Attempt any FOUR

(16)

- a) For an equilateral prism, the angle of minimum deviation is 40° . Calculate the refractive index of prism.
- b) State & explain photoelectric effect.
- c) Explain the production of ultrasonic wave using Piezoelectric method.
- d) What is Wheatstone's network? Obtain balancing condition of Wheatstone's network.
- e) What is photon? State two properties of photon.
- f) Explain production of X-rays by using Coolidge tube?

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ODD TERM END EXAM NOV. / DEC 2016

EXAM SEAT NO.

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LEVEL :- FIFTH

PROGRAM : MECHANICAL ENGG.

COURSE CODE :- MEE502/ME403/M403/2403

COURSE NAME :- IND. ORGANIZATION & MANAGEMENT

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 19 / 11 / 2016

Instruction :-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I		Marks
Q.1	Attempt any FOUR a) Define Management. b) Give classification of business organizations. c) State advantages of government undertakings. d) Define control function of management. e) Differentiate between responsibilities and authorities. f) What are the objectives of Human Resource Management?	(08)
Q.2	Attempt any FOUR a) List down principles of management and explain any two. b) Define and describe planning function of management. c) Explain in brief objectives of management. d) What are the essential managerial competencies? Explain. e) Explain with a neat sketch functional organization. f) What are different forms of ownership? Explain partnership.	(16)
Q.3	Attempt any FOUR a) Explain importance of good management. b) State and describe difference hurdles to effective communication. c) Explain in brief function of Human Resource Management. d) Explain the process of recruitment and selection of employees. e) Describe losses of accidents and the cost involved. f) Explain need of good housekeeping.	(16)

Q.4 Attempt any **FOUR**

(08)

- a) What is the significance of “purchasing” function in an organization?
- b) What do you understand by materials management?
- c) What is Financial Management?
- d) State the object of industrail act.
- e) State the significance of C.P.M.
- f) What is lean maufacturing?

Q.5 Attempt any **FOUR**

(16)

- a) Explain the purchase procedure.
- b) State the functions of purchasing department.
- c) Write a short note on “Working capital”.
- d) Explain the welfare provisions for employees in a factory.
- e) Explain briefly the steps to prevent air pollution.
- f) Explain three-times estimates for PERT.

Q.6 Attempt any **TWO**

(16)

- a) Explain the scope and importance of materials management.
- b) What is over-capitalization? What are the reasons to result over cpitalization?
State its disadvantages.
- c) What is PERT? Differentiate between CDM & PERT. Construct and explain a network diagram for painting in a two storeys building.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO.

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LEVEL:FOURTH.

PROGRAM: MECHANICAL ENGG.

COURSE CODE:MEE402/ME302/M302. COURSE NAME: MACHINE DESIGN.

MAX. MARKS: 80.

TIME : 3 HRS.

DATE: 22/11/2016.

Instruction:-

- 1) Answer to two sections must be written in separate section answer book provided.
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I

Marks

Q.1 Attempt any FOUR

(08)

- a) Draw stress-strain diagram for mild steel.
- b) Define Machine design.
- c) What is the condition for self locking?
- d) State types of thread profile used for power transmission.
- e) What is standardization?
- f) Define principal stress.

Q.2 Attempt any FOUR

(16)

- a) What are the steps involved in general design procedure? Explain.
- b) State ant four factors that govern the selection of material while designing a machine components.
- c) State the various theories of elastic failure. Explain Rankines theory.
- d) Why square thread are used for power transmission? Give reasons.
- e) Define the following terms related screwed joints.
 - 1) Major diameter.
 - 2) Thread angle.
 - 3) Lead.
 - 4) Pitch
- f) Explain :
 - 1) Transverse shear stress.
 - 2) Bending stress.

Q.3 Attempt any TWO.

(16)

- a) Explain the design procedure of a cotter joint with neat sketch.
- b) A vertical 2-start square threaded screw of 120 mm mean diameter and 24 mm pitch, supports a vertical load of 20 KN. The axial thrust in screw is taken by collar bearing of 300 mm outside & 150 mm inside diameter. Find the force required at the end of the lever, which is 400 mm long in order to lift and lower the load. Coefficient of friction for screw & nut is 0.18 & for collar bearing is 0.25.
- c) A wall bracket is attached to a wall by means of four bolts, two at a distance of 50 mm from the lower edge & remaining two at a distance of 450 mm from the lower bolts. It supports a load of 50 KN at a distance of 500 mm from the wall. Sketch the arrangements & estimate the diameter of bolts. Assume working stress in tension as 80 N/mm^2 .

Q.4 Attempt any FOUR

- Represent completely reverse stress on stress-time diagram.
- Define fatigue failure in engineering materials.
- Represent Soderberg and Goodman diagram.
- State the function of coupling. Give its use.
- Draw neat sketch of pair of Helical gear and list its advantage.
- Enlist the advantage of 20° pressure angle system.

Q.5 Attempt any FOUR

(16)

- A standard cross-section of flat key is 16mm X 10mm and fitted in a 60 mm diameter shaft. The key is transmitting 30 KW at 1200 rpm. The key is made of steel of yield strength 210 N/mm^2 and F.O.S. is 3. Calculate length of key.
- A rigid coupling is used to connect 32 KW at 840 rpm motor to pump. There design torque is 20 % more than rated torque. There are four bolts, and pitch circle dia of location of bolt is 150mm. The permissible shear stress of bolt material is 80 N/mm^2 . Determine the diameter of bolt.
- List the advantages of gear drive compared to chain or belt drive.
- A 16 tooth spur pinion has a module of 2 mm and runs at a speed of 1600 rpm. The driven gear has 64 teeth. Calculate.
 - Speed of driven gear.
 - Diameter of pinion and gear.
 - Circular pitch.
- Derive a relation for combined stiffness for spring arranged in series and parallel.
- Draw a neat sketch of styles of end of spring and give a relation between effective turn and total turn.

Q.6 Attempt any TWO.

(16)

- A section of commercial shafting 4 m long between bearing carries 2400 N weight pulley at its midpoint. The pulley is keyed to shaft and receive 35 KW at 350 rpm. The belt drive is horizontal and sum of belt tension is 4400 N. Assume $k_b = k_t = 1.5$ and permissible shear stress is 50 N/mm^2 . Calculate diameter of shaft.
- A Railway wagon moving at a velocity of 2m/sec is brought to rest by two helical compression spring arranged in parallel. The mass of wagon is 800 kg. The spring is compressed to 150 mm. Assume, spring index =6, modulus of rigidity is 82500 N/mm^2 , permissible shear stress is 625 N/mm^2 , square & ground end. Calculate.
 - Wire diameter
 - Mean coil diameter.
 - No. of active turns.
 - Total number of active turns
 - Free length
 - pitch of coil.
- Define: static load carrying capacity of bearing and dynamic load carrying capacity of bearing. (04 marks.)
 - Describe a general selection procedure for a bearing. (04 marks.)

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO.

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LEVEL: THIRD.

PROGRAM: MECHANICAL ENGG.

COURSE CODE: MEE303/ME203/M203.

COURSE NAME: MACHINE DRAWING.

MAX. MARKS: 80

TIME: 4 HRS.

DATE: 19/11/2016

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

- | | Marks |
|--|--------------|
| Q.1 Draw conventional representation of any FOUR of the following. | (08) |
| <ul style="list-style-type: none">a) Concrete.b) Splined shaft.c) Diamond knurling.d) Internal screw thread.e) Tension spring.f) Globe valve. | |
| Q.2 Attempt any TWO . | (16) |
| <ul style="list-style-type: none">a) Fig.1.shows an angle plate 10 mm thick, 60° angle having a circular hole of 30mm diameter on an inclined surface as shown. Using first angle projection method, draw its front auxiliary view.b) Fig.2.shows front view, incomplete top view and partial auxiliary view of a Bevel washer. Redraw the given views and complete the top view.c) I) The shaft size is given as $40_{-0.02}^{-0.04}$ and the hole size is $40_{-0.04}^{+0.02}$. Determine the type of fit between them.
II) Represent the welding drawing of two shafts with equal diameter welded end to end by means of square butt weld with convex counter at site | |
| Q.3 Attempt any TWO . | (16) |
| <ul style="list-style-type: none">a) A vertical square prism having its faces equally inclined to the V.P. is completely penetrated by a horizontal cylinder, the axis of which is parallel to the V.P. and 6mm away from that of prism. Draw the projections of the solids showing curves of intersection. The length of the sides of the base of the prism is 50 mm and diameter of the cylinder is 40 mm. The length of the axis of prism and cylinder is 100 mm. | |

P.T.O

- b) A vertical cone diameter of base 80 mm and axis 90 mm long is completely penetrated by a cylinder of 44 mm diameter. The axis of the cylinder is parallel to HP and VP and intersects the axis of the cone at a point 25 mm above the base. Draw the projections showing curves of intersection.
- c) 1) Ref. Fig.3 .What is the meaning of symbol 'X' and 'Y'.
 2) Draw the symbol of the following.
 I) Straightness II) Circularity III) Angularity IV) Coaxiality.

Q.4 Attempt any **ONE**. (08)

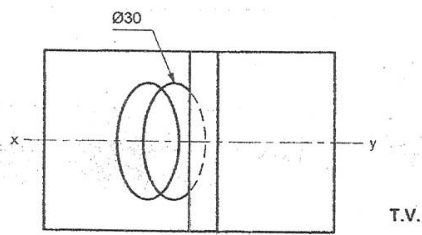
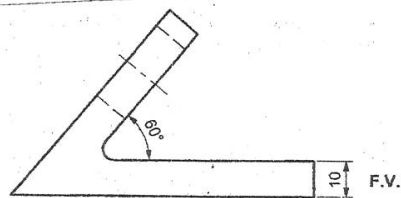
- a) Fig.4.a shows the assembly of Tail-stock. Draw the following details mentioning appropriate dimensional tolerance, tolerance grade etc. on part if required.
- 1) Body- Sectional front view and side view. (06 marks)
 - 2) Center. (02 marks)
- b) Refer Fig.4.b. which shows assembly of drill jig. Draw the following details showing appropriate dimensional and geometrical tolerances etc. if required.
- 1) Stem - Sectional front view (04 marks).
 - 2) Jig plate – Sectional front view and top view (04 marks)

Q.5 Fig.5. shows the assembly of pedestal bearing. Draw the detailed drawing of the following. (12)

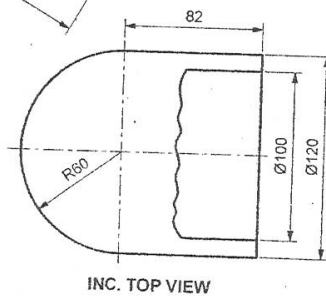
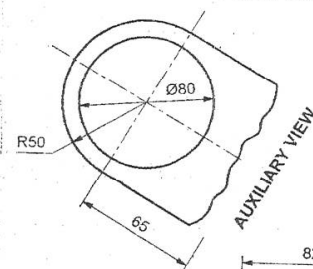
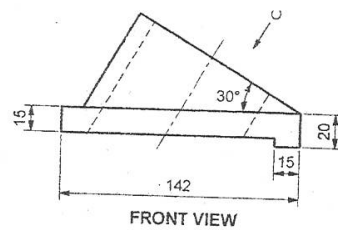
- 1) Body – Sectional front view and top view. (08 marks).
- 2) Brass – Sectional front view and top view. (08 marks).

Q.6 Attempt any **ONE** (20)

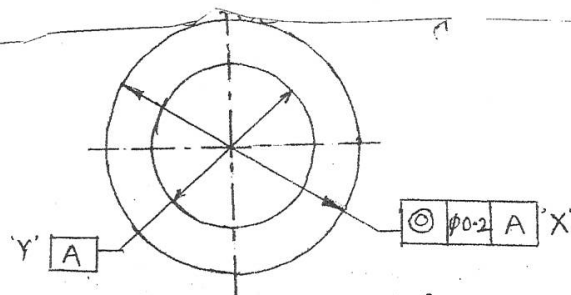
- a) Fig. 6. (a) Shows the details of universal coupling. Draw the following views of assembly.
- 1) Sectional front view.
 - 2) Top view.
 - 3) Prepare bill of material.
- b) Fig.6 (b) Shows the details of lathe tool post. Draw sectional front view and top view of the assembly. Prepare bill of material and indicate the type of Fit.



Q2 (a) Fig: 1



Q2 (b)
Fig: 2



Q3 (c)

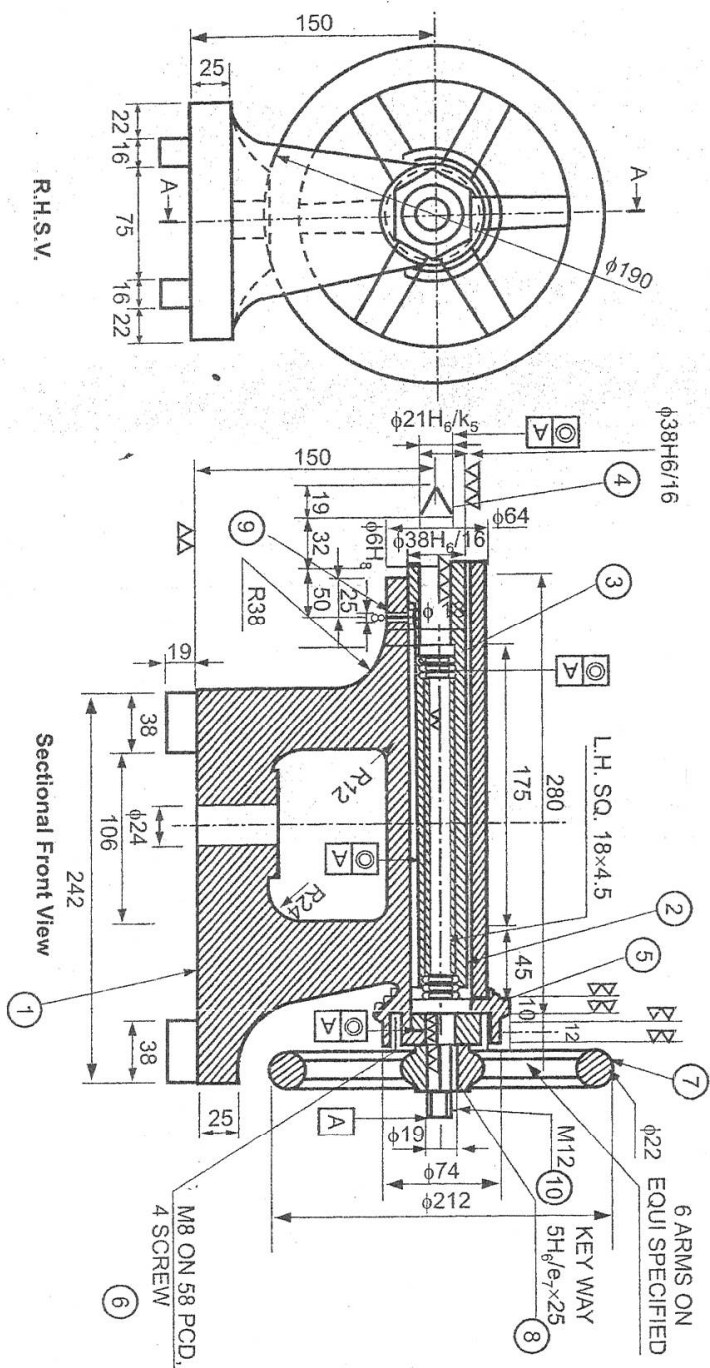


Fig. 4.a. Assembly of Tailstock

PART NO.	PART NAME	MATERIAL	QUANTITY
1.	BODY	C.I.	1
2.	BARREL	M.S.	1
3.	SPINDLE	M.S.	1
4.	CENTER	C.S.	1
5.	SPINDLE BEARING	C.I.	1
6.	SCREW	M.S.	1
7.	HANDAL WHEEL	C.I.	1
8.	KEY	M.S.	1
9.	FEATHER	M.S.	1
10.	NUT	M.S.	1

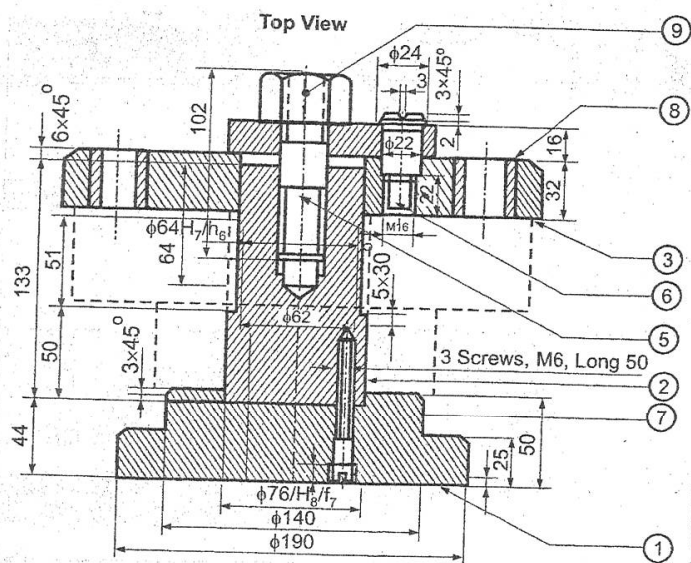
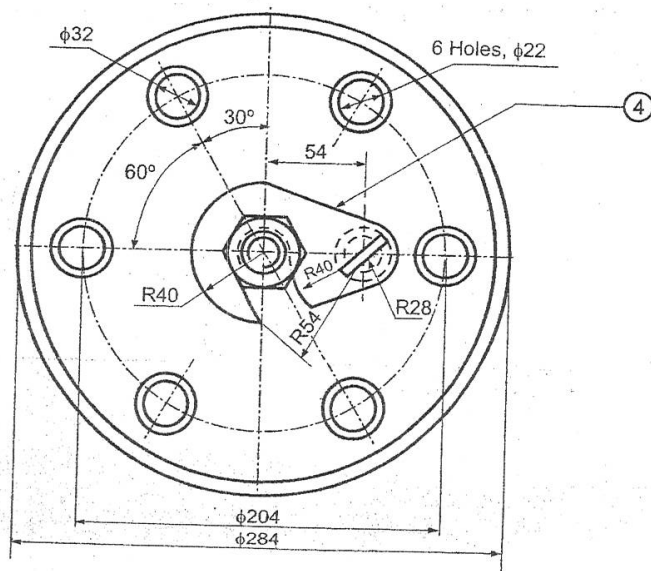
$21\text{H}_g/\text{k}_5$	TRANSITION FIT
$5\text{H}_g/\text{e}_7$	CLEARANCE FIT
$38\text{H}_g/\text{f}_6$	CLEARANCE FIT
$6\text{H}_g/\text{e}_7$	CLEARANCE FIT

$38H_6 =$	+ 0.016 + 0.000	$21H_6 =$	+ 0.013 + 0.000
$38f_6 =$	- 0.025 - 0.040	$21k_5 =$	+ 0.011 + 0.002
$6H_6 =$	+ 0.08 + 0.000	$5H_6 =$	+ 0.008 + 0.000
$6e_7 =$	- 0.020 - 0.032	$5e_7 =$	- 0.020 - 0.032

Section-II

Set-I (Pg 2/4)

3.



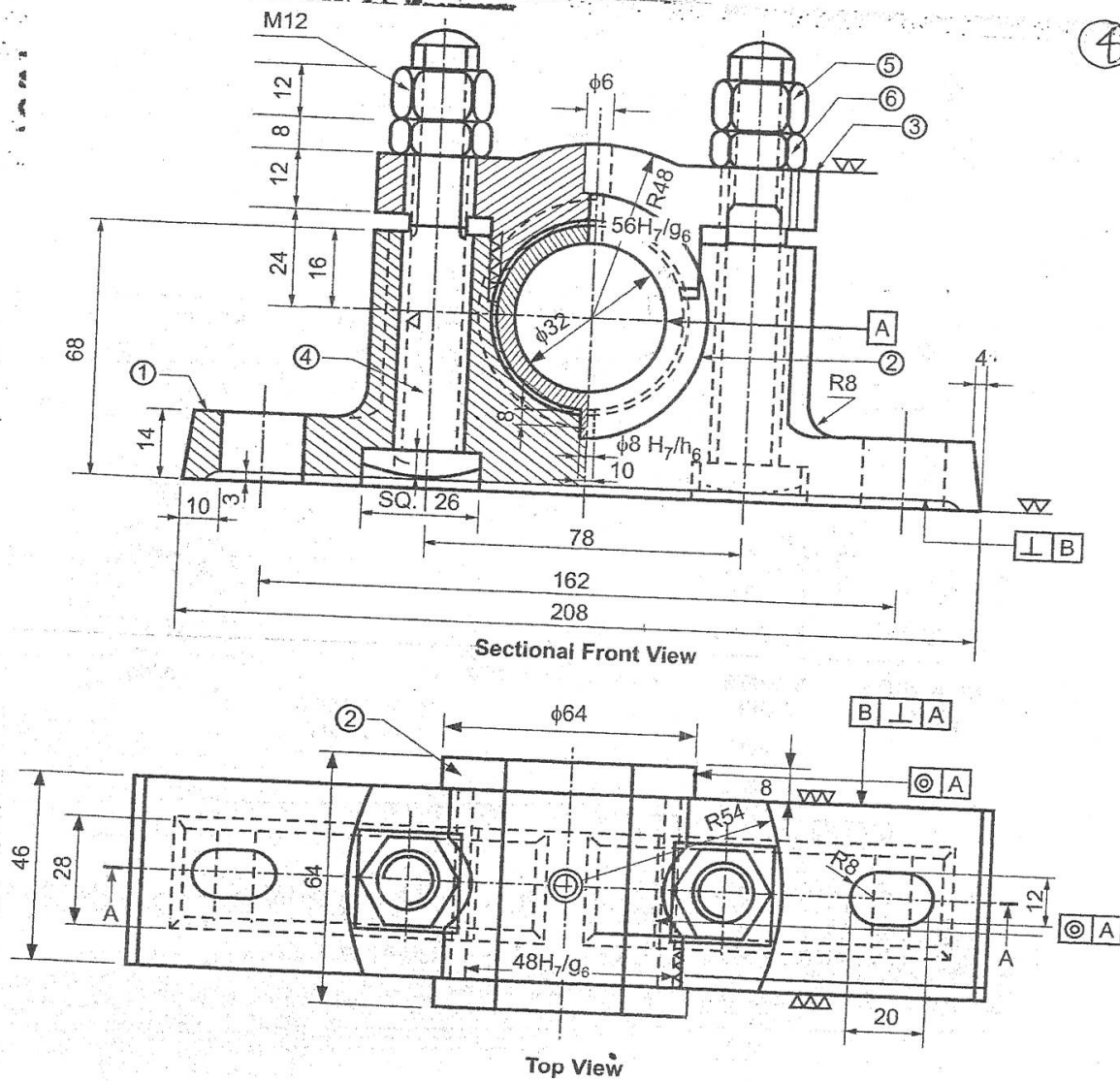
Sectional Front View

Bill of Material

Sr. No.	Part Name	Material	Quantity
1.	Base plate	C.I.	1
2.	Locating peg	M.S.	1
3.	Jig-plate	C.I.	1
4.	Latch washer	M.S.	1
5.	Stud	M.S.	1
6.	Pin	M.S.	1
7.	Cap screw	M.S.	3
8.	Bush	C.S.	6
9.	Nut	M.S.	1

Q. 4.b. Fig. 4.b.

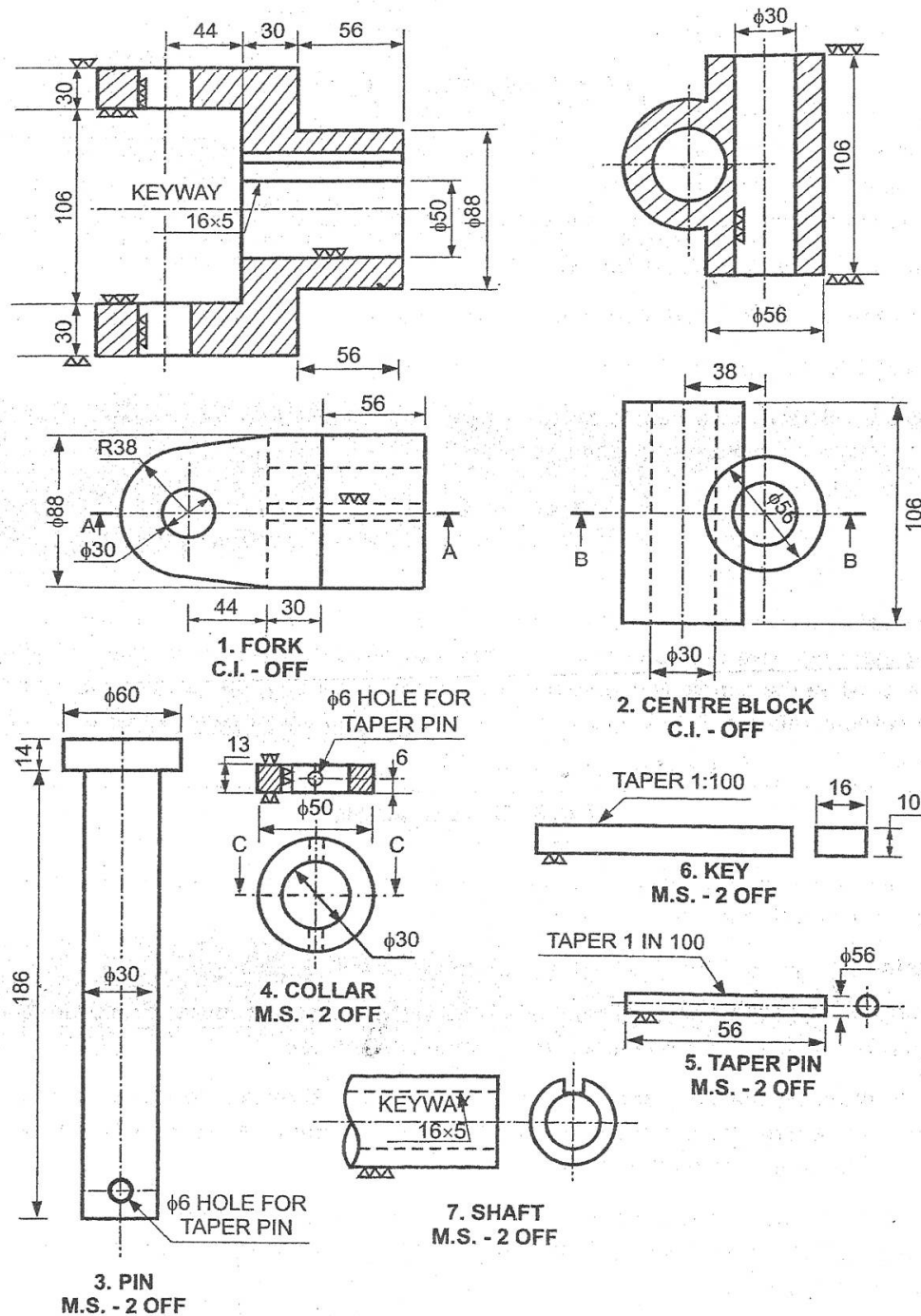
Assembly of Drill Jig



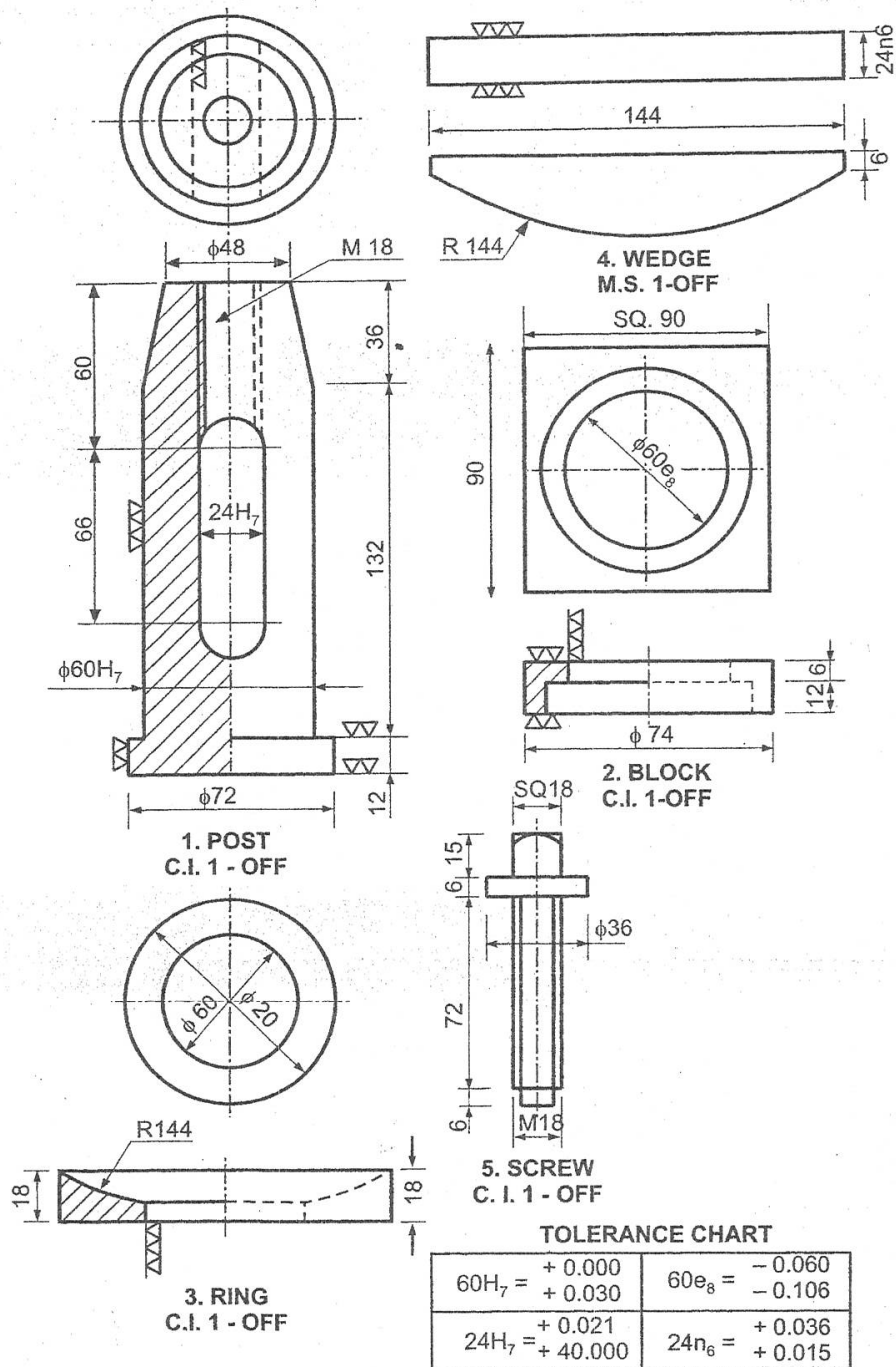
FIT CHART	
$8H_7/h_6 =$	Clearance FIT
$48H_7/g_6 =$	Clearance FIT
$46H_7/h_6 =$	Clearance FIT
$56H_7/g_6 =$	Clearance FIT

Part No.	Part Name	Material	Quantity
1.	BODY	C.I.	1
2.	BRASS	G.M.	1
3.	CAP	C.I.	1
4.	BOLT	M.S.	2
5.	NUT	M.S.	2
6.	LOCK NUT	M.S.	2

Q.5. Fig. 5. Assembly of Pedestal Bearing



Q.6.a. Fig. 6.q.
Details of Universal Coupling



Q.6.b. Fig. 6.b.

Details of Lathe tool post.

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ODD TERM END EXAM NOV-DEC -2016

EXAM SEAT NO.

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LEVEL: THIRD

PROGRAM: MECHANICAL ENGINEERING

COURSE CODE: MEE305/ME205/M205/2205 COURSE NAME: THEORY OF ENGINEERING DESIGN

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 28/11/2016

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Q.1 Attempt any FOUR

**Marks
(08)**

- a) State Hook's law.
- b) Define strain energy & its SI unit.
- c) Define proof resilience & its SI unit.
- d) Draw shear force diagram SFD (as shown in fig.no1)
- e) State parallel axis theorem.
- f) State M.I for Hollow circular section about any axis.

Q.2 Attempt any FOUR

(16)

- a) A bar is as shown in figure no.2 is subjected to an axial load of 5KN. find the total elongation produced in the bar $E=200\text{GPa}$
- b) A mild steel rod of 20mm diameter and 500mm long is enclosed centrally inside a hollow copper tube of external diameter 30mm and internal diameter 25mm. The ends of the rod and tube are brazed together and the composite bar is subjected to an axial pull 40KN. find the stress in steel & copper & extension of the rod, if $E_s=200\text{GPa}$, $E_{cu}=100\text{GPa}$.
- c) A steel rod of 16mm diameter and 3m length when subjected to a tensile force of 40KN. shows an elongation of 3mm and the reduction in diameter 0.005mm. Calculate the modulus of elasticity and modulus of rigidity.
- d) A steel rod 30mm is diameter, 1m long is heated through 100°C and at the same time subjected to a pull P. If the total extension of the rod is 2mm what should be the magnitude of P? $\alpha_{st} = 12 \times 10^{-6} / ^\circ\text{C}$ $E_{st}=200\text{GPa}$.
- e) An axial pull of 50KN is suddenly applied to a steel rod 2m long and 1000mm^2 in cross section. Find the maximum stress, elongation and resilience of the bar. $E=200\text{GPa}$.
- f) A mild steel bar 2m long and 20mm diameter hangs freely and has a collar fixed at the lower end. Determine the maximum instantaneous elongation and maximum stress produced if a load of 1000N falls on the collar from a height of 100mm. $E=200\text{GPa}$

Q.3 Attempt any FOUR

(16)

- a) Draw shear force diagram (SFD) and Bending moment diagram (BMD) for the beam as shown in fig.no.3
- b) Draw SFD & BMD for the beam as shown in fig. no.4

P.T.O

- c) A simply supported beam of span 6m, carries a udl of 3kN/m over 2m from left hand support, and point load 6kN at 4m from left hand support. Draw SFD & BMD.
- d) Draw BMD and locate the point of contraflexure for the beam as shown in fig.no.5
- e) Find the moment of inertia of the angle section ISA 100x100x10mm about both axis xx & yy and radius of gyration.
- f) A channel section as shown in fig.no.6 Calculate moment of inertia about both centroidal axis.

Q.4 Attempt any FOUR

(08)

- a) Define 'core of section' and draw for circular section.
- b) Write formula for flexure & explain the terms in it.
- c) Draw shear stress distribution across 'I' (symmetrical) section.
- d) Define 'obliquity in stresses'
- e) Write the relationship between principal plane & max.shear plane.
- f) A circular shaft rotating with 150rpm with torque 10kN.m. Find out power transmitted by shaft.

Q.5 Attempt any TWO

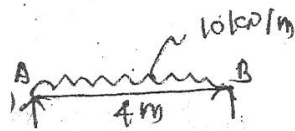
(16)

- a) A cast iron rod 20mm x 20mm in section and 600mm long is s/s & fails to central load 2kN. If the same rod is used as cantilever, what will be the point load for which beam will fail?
- b) A simply supported beam of I section made up of flanges & web 200 x 10mm is carrying a shear force 100kN. Draw shear stress distribution across the section.
- c) Determine Torsional shear stress & angle of twist developed in a shaft having diameter 400mm which it is subjected to torque of 80kN.m length of shaft is 1.8m. take modulus of rigidity is 70GPa

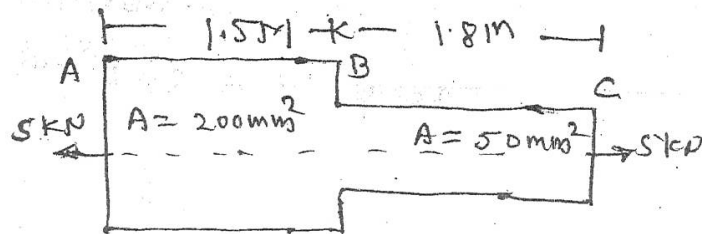
Q.6 Attempt any TWO

(16)

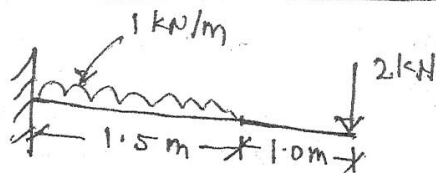
- a) A rectangular solid rod of c/s 100mm x 50mm is subjected to compressive load of 150kN with 40mm eccentric to axis bisecting 50mm side. Calculate max. & min stresses developed at base. Also draw stress distribution diagram.
- b) A particle block is subjected to stresses 150MPa (tensile) & 50MPa (tensile) along with 30MPa shear stress. Calculate
 - i) Position of principal planes & principal stresses on it
 - ii) Max shear plane & stress.
 Use analytical or graphical method.
- c) A hollow circular shaft 200mm external diameter & thickness 25mm is transmitting power at 200rpm. The angle of twist over length of 2m was found to be 1° . Calculate maximum stress induced & power transmitted by shaft. Take modulus of rigidity of material as 80 kN/mm²



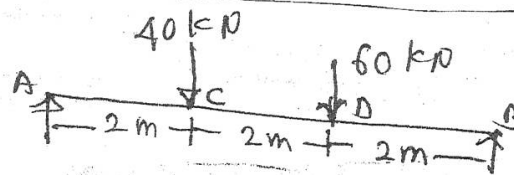
Q1. (d) Fig. No. 1



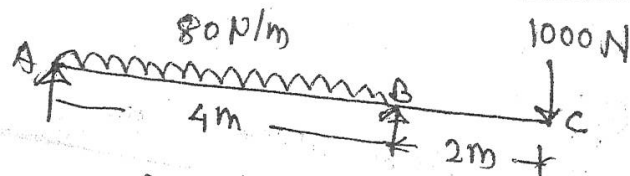
Q2. (a) Fig. No. 2



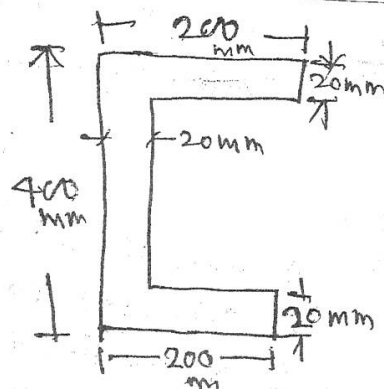
Q3. (a) Fig. No. 3



Q3. (b) Fig. No. 4



Q3. (d) Fig. No. 5



Q3. (f) Fig. No. 6

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ODD TERM END EXAM NOV/DEC -2017

EXAM SEAT NO.

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LEVEL: **THIRD**

PROGRAM: **MECHANICAL ENGG.**

COURSE CODE: **MEE308/M208/ME208** COURSE NAME: **Theory of Machine and Mechanism**

MAX. MARKS: **80**

TIME: **3 HRS.**

DATE: **23/11/2017**

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Q.1 Attempt any **FOUR**

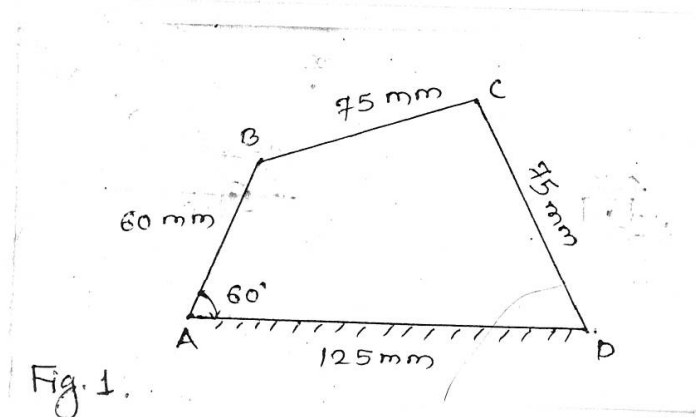
**Marks
(08)**

- a) Define completely constrained Motion with real example.
- b) Name the kinematic pairs in slider crank Mechanism.
- c) State Aronhold Kennedy Theorem..
- d) What is pantograph.
- e) Define : 1) Base Circle 2) Pressure angle.
- f) State any two application of cam.

Q.2 Attempt any **FOUR**

(16)

- a) Locate all Instantaneous centre of mechanism as shown in fig.1. If the link AB rotates at uniform speed of 10 rpm in clockwise direction find the angular velocity of link BC



- b) Differentiate between Machine and Mechanism.
- c) The crank of reciprocating engine is 100 mm long and it rotates at a uniform speed of 20 rad/sec. clockwise. The connecting rod length is 400 mm. Determine velocity and acceleration of piston and angular velocity and angular acceleration of connecting rod when crank is at 0° from i.d.c. (Use Kleins construction Method)
- d) Describe Peaucellier straight line Mechanism with help of a sketch.

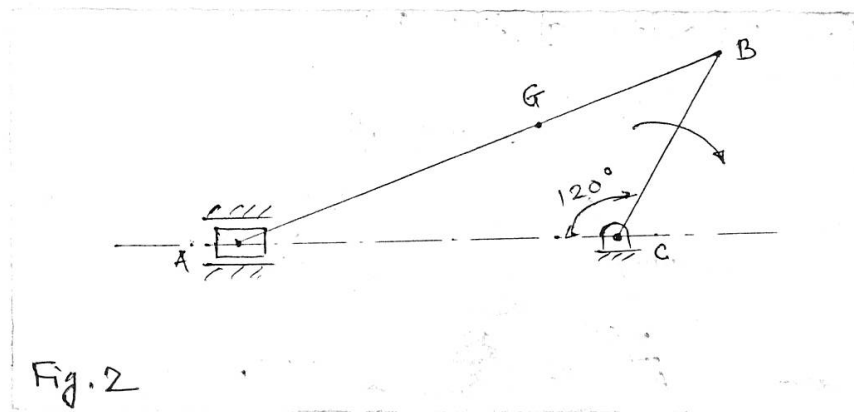
P.T.O.

- e) What is the condition for correct steering ? sketch and show two main types of steering gear and discuss their relative advantages.
- f) Define following kinematic pairs with neat sketch ;
- i) Screw pair ii) Spherical pair iii) Lower pair iv) Turning pair.

Q.3 Attempt any **TWO**

(16)

- a) What is inversion ? Explain with neat sketch Inversions of double slider crank chain Mechanism.
- b) An engine Mechanism is shown in fig. 2 The crank CB = 100 mm and the connecting rod AB = 300 mm with centre of gravity 'G' 100 mm from B. The crank shaft has a angular speed of 75 rad/sec and angular acceleration 1200 rad/sec². Find velocity of poing G and angular velocity and angular acceleration of link AB.



- c) Construct the profile of a cam to suit the following specification
- Least radius of cam = 25 mm
 - Dia of roller follower = 25 mm
 - Angle of lift 120° with S.H.M.
 - Angle of fall 150° with uniform acceleration & retardation.
 - Lift of follower = 40 mm
 - No. of dwell are two of equal interval between motions.
 - The line of stroke of the follower is offset by 12 mm from centre of cam.

Q.4 Attempt any **FOUR**

(08)

- a) State the formula for a length of Belt in,-
- 1) Open belt drive 2) A crass belt drive.
- b) Draw a neat sketch of a single plate friction clutch.
- c) Draw a neat sketch of cone clutch.
- d) Define the terms (i) Backlash (ii) Working depth.
- e) State the different types of governors.
- f) Define the terms (i) Height of a governor (ii) Sleeve lift.

Q.5 Attempt any FOUR**(16)**

- a) Power is transmitted using 'V' belt drive. The included angle of 'V' groove is 30° . The belt is 20 mm deep & maximum width is 20 mm. If the mass of the belt is 0.35 kg per meter length & maximum allowable stress is 1.4 MPa. Determine the maximum power transmitted when the angle of lap is 140° . Take $\mu = 0.15$.
- b) What are different types of chain ? Explain with neat sketches the power transmission chain.
- c) A casting weight 6 kN & is freely suspended from a rope which makes 2.5 turns round a drum of 200 mm diameter. If drum rotates at 40 rpm determine the force required by a man to pull rope from the other end of the rope. Also find the power to raise the casting. The coefficient of the friction is 0.25.
- d) For a Flat belt, prove that $\frac{T_1}{T_2} = e^{\mu\theta}$
- e) A multiple disc clutch have five plates having four pairs of active friction surface. If the intensity of pressure is not to exceed 0.127 N/mm^2 , find the power transmitted at 500 rpm. The outer & inner radii of friction surface are 125 mm & 75 mm respectively. Assume uniform wear theory & take coefficient of friction = 0.3
- f) Explain the working of a multi-plate clutch with the help of a neat sketch.

Q.6 Attempt any FOUR**(16)**

- a) Explain with neat sketch working of epicyclic gear tram.
- b) Differentiate between cycloidal and involute tooth forms.
- c) Define the terms (i) Circular pitch (ii) Module (iii) Pressure angle (iv) Path of contact.
- d) What are centrifugal governors ? How do they differ from inertia governors ?
- e) Explain the working of a Hartnell governor with a neat sketch.
- f) Explain the working of a porter governor with a neat sketch.

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ODD TERM END EXAM NOV./ DEC. -2017

EXAM SEAT NO.

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LEVEL :- THIRD PROGRAM : MECHANICAL

COURSE CODE :- MEE302/ME202

COURSE NAME :- THERMAL ENGG.

MAX. MARKS : 80 TIME : 3 HRS. DATE :- 20 / 11 / 2017

Instruction :-

- 1) Answers must be written in the main answer book provided.(and supplements if required)
- 2) Figure to the right indicate marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Marks

Q.1 Attempt any FOUR (08)

- a) Define the term “Enthalpy”. Write its unit.
- b) A heat Engine is supplied at the rate of 45 kJ/sec & produces a power of 14 KN.
Determine i) Thermal Efficiency of the Engine. ii) Amount of heat rejected per minute.
- c) State Zeroth law of thermodynamics.
- d) A Vessel of 0.03 m³ Capacity contains gas at 350 KN/m² pressure & 35⁰C temperature.
Determine the mass of gas in Vessel. Take R= 290 J/ kg k for gas.
- e) Write function of heat exchanger. List various types of heat exchangers.
- f) Write various modes of heat transfer. Define any one type of mode of heat transfer.

Q.2 Attempt any FOUR (16)

- a) Differentiate between open system and closed system.
- b) Write Kelvin Plank and Clausius Statements of second law of thermodynamics.
- c) Write steady state energy equation. Write meanings of all parameters of equations and apply it to nozzle and boiler.
- d) Calculate the change in internal energy and change in enthalpy of 2kg of air when temperature changes from 20⁰C to 90⁰C. Take C_p = 1 KJ/kg k & C_v = 0.71 KJ/kg k.
- e) List various thermodynamic processes of Ideal gases and represent them on P-V & T-S diagram.
- f) Define i) Thermal conductivity of material ii) Fourier’s Law of heat conduction.

Q.3 Attempt any TWO (16)

- a) i) Define the terms- Thermodynamic Heat & Thermodynamic Work.
Compare Heat & Work.
ii) Describe the term “Property” of a system. Define various types of properties of a system with example.
- b) i) List various types of Ideal gas processes and represent each ideal gas process on P-V & T-S diagram.
ii) A quantity of gas is expanded isothermally from initial condition of 0.2 m³ & 745 kPa to a final pressure of 127 kPa. Find 1) Final volume 2) work done. **R.T.O.**

- c) A steam nozzle supplied with 2400 kg/hr of steam at 15 bar. Inlet and exit conditions of steam are $V_1=1800$ m/min, $V_{s1}=0.15$ m³/kg, $u_1=2600$ KJ/kg, $P_1 = 1$ bar
 $V_{s2} = 1.7$ m³/kg & $u_2= 2500$ KJ/kg.
 Calculate the exit velocity of the steam.

Q.4 Attempt any **FOUR**

(08)

- Define Sensible heat of water.
- State the objectives of condenser.
- What are the elements of steam condensing plant?
- Name the high pressure boilers you know.
- Define Nozzle Efficiency.
- Determine the dryness fraction of steam if 0.8 kg of water is in suspension with 45 kg of dry steam.

Q.5 Attempt any **FOUR**

(16)

- Describe with neat sketch forced draught cooling tower.
- Draw a neat and well labelled sketch of combined separating and throttling calorimeter.
- State the advantages of condenser in steam power plant.
- How turbines are classified?
- Steam enters an engine at a pressure of 12 bar with a 67⁰C of superheat. It is exhausted at a pressure of 0.15 bar and 0.95 dry. Find the drop in enthalpy of steam.

P_r (bar)	h_f (KJ/kg)	h_{fg} (KJ/kg)
12	798.4	1984.3
0.15	226.0	2373.2

- State the functions and location of steam stop valve and economizer.

Q.6 Attempt any **TWO**

(16)

- Determine the quantity of heat required to produce 1kg of steam at a pressure of 6 bar at a temperature of 25⁰C, under the following conditions:
 - When steam is wet with dryness fraction 0.9.
 - When steam is dry saturated and
 - When it is superheated at a constant pressure at 250⁰C with $C_{p_{sup}} = 2.3$ KJ/ kg K.

P_r (bar)	T_{sat} 0 (C)	h_f (KJ/kg)	h_{fg} (KJ/kg)
6	158.8	670.4	2085.0

- Explain velocity compounding in detail.
- Explain with neat sketch the working of Benson boiler.

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ODD TERM END EXAM NOV. / DEC. -2017**EXAM SEAT NO.**

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LEVEL :- THIRD**PROGRAM : MECHANICAL ENGINEERING****COURSE CODE :- MEF304/M204/ME204/MEE304****COURSE NAME :- MANUFACTURING PROCESSES****MAX. MARKS : 80 TIME : 3 HRS. DATE :- 02/12/2017****Instruction :-**

- 1) Answers must be written in the main answer book provided.(and supplements if required)
- 2) Illustrate your answers with sketches wherever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables shall be made available on request.
- 5) Assume and mention suitable additional data if necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) QN > Question No., SQN> Question No. R> Remembering, U> Understanding, A> Application.

Q N	S Q N	Question Text	R/ U/ A	CO Cod c MEF304	Mark s
Q.1		Attempt any FOUR			08
	a)	Enlist different types of pattern.	R	1	
	b)	Write about shrinkage allowance.	R	1	
	c)	Write the contents of core sand.	R	1	
	d)	Sketch a vertical core.	R	1	
	e)	Enlist die casting methods.	R	1	
	f)	Write steps in 'charging of cupola'.	R	1	
Q.2		Attempt any FOUR			16
	a)	Explain the pattern suitable for machine moulding.	A	4	
	b)	Compare between wooden pattern and metallic pattern.	A	4	
	c)	For preparing aluminium pattern which allowances will you consider and how will you consider?	A	4	
	d)	Explain different types of moulding sand.	U	4	
	e)	Compare between green sand and dry sand moulding.	A	4	
	f)	Which core will you select for the following? i) When the casting is to have opening only one side and one core print is available. ii) When a hole in the casting either above or below the casting.	A	4	
Q.3		Attempt any FOUR			16
	a)	Explain the working of Jolt machine with a neat sketch.	U	4	
	b)	Explain various operations to be done in cupola furnace.	U	4	
	c)	Explain following casting defects with their remedies. i) Fin ii) Swell	U	4	
	d)	Explain cold chamber die casting method with a neat sketch.	U	4	
	e)	It is required to melt non ferrous metals. Sketch a furnace you will use and name it.	A	4	
	f)	Define die casting. State the applicability of die casting with respect to materials.	R	1	

P.T.O.

Q N	S Q N	Question Text	R/ U/ A	CO Cod e MEF304	Mark s
Q.4		Attempt any TWO			08
	a)	Compare soldering with brazing	A	1	
	b)	Draw the neat sketch of Hand Press & label the parts.	R	4	
	c)	Explain principle of press forging with neat sketch.	U	4	
Q.5		Attempt any FOUR			16
	a)	Compare neutral frame and carburizing frame.	A	1	
	b)	List the most commonly used equipments used for electric arc welding.	R	1	
	c)	Compare projection and percussion resistance welding methods.	A	4	
	d)	Differentiate between punching and blanking operation with neat sketch.	A	4	
	e)	Describe and specify the merits of different kinds of rolling mills.	U	4	
	f)	What is the working principle of direct extrusion? Describe it with neat sketch.	U	4	
Q.6		Attempt any TWO			16
	a)	Name common materials used for forging. Give the correct forging temperature of some common forgeable metals. State which one is forgeable metal and which is not.	A	4	
	b)	i) How will you classify presses?	R	1	
		ii) Explain the working principle of power press with neat sketch.	U	4	
	c)	Describe submerged arc welding with neat sketch. State the advantages of submerged arc welding.	U	4	

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ODD TERM END EXAM NOV/DEC -2017

EXAM SEAT NO.

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LEVEL: FIRST

PROGRAM: COMMON

COURSE CODE: CCF105/107/CCE105/R107/X104

COURSE NAME: BASIC MATHEMATICS

MAX. MARKS: 80

TIME: 3 HRS.

DATE: 15/12/2017

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>Course outcome

QN	S Q N	Question Text	RU A	Co CCF105-	Mar ks
Q.1		Attempt any FOUR			(08)
	a)	Find 'x' if $\begin{vmatrix} 1 & x & x^2 \\ 1 & 2 & 4 \\ 1 & 3 & 9 \end{vmatrix} = 0$	R	1	
	b)	Resolve in to partial fraction : $1 + \frac{1}{x^2 - 1}$	U	1	
	c)	If $A = \begin{bmatrix} 3 & 2 \\ 1 & -1 \\ 0 & 4 \end{bmatrix}$, $B = \begin{bmatrix} -1 & -1 \\ 3 & 2 \\ 4 & -2 \end{bmatrix}$, verify that $A+B=B+A$	U	3	
	d)	If $\begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -1 \\ 3 & 2 \end{bmatrix}$ verify that $(A+B)' = A' + B'$	U	3	
	e)	If $\begin{bmatrix} 7 & 0 & 2 \\ 1 & 2 & 6 \\ 4 & 5 & 3 \end{bmatrix}$, find whether matrix A is singular or non singular.	R	3	
	f)	If $A = \begin{bmatrix} 3 & -1 \\ 2 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}$, find X such that $2X+3A-4B = I$	A	3	
Q.2		Attempt any FOUR			(16)
	a)	The voltages in an electric circuit are related by following equation. $v_1 + v_2 + v_3 = 9$; $v_1 - v_2 + v_3 = 3$; $v_1 + v_2 - v_3 = 1$. Find v_1, v_2 & v_3	A	1	
	b)	Solve the equations: $x + 2y + 3z = 1$, $2x + 3y + 2z = 2$ & $3x + 2y + 4z = 1$, by using matrix inversion method.	A	3	
	c)	Resolve into partial fractions: $\frac{x-5}{x^3 + x^2 - 6x}$	A	2	
	d)	If $\left\{ \begin{bmatrix} 3 & 1 \\ 3 & 4 & 0 \\ 3 & -3 \end{bmatrix} - 2 \begin{bmatrix} 0 & 2 \\ -2 & 3 \\ -5 & 4 \end{bmatrix} \right\} \begin{bmatrix} -1 \\ 2 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$, find x, y, z.	A	3	
	e)	Resolve into partial fractions : $\frac{x^2 + 23x}{(x+3)(x^2 + 1)}$	A	2	
	f)	Expand using Binomial Theorem $\left(3a - \frac{8}{b}\right)^7$	A	4	

Q.3	Attempt any FOUR			(16)
a)	Solve by Cramer's Rule : $x + y = 3, y + z = 5, z + x = 4$	A	1	
b)	Find inverse of matrix , $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$	A	3	
c)	Resolve into partial fractions : $\frac{2x+1}{x^2.(x+1)}$	A	2	
d)	If $A = \begin{bmatrix} 0 & 1 & -1 \\ 3 & -2 & 3 \\ 2 & -2 & 3 \end{bmatrix}$, show that $A^2 = I$	U	3	
e)	Resolve into partial fractions: $\frac{x^3}{x^2-1}$	A	2	
f)	Show that $(\sqrt{3}+1)^5 - (\sqrt{3}-1)^5 = 152$	U	4	
Q.4	Attempt any FOUR			(08)
a)	Express the following angles in radian measures. i) 75° ii) -270°	R/ U	5	
b)	Evaluate without using calculator $\frac{\tan 85^\circ - \tan 40^\circ}{1 + \tan 85^\circ \tan 40^\circ}$	R/ U	5	
c)	Prove that $\sin\left(\theta + \frac{\pi}{6}\right) - \sin\left(\theta - \frac{\pi}{6}\right) = \cos \theta$	U	5	
d)	If $\sin A = 0.4$ find $\cos 2A$ using multiple angle formula.	R/ U	5	
e)	Prove that $\operatorname{cosec}^2 \theta - \cos^2 \theta \cdot \operatorname{cosec}^2 \theta = 1$	R/ U	5	
f)	Find the value of $\sin\left[\cos^{-1}\left(-\frac{1}{2}\right)\right]$	R/ U	5	
Q.5	Attempt any FOUR			(16)
a)	The difference between two acute angles of a right angled triangle is $\frac{2\pi^c}{5}$. find the angles in degrees	U/ A	5	
b)	Prove that $\sin 20^\circ \cdot \sin 40^\circ \cdot \sin 60^\circ \cdot \sin 80^\circ = \frac{3}{16}$	U/ A	5	
c)	Prove that $\frac{\sin 4\theta + \sin 2\theta}{1 + \cos 2\theta + \cos 4\theta} = \tan 2\theta$	U	5	
d)	Prove that $\cos(A+B) = \cos A \cos B - \sin A \sin B$	U/ A	5	
e)	Show that $\frac{\sin 7x + \sin x}{\cos 5x - \cos 3x} = \sin 2x - \cos 2x \cdot \cot x$	U/ A	5	
f)	Show that $\cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{3}{5}\right) = \tan^{-1}\left(\frac{27}{11}\right)$	A	5	
Q.6	Attempt any FOUR			(16)
a)	If $\tan(x+y) = \frac{3}{4}$ and $\tan(x-y) = \frac{8}{15}$ Then show that $\tan(2x) = \frac{77}{36}$	U/ A	5	
b)	Prove that $\cos A \cos(60-A) \cdot \cos(60+A) = \frac{1}{4} \cos 3A$	U/ A	5	
c)	Prove that $\frac{\sin A - \sin 3A}{\sin^2 A - \cos^2 A} = 2 \sin A$	U/ A	5	
d)	Prove that $\frac{\sin A + \sin 2A + \sin 3A + \sin 4A}{\cos A + \cos 2A + \cos 3A + \cos 4A} = \tan\left(\frac{5A}{2}\right)$	U/ A	5	
e)	Prove that $2 \tan^{-1} x = \tan^{-1}\left(\frac{2x}{1-x^2}\right)$	U/ A	5	
f)	Show that $\tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{13}\right) = \tan^{-1}\left(\frac{2}{9}\right) = \cot^{-1}\left(\frac{9}{2}\right)$	A	5	

EXAM SEAT NO.

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LEVEL: **THIRD**PROGRAM: **CE/ME/MT**COURSE CODE: **CEE313/R228/MEE313/ME214 /MG228**COURSE NAME: **HIGHER MATHEMATICS**MAX. MARKS: **80**TIME: **3 HRS.**DATE: **24/11/2017**

Instruction:-

- 1) Answers must be written in the main answer book provided. (and supplements if required)
- 2) Figure to the right indicates marks.
- 3) Illustrate your answers with sketches wherever necessary.
- 4) Use of non-programmable pocket calculator is permissible.
- 5) Mathematical and other tables shall be made available on request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Marks
(08)**Q.1** Attempt any **FOUR**

With usual notations of symbol prove that

- a) $\Delta^3 y_2 = \nabla^3 y_5$
- b) $e^x = \left(\frac{\Delta^2}{E}\right) e^x \cdot \frac{E e^x}{\Delta^2 e^x}$
- c) $E\nabla = \Delta$
- d) Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ if $z = \tan^{-1}\left(\frac{x^2 + y^2}{x + y}\right)$
- e) If $u = \frac{x^{1/3} + y^{1/3}}{x^{1/4} + y^{1/4}}$ prove by Euler's Theorem that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{12} u$
- f) If $x = r \cos \theta$, $y = r \sin \theta$ show that $\frac{\partial(x, y)}{\partial(r, \theta)} = r$

Q.2 Attempt any **FOUR**

(16)

- a) Show that $\Delta^2 \cos 2x = -4(\sinh)^2 \cos(2x + 2h)$
- b) Express $f(x) = x^4 + 3x^3 - 5x^2 + 6x - 7$ in terms of factorial polynomials. Hence find $\Delta^2 f(x)$ at $x = 2$
- c) Applying Newton's forward Interpolation formula compute the value of $\sqrt{5.5}$ given that
 $\sqrt{5} = 2.236$, $\sqrt{6} = 2.449$
 $\sqrt{7} = 2.646$, $\sqrt{8} = 2.828$
- d) Using Newton's Backward Interpolation formula evaluate $e^{0.38}$ give that

x	0.0	0.1	0.2	0.3	0.4
e^x	1	1.1052	1.2214	1.3494	1.4918

- e) Find the missing term in the following table

x	100	101	102	103	104
$f(x)$	2	2.0043	---	2.0128	2.0170

- f) Using Lagrange's Interpolation formula express $f(x)$ by a polynomial of degree 2 given that

x	1	2	-4
$f(x)$	3	-5	4

P.T.O

Q.3 Attempt any FOUR**(16)**

- a) Verify $JJ^{-1} = 1$ if $x = uv$, $y = \frac{u}{v}$
- b) If z is a Homogenous function of degree n show that $x \frac{\partial^2 z}{\partial x \partial y} + y \frac{\partial^2 z}{\partial y^2} = (n-1) \frac{\partial z}{\partial y}$
- c) If $u = \sin^{-1} \left(\frac{x+y}{\sqrt{x} + \sqrt{y}} \right)$ show by Euler's Theorem that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \tan u$
- d) Verify Euler's Theorem for the function $u = \sin^{-1} \frac{x}{y} + \tan^{-1} \frac{y}{x}$
- e) If $u = e^{xyz}$ find $\frac{\partial^3 u}{\partial x \partial y \partial z}$
- f) Find $\frac{\partial u}{\partial r}$ and $\frac{\partial u}{\partial \theta}$ if $u = e^{r \cos \theta} \cos(r \sin \theta)$

Q.4 Attempt any FOUR**(08)**

- a) Find $L \left\{ \left(\frac{3t^2 + t}{t^2} \right)^2 \right\}$
- b) Find $L^{-1} \left\{ \frac{2(s+1)}{s^2 + 2s + 10} \right\}$
- c) Find Laplace transform of $\frac{1}{t}(1 - e^t)$
- d) Solve : $2 \frac{d^2 y}{dx^2} + 5 \frac{dy}{dx} - 12y = 0$
- e) Solve : $\frac{d^3 y}{dx^3} - 3 \frac{d^2 y}{dx^2} + 4y = 0$
- f) Solve $(D^2 + 4)y = 0$

Q.5 Attempt any FOUR**(16)**

- a) Find $L \{ t^2 (1 - \cos t) \}$
- b) Find $L^{-1} \left\{ \frac{s^2 + 1}{s^3 + 3s^2 + 2s} \right\}$
- c) Apply convolution theorem to evaluate $L^{-1} \left\{ \frac{s^2}{(s^2 + a^2)^2} \right\}$
- d) Solve using Laplace transform method, $\frac{dy}{dt} + y = e^{-3t}$, $y(0) = 1$
- e) Find $L \{ 2e^{4t} \sinh 2t \}$
- f) Solve : $\frac{d^2 y}{dx^2} - 3 \frac{dy}{dx} + 2y = 3 + x$

Q.6 Attempt any FOUR**(16)**

- a) Find $L \{ \sin 2t \cdot \cos 3t \}$
- b) Find $L^{-1} \left\{ \frac{e^{3-2s}}{(s+4)^5} \right\}$
- c) Find $L^{-1} \left\{ \frac{2s^2 - 6s + 5}{s^3 - 6s^2 + 11s - 6} \right\}$
- d) Using Laplace transform method solve $R \frac{dQ}{dt} + \frac{Q}{C} = V$, $Q = 0$ when $t = 0$
- e) Solve : $(D^3 - 3D^2 + 3D - 1)y = 0$
- f) Solve: $\frac{d^3 y}{dx^3} - 5 \frac{d^2 y}{dx^2} + 8 \frac{dy}{dx} - 4y = 0$

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ODD TERM END EXAM NOV/DEC -2017**EXAM SEAT NO.**

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LEVEL: FIRST**PROGRAM: COMMON****COURSE CODE:CCF108 /R110/X107/110/CCE108****COURSE NAME: ENGINEERING DRAWING -II****MAX. MARKS: 80****TIME: 4 HRS.****DATE: 22/11/2017****Instruction:-**

- 1) Answer to each section must be written in separate answer book.
- 2) Illustrate your answers with sketches where ever necessary.
- 3) Use of non-programmable pocket calculator is permissible.
- 4) Mathematical and other tables will be made available on request.
- 5) Assume and mention suitable additional data necessary.
- 6) Use of Mobile is strictly prohibited.
- 7) **QN**>Question No, **SQN**>Sub-Question No, **R**> Remembering, **U**>Understanding, **A**>Application **CO**>course outcome

QN	S Q N	Question Text	R U A	CO CCF108-	Marks
Q.1		Attempt any TWO			(08)
	a)	Illustrate following joints with their symbols i) Spot weld ii) Single- J butt weld	U	3	
	b)	Draw free hand sketch for 'V' thread.	U	3	
	c)	Draw free hand sketch for wing nut.	U	3	
Q.2		Attempt any TWO			(16)
	a)	Draw the following orthographic views of the object as shown in fig.1. i) Sectional F.V (03 marks) ii) Side view from left (03 marks) iii) Top view (02 marks)	U	1	
	b)	Fig.2 shows pictorial view of an object using first angle projection method, draw i) Front view (03 marks) ii) Top view (02 marks) iii) Sectional left hand side view(03 marks) iv) Give important dimensions.	U	2	
	c)	Fig 3.Shows pictorial view of an object, Draw i) Sectional F.V(03 marks) ii) Top view (02 marks) iii) Right hand side view (03 marks)	U	2	
Q.3		Attempt any TWO			(16)
	a)	Fig.4 shows pictorial view of an object. Draw following views of an object by using first angle method. i) F.V. in the direction X (03 marks) ii) Top view (02 marks) iii) Right hand side view (03 marks)	U	2	

P.T.O

	b)	By using first angle method, draw i) F.V. in the direction X (03 marks) ii) Top view (02 marks) iii) Left hand side view (03 marks) Refer Fig.5	U	2	
	c)	Fig 6 show pictorial view of an object using first angle method of projection , draw i) Front view (03 marks) ii) Top view (02 marks) iii) Right hand side view(03 marks)	U	2	
Q.4		Attempt any ONE			(08)
	a)	Figure no.4 (a) shows two views of an object. Draw by using first angle projection method the following views. i) Sectional elevation (section A-A) (04 marks) ii) Left hand side view (missing view) (04 marks)	U	4	
	b)	Fig.4 (b). Shows elevation and plan of a machine part. Draw the following views, by using first angle method of projection. i) Sectional elevation (section A-A) (04 marks) ii) Left hand side view (missing view) (04 marks)	U	4	
Q.5		Attempt any ONE			(16)
	a)	Fig. no 5 (a). Shows two views of an object. Draw its isometric view, taking 'O' as an origin. Use natural scale.	U	5	
	b)	i) Construct isometric scale upto 150mm (02 marks) ii) Fig. no 5 (b) (ii) shows two views of an object. Draw its isometric projection taking 'O' as an origin by isometric scale. (14 marks)	U	5	
Q.6		Attempt any TWO			(16)
	a)	Figure no. 6 (a) shows front view and top view of an a square prism, having a circular hole in the center. Draw its development of the surface.	U	6	
	b)	Figure no 6 (b) shows front view of cone, resting in H.P in first quadrant, cut by three different planes I, II, III. Draw the development of the lateral surface of this cut cone.	U	6	
	c)	Figure no 6 (c) shows front view of a right square pyramid with the sides of base equally inclined to V.P, resting on its base H.P. It is cut by two sectional planes A&B at 60^0 to each other as shown in fig. no 6(c). Draw the development of the lateral surface of the pyramid.	U	6	

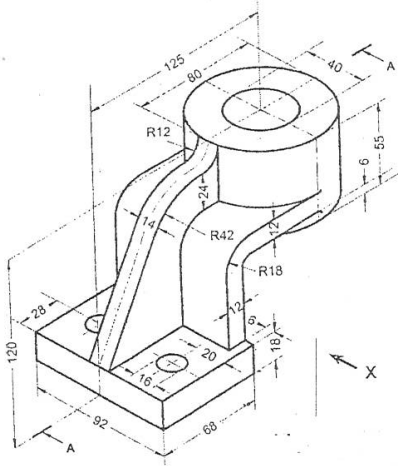


Fig. 1 ↗
Q. 2 Ⓐ

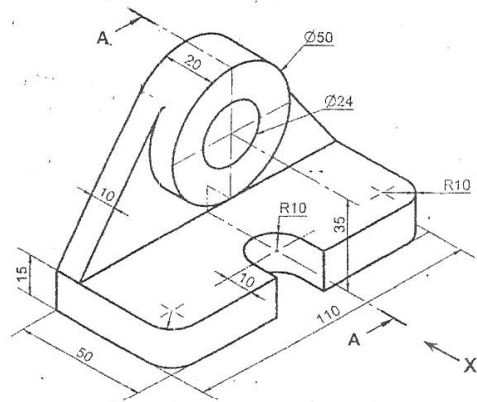


Fig. 2 ↗
Q. 2 Ⓑ

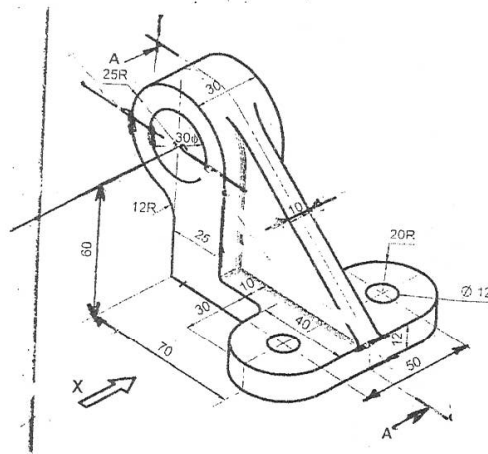


Fig. 3 ↗
Q. 2 Ⓒ

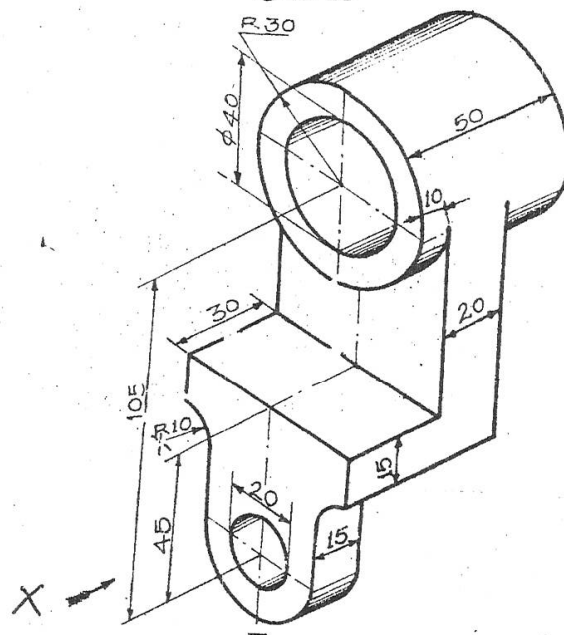
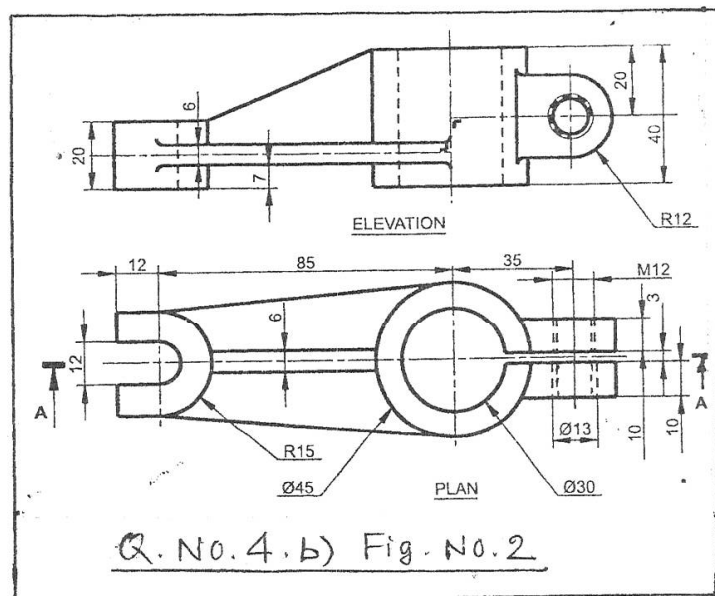
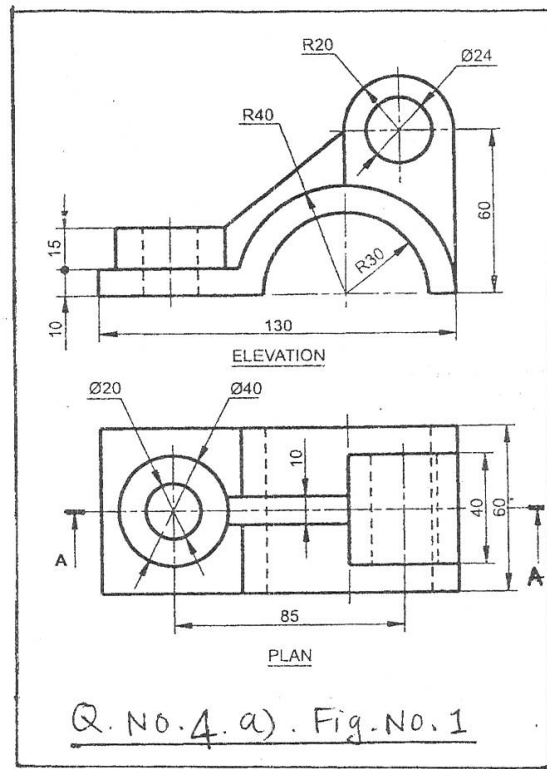
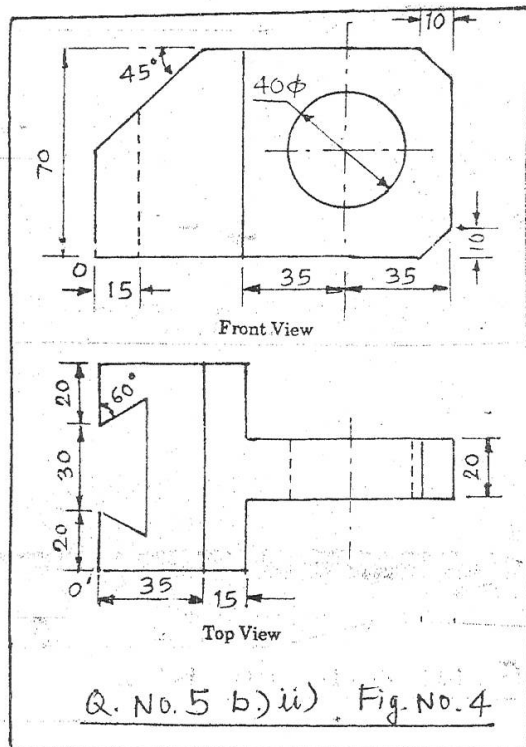
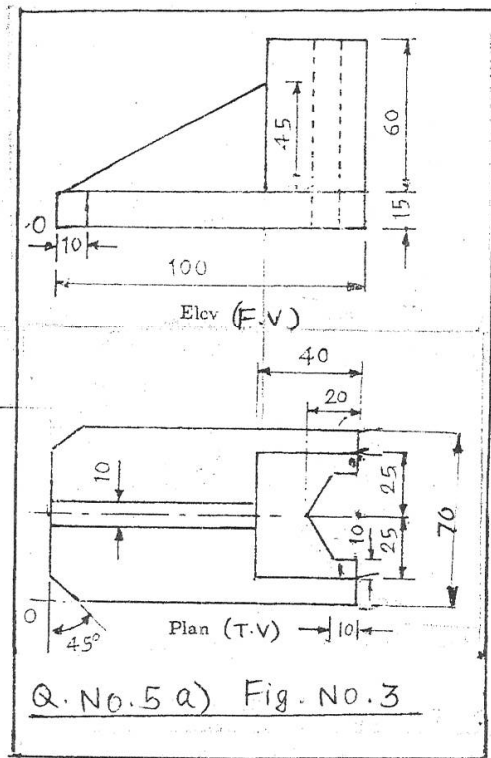


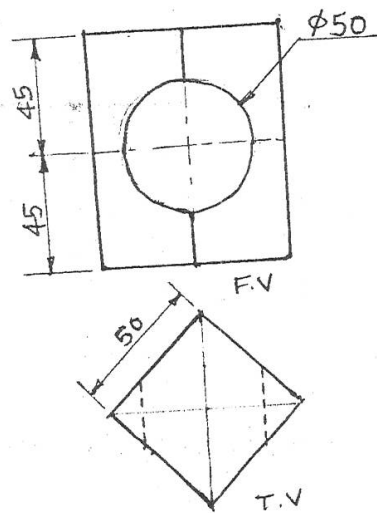
Fig. 6

Q. 3 C

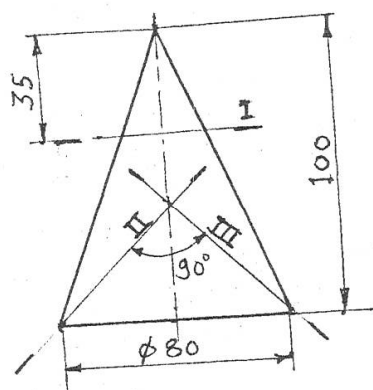




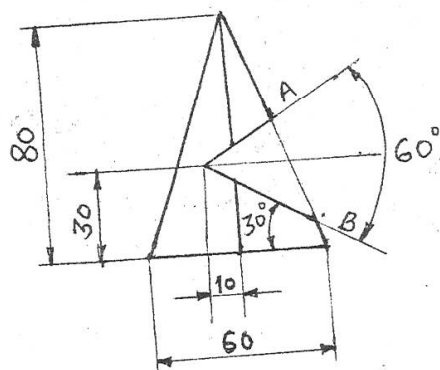
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Q. No. 6(a) Fig. No. 5



Q. No. 6(b) Fig. No. 6



Q. No. 6(c) Fig. No. 7