

**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**EVEN TERM END EXAM APRIL/MAY -2017**

**EXAM SEAT NO.**

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**LEVEL: THIRD**

**COURSE CODE: EEE308**

**MAX. MARKS: 80**

**PROGRAM: ELECTRICAL**

**COURSE NAME: MATERIAL WIRING & ILLUMINATION**

**TIME: 3 HRS.**

**DATE: 19/04/2017**

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 resistivity of conducting materials.
- b) How magnetic materials are classified?
- c) State any two materials used for permanent magnets.
- d) State the functions of diagonal plier and nose plier in wiring.
- e) What is the use of insulating materials in electrical engineering?
- f) What is meant by concealed wiring?

**Q.2 Attempt any FOUR**

**(16)**

- a) Explain electrical and mechanical properties of conductors.
- b) Explain how resistance of conducting material varies with their dimensions?
- c) Explain different properties of soft magnetic materials.
- d) How insulating materials can be classified depending upon their limiting temperatures.
- e) Explain how mica and porcelain materials are suitable to use as an insulating materials.
- f) Explain with neat diagram the use of following tools
  - i) Tester
  - ii) Stripper
  - iii) Drill bit
  - iv) SWG
  - v) Crimping machine.

**Q.3 Attempt any FOUR**

**(16)**

- a) State any eight properties of copper.
- b) Write short note on non magnetic steel.
- c) Write down any four insulating materials –other than mica and porcelain and state one applications of each.

**P.T.O**

- d) Explain different types of wiring function wise.
- e) List any eight accessories required for wiring.
- f) Explain different types of wires.

**Q.4 Attempt any FOUR**

**(08)**

- a) Define Domestic load.
- b) What are various ratings of incandescent lamps?
- c) Give specification of motor for 150liter Refrigerator.
- d) Why all domestic loads are connected in parallel?
- e) Define – space- Height ratio in case of illumination.
- f) Give full form of MHCP.

**Q.5 Attempt any FOUR**

**(16)**

- a) List out domestic loads used in residence (any 08)
- b) State the procedure or steps to make estimation & costing of a residential flat.
- c) Why earthing is necessary for power circuit?
- d) What is the function of fuse in case of domestic wiring? Now a days, fuse is replaced by which device? Give specification of that device.
- e) Define i) Luminous Intensity  
ii) Illumination  
iii) Lux  
iv) Solid angle.
- f) Explain different types of lighting schemes in case of illumination.

**Q.6 Attempt any TWO**

**(16)**

- a) With suitable example, make estimation & costing of casing capping wiring for 1 room-kitchen flat.
- b) i) State Laws of Illumination.  
ii) Define – Maintenance factor, Depreciation factor.
- c) It is required to provide an illumination of 150 lux in a factory hall 45m X 15m, using fluorescent tubes. Tubes are available in 2 sizes.
  - i) 40W, 35 lumen/watt.
  - ii) 80W, 50 lumen/watt.

Assume D.F= 0.8 & U.F = 0.6

Estimate the no of tubes required i) only 40W used ii) only 80W used

Draw a neat sketch of layout of tubes. Showing distance between tubes, distance between wall & tube space-height ratio between 1.2 to 1.5

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**EVEN TERM END EXAM APRIL/MAY -2017**

**EXAM SEAT NO.**

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LEVEL: **FOURTH**

COURSE CODE: **EEE402/EE411**

PROGRAM: **ELECTRICAL ENGG.**

COURSE NAME: **ELECTRICAL ESTIMATION & COSTING.**

MAX. MARKS: **80**

TIME: **3 HRS.**

DATE: **19 /04/2017**

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) Differentiate overhead & underground service connections. (any four points).
- b) State the importance of earthing.
- c) Justify the need for sub-circuits in residential electrical installation systems.
- d) State the power of a 1400 mm sweeps ceiling fan & the power wasted in conventional choke and electronic ballast of fluorescent tubes.
- e) State the range of earth resistance for a large commercial complex & a distribution substation.
- f) Differentiate between the ELCB & MCB.(any four point).

**Q.2** Attempt any **FOUR**

**(16)**

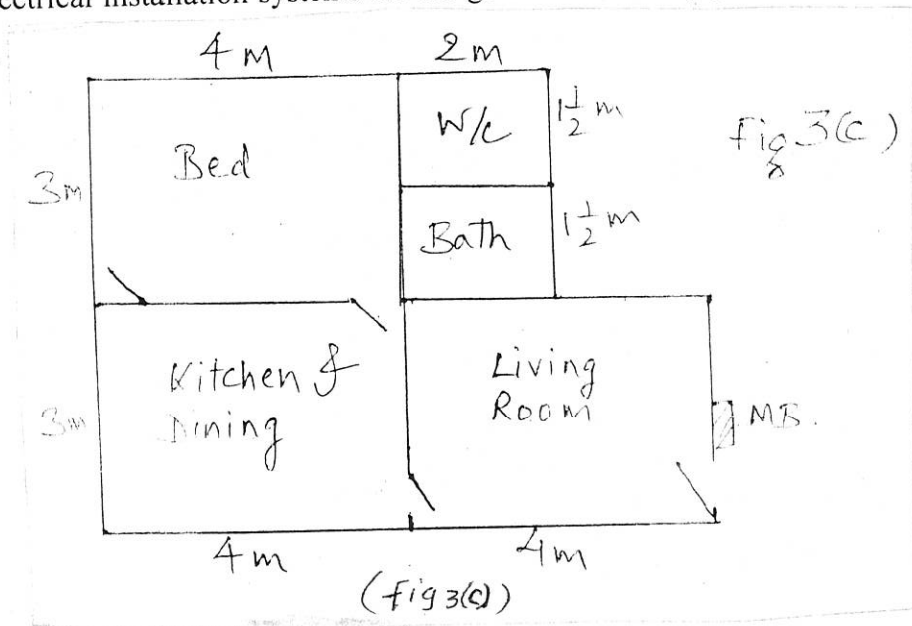
- a) Draw a schematic diagram showing the components of an underground type of service connection.
- b) State the coverage of IE Rule 30 governing service lines & apparatus on consumer's premises.
- c) Draw a labelled schematic diagram of the pipe type earthing system and state its applications.
- d) Differentiate plate & pipe earthing systems.
- e) State the coverage of Rule 54 (IE Rule) in respect of 'Declared voltage of supply to consumer'.
- f) Prepare rough estimate for an overhead service connection from a supply pole located 6m away from a single storey building to be provided with sanction load of 2.5 KW at 230 V,50 Hz.

**Q.3** Attempt any **TWO**

**(16)**

- a) State the procedure to design an electrical installation system for a residential consumer.
- b) A flat fitted in an exact square plan of (8m X 8m) as 4 identical rooms each of (4m X 4m) to constitute a 2 BHK residence. Assuming suitable wc & bath prepare material estimate for the electrical installation system.

- c) Design the electrical installation systems for the given residence (fig.3(c)) & prepare the cost estimate.



Section - II

Marks

(08)

**Q.4** Attempt any **FOUR**

- State any two differences between electrification of residential and commercial installation.
- State the value of insulation resistance of wiring as per IS.
- State any two industrial loads.
- What is 'Electrical Contract'?
- What is 'Tender Notice'?
- What is 'Technical Sanction'?

(16)

**Q.5** Attempt any **FOUR**.

- Explain various types of wires and wiring systems used presently in commercial installations.
- With diagram, explain how insulation resistance of wiring installation is tested.
- Explain how earthing of wiring installation is tested as per IS.
- State important guidelines about motor wiring.
- Explain how the rating of fuse and starter is decided for motor feeder circuit.
- Which thing are included in the costing of electrical installation of small factory unit.

(16)

**Q.6** Attempt any **TWO**.

- 1) State guidelines regarding design of electrical installation in factory (4 marks)  
2) What is comparative statement? What are the criteria for selecting contractors? (4 marks)
- Explain various design considerations for electrical installation of commercial building.
- 1) What is the criteria for selection of service connection and nature of supply for commercial installation? (4 marks)  
2) Which things are included in the estimate of commercial installation? (4 marks)

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**EVEN TERM END EXAM April/ May 2017**

**EXAM SEAT NO.**

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**LEVEL :- SECOND PROGRAM : COMMON**

**COURSE CODE :- CCF/CCE202/X106**

**COURSE NAME :- COMMUNICATION SKILLS**

**MAX. MARKS : 40 TIME : 2HRS. DATE: - 20 / 04 / 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 (Answer the following questions in 3-5 sentences). (08)**

- a) Write importance of oral communication for engineers.
- b) Write four examples of oral communication.
- c) State the advantages of written communication.
- d) Define the term artefacts.
- e) Write two advantages of LCD projector.
- f) Explain panel interview.

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

- a) Explain communication process with suitable diagram.
- b) Explain mechanical and physical barriers.
- c) Write strengths of media aided presentation.
- d) Explain 'Media plays an important role in the communication processes'.
- e) Write four advantages and disadvantages of oral communication.
- f) Write short note on mock interview.

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

- a) Write any four principles of effective communication.
- b) Write an application for the post of Design Engineer in Tata Motors, Pune.  
Give your resume.

c) Prepare a pie-chart which shows the distribution of sales of the car industry among six car companies :

General Motors : 37%

Maruti : 22%

Ford : 04%

Tata : 12%

Hyundai : 13%

Fiat : 12%

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**EXAM SEAT NO.**

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**LEVEL :- FOURTH**

**PROGRAM : ELECTRICAL ENGINEERING**

**COURSE CODE :- EEE405**

**COURSE NAME :- TESTING AND MAINTENANCE OF ELECTRICAL EQUIPMENTS**

**MAX. MARKS : 80 TIME : 3 HRS. DATE :- 20 / 04 / 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 o request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I		Marks
Q.1	Attempt any <b>FOUR</b>	(08)
a) Define safety and accidents.		
b) State any two I.E. rules.		
c) What is objective of testing of electrical machines?		
d) What is meant by indirect testing? Give any one example.		
e) What is breakdown maintenance?		
f) State the conditions for satisfactory parallel operation of three phase alternator.		
Q.2	Attempt any <b>FOUR</b>	(16)
a) What are the Do's and Dont's for the substation operations.		
b) Explain the factors affecting preventive maintenance schedule?		
c) What are the advantages of preventive maintenance schedule?		
d) Explain turns ratio test on three-phase induction motor.		
e) List any six routine tests on 3-phase induction motor and explain any one.		
f) Give maintenance schedule of 3-phase alternator.		
Q.3	Attempt any <b>FOUR</b>	(16)
a) Write short note on total productive maintenance.		
b) Explain any one method of providing artificial respiration to a person who has received an electric shock.		
c) Explain reduced voltage running up test on 3-phase induction motor.		
d) Write down routine maintenance of 3-phase induction motor.		
e) Explain maintenance schedule of synchronous machine as per IS-4884-1968.		
f) Explain the meanings of type tests, routine tests and special tests on motors.		

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Q.4 Attempt any **FOUR**

(08)

- a) Write two properties of good transformer oil.
- b) State two common troubles in electrical installation.
- c) Write two effects of misalignment in direct coupled drives.
- d) What is revarnishing? Why it is required?
- e) Describe in brief the method of cleaning the insulation covered with loose dust.
- f) Write two advantages of parallel operation of 3-phase transformers.

Q.5 Attempt any **FOUR**

(16)

- a) Describe in brief four factors to be considered in designing the machine foundation.
- b) Write the procedure to be followed for alignment of two shafts in direct coupled drive.
- c) Give classification of Insulating materials as per IS 8504 ( part III) 1994.
- d) Describe with neat diagram the procedure of Flash point test on transformer oil.
- e) With the help of neat diagram explain open delta ( delta-delta) test on transformer.
- f) Describe in brief the preventive maintenance and Routine maintenance of Distribution transformer as per IS 10028 ( part III) 1981.

Q.6 Attempt any **TWO**

(16)

- a) Prepare troubleshooting chart for 3-phase Induction motor.
- b) List Four Electrical faults and Four Magnetic faults in electrical machines with reasons for their occurrence.
- c) With the help of neat diagram, explain the procedure and purpose of separate source voltage withstand test on transformer.

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**EXAM SEAT NO.**

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LEVEL: **THIRD.**

COURSE CODE: **EEE303/EE211.**

MAX. MARKS: **80**

PROGRAM: **ELECTRICAL ENGINEERING.**

COURSE NAME: **GENERATION & TRANSMISSION.**

TIME: **3 HRS.**

DATE: **20/04/2017.**

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.
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**Q.1** Attempt any **FOUR**

**Marks  
(08)**

- a) State the different types of line insulators.
- b) Write any four properties of conductor.
- c) List any four non conventional energy sources.
- d) Define economics of power generation.
- e) State the advantages of Nuclear power station.
- f) State what is meant by base load and Peak load on stations.

**Q.2** Attempt any **FOUR**

**(16)**

- a) Explain the generation of Electrical energy in power plants.
- b) Explain construction of Nuclear reactor with sketch.
- c) Draw block diagram for steam power station.
- d) State any four points of selection of site for hydro power station.
- e) Explain the necessity of co-ordination of base load and peak load power plants.
- f) Define string efficiency. Draw the string of three suspension insulators and show the voltage distribution. Write the expression for string efficiency.

**Q.3** Attempt any **FOUR**

**(16)**

- a) Explain how each of the following insulators support conductor.
  - 1) Pin insulator
  - 2) shackle insulator
- b) State any four advantages of interconnected power system.
- c) State the methods of improving string efficiency. Explain any one in detail.
- d) Draw and explain a typical load curve and load duration curve.

- e) Draw schematic arrangement of Gas Turbine power plant & explain its working.
- f) Explain the working of hydro-power station with schematic layout.

**Q.4 Attempt any FOUR**

**(08)**

- a) List any two disadvantages of HVDC transmission.
- b) List any advantages of HVDC transmission.
- c) Draw the graphical representation to show the breakeven distance for economic transmission in HVDC compared to hvac Transmission.
- d) List four components of hvac Transmission.
- e) Draw the block diagram of the monopolar HVDC system
- f) Draw the block diagram of the any bipolar HVDC system.

**Q.5 Attempt any FOUR**

**(16)**

- a) Define corona. State the factors responsible for it.
- b) State the advantages (two only) and disadvantages (two only) of corona.
- c) Define sag in overhead transmission lines. Derive expression for it for a line supported at two ends at same height. Assume required parameters.
- d) Define the skin effect in lines. State the factors that govern it.
- e) Derive the expression for the inductance of a single phase line.
- f) Derive the expression for the capacitance of a three phase line.

**Q.6 Attempt any FOUR**

**(16)**

- a) Define long transmission lines. How are they different from the short lines? Explain.
- b) Describe using phasor diagram and mathematical expression the effect of load power factor on the voltage regulation of short lines.
- c) Draw the schematic diagram of the nominal 'T' model of the medium lines. Draw relevant phasor diagram.
- d) Draw the schematic diagram of the nominal ' $\pi$ ' (Pi) model of the medium lines. Draw the relevant phasor diagram.
- e) A single phase line delivers a load of 150 KVA at 0.93 power factor (lag) at 1500 V. The line has a loop impedance of  $(0.6 + j0.4)$  ohms. Determine the efficiency and the sending end voltage.
- f) Represent a medium transmission line using the end condenser method. Label it. Draw the relevant phasor diagram.

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**EXAM SEAT NO.**

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**LEVEL: FOURTH**

**PROGRAM: ELECTRICAL**

**COURSE CODE: EEE403/EE212/EE303/E303**

**COURSE NAME: DISTRIBUTION AND UTILISATION**

**MAX. MARKS: 80**

**TIME: 3 HRS.**

**DATE: 21/04/2017**

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.
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- 6) Assume additional suitable data necessary.
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**Section – I**

**Marks**

**Q.1 Attempt any FOUR**

**(08)**

- a) Define distribution system.
- b) What is meant by primary distribution system? What is its normal voltage?
- c) Define tariff
- d) State any two causes of low power factors.
- e) What is meant by electric welding?
- f) What are the electrical welding equipments?

**Q.2 Attempt any FOUR**

**(16)**

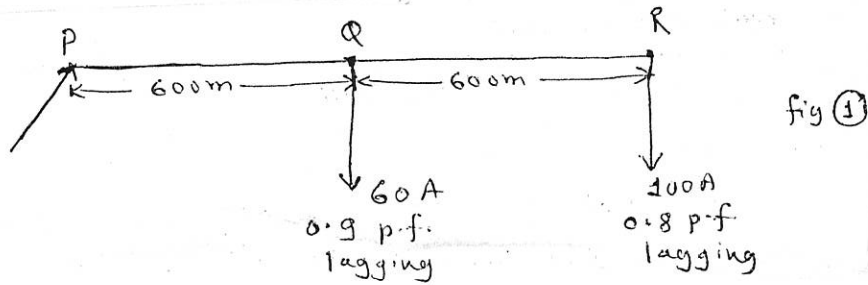
- a) Explain secondary distribution system with suitable diagram.
- b) What are the different design considerations in a distribution system? Explain.
- c) Explain how distribution system can be classified.
- d) What are the desirable characteristics of tariff? Explain.
- e) What are the disadvantages of low-power factor? Explain.
- f) Compare A.C. & D.C welding.

**Q.3 Attempt any FOUR**

**(16)**

- a) Compare metal arc and carbon arc welding.
- b) How power factor can be improved using different equipments? Explain.
- c) What are the different types of tariffs? Explain flat rate tariff.
- d) A supply system feeds the following loads (i) a lighting load of 500KW (ii) a load of 400KW at a p.f of 0.707 lagging (iii) a load of 800KW at a p.f of 0.8 leading (iv) a load of 500KW at 0.6 lagging (v) A synchronous motor driving 540KW d.c generator & having an overall efficiency of 90%. Calculate the power factor of synchronous motor so that the station p.f may become unity.

- e) A two wire distributor 1200m long is loaded as shown in fig.no.1. The power factor at the two load points refer to the voltage at R. The impedance of each line is  $(0.15+j0.2)\Omega$ . Calculate the sending end voltage, current and power factor. The voltage at point R is 230V.



- f) Explain ring distribution system with neat diagram.

### Section – II

Marks

Q.4 Attempt any **FOUR**

(08)

- Define electric drive.
- State the importance of electrical characteristics of motors.
- State the types of catenary used in case of electric traction.
- State different modes of heat transfer.
- State the properties of heating elements.
- State the advantages of electric braking.

Q.5 Attempt any **FOUR**

(16)

- What are the requirements to be satisfied by an ideal traction system?
- Disuse why a D.C series motor is ideally suited for traction services.
- Write a note on train lighting.
- Explain the construction and working of resistance oven.
- Give comparison between AC and DC drives.
- Explain the terms load equalization.

Q.6 Attempt any **FOUR**

(16)

- List the steps briefly in the design of heating elements.
- List and describe briefly the causes of failure of heating elements in electric heating system.
- State the equipments used in AC locomotive. Explain any two equipments with suitable diagram.
- State the factors governing selection of electric drives.
- Write a note on track electrification.
- Explain advantages and disadvantages of electric drives.

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**EVEN TERM END EXAM April/ May 2017**

**EXAM SEAT NO.**

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LEVEL :- **FIRST**

PROGRAM : **EE/IE/IT/E & TC**

COURSE CODE :- **CCF104/CCE104/X109/X103**

COURSE NAME :- **CHEMISTRY OF ENGINEERING MATERIALS**

MAX. MARKS : **80** TIME : **3 HRS.** DATE: - **24 / 04 / 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.
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Marks

Q.1 Attempt any **FOUR**

(08)

- a) Write any two differences between atomic number and atomic mass number.
- b) State Pauli's exclusion principle.
- c) Define i) Electrolyte ii) Electroplating.
- d) State Faraday's first law of electrolysis.
- e) State any two factors affecting rate of atmospheric corrosion.
- f) Draw diagram of galvanizing method of protection of metal from corrosion.

Q.2 Attempt any **FOUR**

(16)

- a) Write orbital electronic configuration of following elements



- b) Explain formation of CO<sub>2</sub> molecule.
- c) Explain the types of oxide film in atmospheric corrosion.
- d) Write any four differences between Temporary hardness and permanent hardness.
- e) Explain with reaction bleaching powder method of chlorination used for sterilization of water.
- f) i) State any two applications of p<sup>H</sup>. ii) Draw p<sup>H</sup> scale.

Q.3 Attempt any **FOUR**

(16)

- a) Define degree of ionization. Explain any three factors affecting degree of ionization.
- b) Explain mechanism of electrolysis of CuSO<sub>4</sub> solution by using copper electrode.
- c) What is metal cladding process? Draw diagram of metal cladding process and write two limitations of it.
- d) State and explain any four disadvantages of scale formation in boiler.
- e) State any two disadvantages each of hard water in i) paper industry and ii) Sugar industry.
- f) Write principle of ion exchange method used for removal of hardness from water. How exhausted Cation exchangers are regenerated?

P.T.O.

Q.4 Attempt any **FOUR**

(08)

- a) With example write classification of batteries.
- b) Write with formula four ores of copper.
- c) Define i) Flux ii) Mineral.
- d) Define Alloy & write its classification.
- e) Write two applications of silicon carbide.
- f) Write two properties of Teflon.

Q.5 Attempt any **FOUR**

(16)

- a) With labelled diagram write construction and working of lead acid storage cell.
- b) With the labelled diagram explain froth floatation process.
- c) Explain calcination method with chemical reactions.
- d) Write with example four purposes of making alloy.
- e) Write four properties and two applications of Germanium
- f) With example explain addition polymerization.

Q.6 Attempt any **FOUR**

(16)

- a) Define i) Battery ii) Separator iii) Electrochemical couple iv) Charge.
- b) With diagram explain smelting process of extraction of copper.
- c) Write occurrence of metals in nature. Draw flow chart of metallurgical process.
- d) Write composition and two applications of Rose metal.
- e) Define polymer and insulators. Write preparation of glass wool.
- f) Write four characteristics of good adhesives. Write two uses of Thermocole.

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**EVEN TERM END EXAM APRIL/MAY-2017**

**EXAM SEAT NO.**

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**LEVEL:THIRD.**

**COURSE CODE:EEE310.**

**MAX. MARKS: 80**

**PROGRAM: ELECTRICAL ENGINEERING.**

**COURSE NAME: ELECTRICAL INSTRUMENTATION.**

**TIME: 3 HRS.**

**DATE: 21/04/2017**

**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.
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**Q.1 Attempt any FOUR**

**Marks  
(08)**

- a) Define significant figure.
- b) What do you mean by Accuracy & Precision?
- c) How current standards are made?
- d) Define terms 1) International Standards.  
2) Working Standards.
- e) What are the different methods of measuring high resistor?
- f) What are applications of megger.

**Q.2 Attempt any FOUR**

**(16)**

- a) Explain the terms a) Static error.  
b) Static correction.
- b) Explain the terms a) Limiting error.  
b) Relative error.
- c) Explain Caesium Beam standard with neat diagram.
- d) Draw neat diagram and explain secondary standard of emf.
- e) With neat diagram explain Weston frequency meter.
- f) Explain Digital LCR meter and it's application.

**Q.3 Attempt any FOUR**

**(16)**

- a) How do errors get introduced in measurements?
- b) What do you mean by Deviation & variance?
- c) With the help of neat diagram explain standard resistor.
- d) Explain Maxwell's bridge circuit with the neat diagram.

**PTO**

- e) What are the applications of insulation resistance test? List out.
- f) With the help of neat diagram explain measurement of capacitance by "Schering Bridge.

**Q.4** Attempt any **FOUR**

**(08)**

- a) State the various parts used for cathode ray tube.
- b) Classify the transducers.
- c) Which are the basic considerations for selection of transducers?
- d) What is the piezo-resistive effect of metal conductor?
- e) Which are the quantities measured by digital multimeter?
- f) What are the applications of function generator?

**Q.5** Attempt any **FOUR**

**(16)**

- a) Draw labeled diagram of C.R.O. circuit & explain briefly each parts function.
- b) Explain with suitable sketches capacitive type transducers & their applications (at least two applications)
- c) Explain with suitable labeled sketch piezo-electric transducers & their applications (at least two applications)
- d) State the various types of temperature sensing-measuring devices & explain with labeled sketch any one with at least two typical applications.
- e) Draw labeled sketch of block diagram of function generator & explain its working.
- f) With suitable labeled sketch explain working of strip chart recorder.

**Q.6** Attempt any **FOUR**

**(16)**

- a) State types C.R.O. & explain briefly "Lissajons figures" & its applications for CRO.
- b) State various types of inductive transducers, with their labeled sketches & their applications. (any two)
- c) What is a principle of working of photo sensitive transducers, state their types & applications.(any two)
- d) Explain with neat sketch the working principle of LVDT. List two areas for its applications.
- e) State the various types of semiconductor type thermometers with suitable labeled sketches & explain any one in brief.
- f) Draw labeled diagram of Analog Multimeter & explain briefly working principle with applications.

**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**EVEN TERM END EXAM APRIL/MAY -2017**

**EXAM SEAT NO.**

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**LEVEL: FIRST**

**PROGRAM: COMMON**

**COURSE CODE: CCF110/CCE110/X111/R112** **COURSE NAME: APPLIED MECHANICS**

**MAX. MARKS: 80**

**TIME: 3 HRS.**

**DATE: 02/05/2017**

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 concurrent force system with any one of field example.
- b) State polygon law of forces.
- c) Explain funicular polygon with its use.
- d) State any two laws of friction.
- e) Explain the relationship between angle of friction & angle of Repose.
- f) Draw free body diagram of body resting on rough inclined surface.

**Q.2** Attempt any **FOUR**

**(16)**

- a) Resolve the 200N force along  $30^\circ$  &  $20^\circ$  on either side with neat sketch.
- b) Find resultant in magnitude & direction of forces 1kN, 2kN, 3kN, 4kN, 5kN and 6kN acting from center of hexagon towards its angular points respectively. (solve by analytical method)
- c) Solve Q.No.2 (b) by graphical method.
- d) An electric bulb of 5N weight is hanging from ceiling. Its wire is pulled by a force acting horizontally such that the wire makes an angle of  $60^\circ$  with ceiling. Find the magnitude of pulled force & tension in the wire.
- e) Find the support reaction of beam ABCD supported at 'A' & 'C' & portion CD is overhang. The given span is  $AB=BC=2m$  &  $CD=1.5m$ . The UDL of 20kN/m is acting on 'B' to 'D' with downward point load of 50kN acting at point D free end.
- f) The body of weight 100N will begin to slide when horizontal plane is raised gradually upto  $22^\circ$ . What is horizontal force required to drag the same body.

**Q.3** Attempt any **FOUR**

**(16)**

- a) The forces 50N, 30N, 20N & 15N are acting on four sides of 10cm square box respectively on clockwise direction. Find resultant from force & locate from 50N side.
- b) Three forces are acting along three side of an equilateral triangle of side 2m with forces 15N, 20N & 10N respectively. Find resultant from force of side 10N.
- c) A solid sphere of radius 10cm weighing 1.2KN is hung with steel cable 50cm from vertical smooth wall to its center. Find the contact force between wall & solid sphere & tension in cable.

**P.T.O**

- d) Beam AB of span 6m is hinged at A & roller support at B carrying vertically downward point load of 12kN at 2m from support A & inclined point load of 10kN inclined at  $30^\circ$  anticlockwise from horizontal at 4m from support A, Also udl of 5kN/m is acting over entire span. Calculate support reaction by analytical method.
- e) Solve Q.No.3 (d) by graphical method.
- f) A ladder of 3.5m with weight 150N is rested on smooth vertical wall & rough horizontal surface with  $18^\circ$  inclination to horizontal. What is force (pull) required at horizontal contact surface to keep ladder in equilibrium when man weighing 750N stands on its mid length. Take coefficient of friction between rough horizontal surface is 0.25.

**Q.4 Attempt any FOUR**

**(08)**

- a) Define Rectilinear motion.
- b) Differentiate displacement & distance.
- c) Define angular velocity.
- d) Define energy.
- e) Define work done by torque.
- f) State law of machine with meaning of each notation.

**Q.5 Attempt any FOUR**

**(16)**

- a) A composite section as shown in figure in which a equilateral triangle is rested on a square. Determine centroidal position of the section from reference axes X& Y
- b) A circular disc of 500mm diameter is cut off from a sheet of radius 500mm find the centroid of the remainder portion from reference axes X&Y as shown in figure.
- c) A car starting from rest & increases speed from 0 to 10m/s with constant acceleration  $0.5 \text{ m/sec}^2$  runs at this speed for a time of 30 seconds & finally comes to rest, with deceleration of  $0.3 \text{ m/sec}^2$ . Find the total distance travelled by car.
- d) A wheel moves from 200rpm to 150 rpm in 10 seconds find the retardation & time required to come to stop.
- e) A bullet weighing 1N is fired with velocity 400m/sec. into a wooden block weighing 100N. If the bullet remains embedded in the block, calculate the velocity of the block after impact.
- f) In a simple lifting machine 100N is lifted by an effort of 8N at an efficiency 62.5%. Find the effort lost in friction & the load lost in friction.

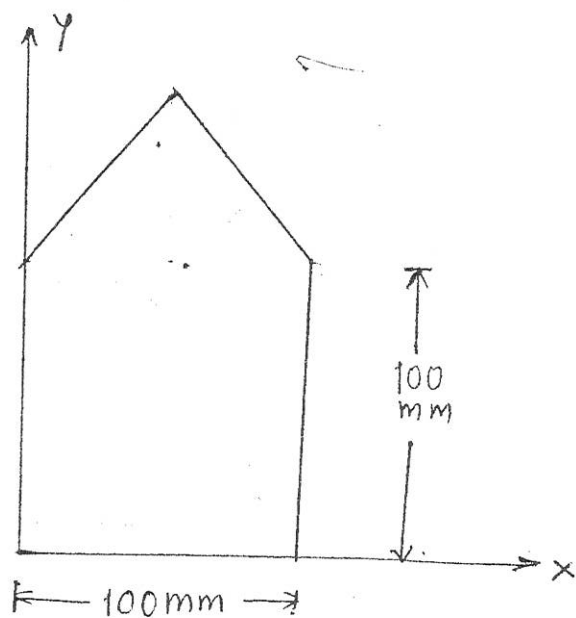
**Q.6 Attempt any FOUR**

**(16)**

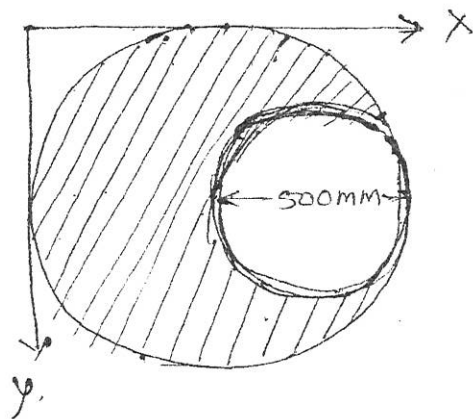
- a) Determine center of gravity of a solid composite body as shown in figure from the base of body.
- b) A stone is dropped into well. Its sound is heard after 3 seconds. The velocity of sound is 320 m/sec. find the depth of well.
- c) A wheel starts from the rest & accelerates at  $15 \text{ rad/sec}^2$  until it reaches a speed of 300 rpm. With this speed it rotates for 3 minutes & then retards uniformly for 150 seconds & stops. Find total number of revolutions made.
- d) In a simple lifting machine the effort required to lift a certain load is 150N. When efficiency is 65%. Find ideal effort of machine.
- e) A simple lifting machine lifts a load of 400N & 600N by efforts of 60N & 80N respectively. Find law of machine & efficiency at a load of 800N if velocity ratio of machine is 22.
- f) 300 cubic meters of water is to be raised to a tank of height 10 meters in 10 minutes. Calculate the power of the pump required in kilowatt.

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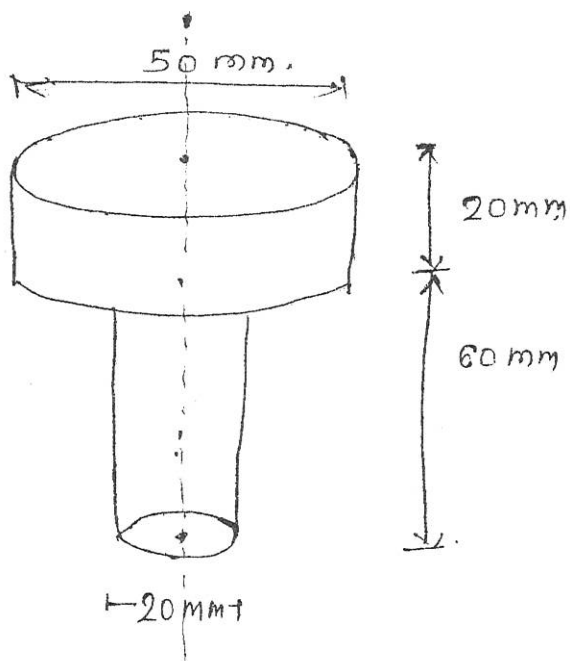
Q.5)  
a)



Q.5)  
b)



Q.6) a.)







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**EVEN TERM END EXAM APRIL/MAY-2017**

**EXAM SEAT NO.**

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LEVEL: **THIRD.**

COURSE CODE: **EEE304/EE310**

MAX. MARKS: **80**

PROGRAM: **ELECTRICAL ENGINEERING.**

COURSE NAME: **APPLIED ELECTRONICS.**

TIME: **3 HRS.**

DATE: **02/05/2017**

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 if necessary.
- 7) Use of Mobile is strictly prohibited.

**Q.1** Attempt any **FOUR**

**Marks  
(08)**

- a) State properties of class A power amplifier (any four)
- b) Draw circuit diagram of Direct-coupled amplifier.
- c) State Barkhausen's criteria.
- d) Define- i) Rise time ii) Fall time.
- e) Draw circuit diagram of tuned base oscillator.
- f) Draw the output waveform of Schmitt trigger.

**Q.2** Attempt any **FOUR**

**(16)**

- a) Explain working of class B push-pull amplifier with neat circuit diagram.
- b) State different transistor configurations & explain one of them.
- c) Draw circuit diagram of RC phase-shift oscillator & explain how Barkhausen's criteria is satisfied in the circuit. Also write frequency equation for the same circuit.
- d) Explain working of clapp oscillator with neat circuit diagram.
- e) Determine the period and frequency of oscillation for an astable multivibrator with component values  $R_1=2K\Omega$ ,  $R_2=20K\Omega$  &  $C_1=0.01\mu F$ ,  $C_2=0.05\mu F$ .
- f) Draw circuit diagram of Monostable multivibrator & explain its circuit operation.

**Q.3** Attempt any **FOUR**

**(16)**

- a) Explain working of Hartley oscillator with neat circuit diagram.
- b) Draw circuit diagram of transformer coupled amplifier & explain working.

**P.T.O.**

- c) Explain working of class A power amplifier with neat circuit diagram.
- d) Differentiate between Colpitt's oscillator & Hartley oscillator (any four point)
- e) Find the values of resistor to produce pulse width of  $5\mu\text{s}$ , for monostable multivibrator, if capacitor  $C=1\mu\text{f}$ . State any two applications of monostable multivibrator.
- f) Explain circuit operation of astable multivibrator. State the equation of oscillator frequency.

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

- a) List the turn-on methods of SCR.
- b) List any two applications of LASCR.
- c) Define load commutation.
- d) List any two applications of power electronics.
- e) Define Line commutation.
- f) Draw construction of photodiode.

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

- a) Draw a labeled V-I characteristics of SCR & explain it.
- b) Explain with neat circuit diagram Batch counter.
- c) Draw & explain UJT triggering.
- d) With neat circuit diagram explain RC-half wave triggering circuit.
- e) Draw a neat circuit diagram & waveforms of class C commutation & explain it.
- f) Explain with neat diagram working of LDR.

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

- a) Explain with neat constructional diagram power MOSFET. Compare MOSFET & IGBT (any four points)
- b) Explain with neat circuit diagram & waveforms Ramp & pedestal triggering.
- c) What is external pulse commutation? Explain class A commutation with waveform and what are disadvantages of class A commutation?

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**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

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**EVEN TERM END EXAM April/ May 2017**

**EXAM SEAT NO.**

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**LEVEL :- FIFTH**

**PROGRAM : ELECTRICAL ENGINEERING**

**COURSE CODE :- EEE503/EE305/E305**

**COURSE NAME :- ELECTRICAL MACHINE CONTROL & AUTOMATION**

**MAX. MARKS : 80 TIME : 3 HRS. DATE :- 03 / 05 / 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) How linear mechanical movement can be obtained by using motor?
- b) Give two examples of primary and pilot control devices.
- c) How contactors are classified?
- d) What is the function of relays in control circuit?
- e) What is solenoid valve?
- f) Draw symbol for three phase squirrel cage induction motor and limit switch.

**Q.2 Attempt any FOUR**

**(16)**

- a) Draw and explain two wire control circuit.
- b) Explain MCCB & MCB along with their ratings.
- c) Explain over voltage relay.
- d) Explain pneumatic timer with neat diagram.
- e) What is meant by control transformer? Explain with neat diagram.
- f) Draw connection of two position switches in a simple circuit and explain.

**Q.3 Attempt any FOUR**

**(16)**

- a) How ratings of contactor are given? Give example.
- b) Explain frequency responsive relay with neat diagram.
- c) Explain phase failure relay with neat connection diagram.
- d) Explain limit switches, with suitable diagrams.
- e) How plugging switch can be represented? Explain.
- f) Explain Thermostats with neat diagram.

**P.T.O.**

Q.4 Attempt any **FOUR**

(08)

- a) What are flux decay relays?
- b) Draw torque-speed curve during the period of acceleration of slip-ring induction motor.
- c) State applications of PLC.
- d) What is mean by plugging of motor?
- e) State advantages a disadvantages of part winding starters for 3 phase –I-M.
- f) Draw the control circuit for forward-stop-Reverse control of 3phase-I.M.

Q.5 Attempt any **FOUR**

(16)

- a) Explain working of definite time limit starter using contactor with timer head  
( Draw control circuit)
- b) State advantages of digital logic over relay logic.
- c) Explain dynamic breaking of 3-phase I.M. with power and control circuit.
- d) Explain 3-step starting for squirrel cage I.M. with control circuit.
- e) Explain automatic auto-transformer starter ( open circuit transition)
- f) Explain over temperature protection.

Q.6 Attempt any **FOUR**

(16)

- a) Explain working of PLC by drawing block diagram.
- b) Explain rotor frequency starter for slip ring induction motor with power and control circuit.
- c) Explain overload relay, through CT for overload protection of motor of high rating.
- d) Explain DOL starter with random reversing.
- e) Explain two speed one winding motor starter with power diagram.
- f) Explain plug stopping of 3–phase, squirrel cage induction motor.

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**EVEN TERM END EXAM APRIL/MAY -2017**

**EXAM SEAT NO.**

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**LEVEL: FIRST**

**PROGRAM: COMMON**

**COURSE CODE: CCF105/CCE105/X104/R107/107 COURSE NAME: BASIC MATHEMATICS**

**MAX. MARKS: 80**

**TIME: 3 HRS.**

**DATE: 09/05/2017**

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) Resolve into partial fraction  $\frac{1}{x^2 - x}$
- b) If  $A = \begin{bmatrix} 2 & -1 & 1 \\ 3 & -4 & 0 \end{bmatrix}$  &  $B = \begin{bmatrix} 0 & 2 \\ -3 & 1 \\ 4 & -1 \end{bmatrix}$  is the matrix AB is non singular.
- c) Evaluate i)  $7_{P_3}$  ii)  $4_{C_3}$
- d) Solve the equations by matrix method  
 $3x + y = 1$   
 $5x + 2y = 3$
- e) Expand the following binomial upto 4<sup>th</sup> term of the expansion  $(1 + 2x)^{\frac{1}{2}}$
- f) Expand  $(x + y)^5$  by using binomial theorem.

**Q.2 Attempt any FOUR**

**(16)**

- a) Find k if  $\begin{vmatrix} 2-k & 7 \\ 3-4 & 13 \\ 8-11 & 33 \end{vmatrix} = 0$
- b) Resolve into partial fraction  $\frac{x^3 + x}{x - 9}$
- c) If  $A = \begin{bmatrix} 2 & 4 & 4 \\ 4 & 2 & 4 \\ 4 & 4 & 2 \end{bmatrix}$  show that  $A^2 - 8A$  is a scalar matrix.
- d) Resolve into partial fraction  $\frac{x^2 + x + 1}{(x - 1)^3}$
- e) If  $A = \begin{bmatrix} 2 & -3 \\ 3 & 4 \end{bmatrix}$ ,  $B = \begin{bmatrix} 4 & 5 \\ 3 & -2 \end{bmatrix}$ ,  $C = \begin{bmatrix} 3 & -1 \\ 0 & 6 \end{bmatrix}$  Find  $3A + 4B - 2C$
- f) Find x and y if  $\left\{ 4 \begin{bmatrix} 1 & 2 & 0 \\ 2 & -1 & 3 \end{bmatrix} - 2 \begin{bmatrix} 1 & 3 & 1 \\ 2 & -3 & 4 \end{bmatrix} \right\} \begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$

**Q.3 Attempt any FOUR**

**(16)**

- a) Solve the equations by Cramer's rule  
 $x + y + z = 3$   
 $x - y + z = 1$   
 $x + y - 2z = 0$

- b) Resolve into partial fraction  $\frac{2x+1}{x^2(x+1)}$
- c) If  $A = \begin{bmatrix} 1 & -3 \\ 2 & -1 \end{bmatrix}$  &  $B = \begin{bmatrix} 1 & 0 & 1 \\ 2 & -1 & 3 \end{bmatrix}$  verify that  $(AB)^T = B^T A^T$
- d) Resolve into partial fraction  $\frac{2x+3}{x^2-2x-3}$
- e) Show that  $(\sqrt{3}+1)^5 - (\sqrt{3}-1)^5 = 152$
- f) Solve the equation using matrix method
- $$\begin{aligned} x + y + z &= 2 \\ y + z &= 1 \\ x + z &= 3 \end{aligned}$$

**Q.4 Attempt any FOUR**

(08)

- a) Prove that  $\operatorname{cosec}^2 \theta - \cos^2 \theta \cdot \operatorname{cosec}^2 \theta = 1$
- b) Without using calculator find  $\sin 15^\circ$
- c) If  $\sin A = \frac{1}{2}$ , find  $\sin 3A$
- d) Prove that  $\cos 2\theta = 1 - 2\sin^2 \theta$
- e) Prove that  $\sin\left(\theta + \frac{\pi}{6}\right) - \sin\left(\theta - \frac{\pi}{6}\right) = \cos \theta$
- f) Find the principal value of  $\cos^{-1}\left(\frac{-1}{2}\right) - \sin^{-1}\left(\frac{1}{2}\right)$

**Q.5 Attempt any FOUR**

(16)

- a) Prove that  $\frac{\operatorname{cosec} A}{\operatorname{cosec} A - 1} + \frac{\operatorname{cosec} A}{\operatorname{cosec} A + 1} = 2 \sec^2 A$
- b) Prove that  $\sin(A+B) = \sin A \cos B + \cos A \sin B$
- c) Simplify  $\frac{\cos^2(180^\circ - \theta)}{\sin(-\theta)} + \frac{\cos^2(270^\circ + \theta)}{\sin(180^\circ + \theta)}$
- d) Prove that  $\frac{\cos 3\theta}{\cos \theta} + \frac{\sin 3\theta}{\sin \theta} = 4 \cos 2\theta$
- e) Prove that  $\frac{\sin 4A + \sin 5A + \sin 6A}{\cos 4A + \cos 5A + \cos 6A} = \tan 5A$
- f) Prove that  $\cos^{-1}\left(\frac{4}{5}\right) + \cos^{-1}\left(\frac{12}{13}\right) = \cos^{-1}\left(\frac{33}{65}\right)$

**Q.6 Attempt any FOUR**

(16)

- a) If A & B are obtuse angles such that  $\sin A = \frac{5}{13}$  &  $\cos B = \frac{-4}{5}$ . Find  $\tan(A+B)$
- b) prove that  $\cos 3\theta = 4 \cos^3 \theta - 3 \cos \theta$
- c) Prove that  $\frac{1 - \tan 2\theta \cdot \tan \theta}{1 + \tan 2\theta \cdot \tan \theta} = \frac{\cos 3\theta}{\cos \theta}$
- d) Prove that  $\frac{\sin 8x - \sin 5x}{\cos 7x + \cos 6x} = \sin x + \cos x \cdot \tan \frac{x}{2}$
- e) Prove that  $\tan^{-1}(x) + \tan^{-1}(y) = \tan^{-1}\left(\frac{x+y}{1-xy}\right)$  if  $xy < 1$
- f) Prove that  $\tan^{-1}(1) + \tan^{-1}(2) + \tan^{-1}(3) = \pi$

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**EVEN TERM END EXAM April/ May 2017**

**EXAM SEAT NO.**

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**LEVEL :- THIRD PROGRAM : ELECTRICAL ENGINEERING**

**COURSE CODE :- EEE304/EE310**

**COURSE NAME :- APPLIED ELECTRONICS**

**MAX. MARKS : 80 TIME : 3 HRS. DATE: - 09 / 05 / 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.
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Marks

**Q.1 Attempt any FOUR**

(08)

- a) State Barkhausen's criteria.
- b) What is the need of multistage amplifier?
- c) Define Multivibrator
- d) Why Astable Multivibrator is known as free running Multivibrator?
- e) What is the need of biasing?
- f) Draw the block diagram of oscillator.

**Q.2 Attempt any FOUR**

(16)

- a) Draw and explain Monostable Multivibrator.
- b) With neat circuit diagram, explain Colpitt's oscillator. Write the formula for frequency of oscillation.
- c) Explain class B push pull amplifier.
- d) How transistor can act as a switch? Explain.
- e) Explain tuned oscillator.
- f) Compare class A and Class B power amplifier. ( any four points)

**Q.3 Attempt any TWO**

(16)

- a) Draw a neat labelled circuit diagram and frequency response curve of two stage RC coupled amplifier and explain.
- b) Draw a neat circuit diagram of Hartley oscillator and explain it. In a transistorized Hartley oscillator  $L_1=25\text{mH}$ ,  $L_2=0.5\text{mH}$ , &  $C=200\text{pF}$ . Determine the frequency of oscillations.
- c) With neat circuit diagram and waveforms; explain Astable Multivibrator. Calculate frequency of astable Multivibrator with  $R_1 = R_2 = 15\text{k}\Omega$  &  $C_1 = C_2 = 0.05\mu\text{F}$ .

**P.T.O.**



Q.4 Attempt any **FOUR**

(08)

- a) What is importance of power electronics?
- b) Draw construction of LDR.
- c) What is use of optocouplers?
- d) Draw neat snubber circuit diagram.
- e) What is line commutation?
- f) Where is forced commutation required? Why?

Q.5 Attempt any **FOUR**

(16)

- a) With neat constructional diagram of power MOSFET explain its construction.
- b) Draw neat diagram of triac as anti parallel connection of SCR and explain its operation.
- c) With neat diagram, explain working of photo diode.
- d) Draw neat circuit diagram of Burglar alarm and explain its operation.
- e) Explain with neat circuit diagram, gate protection circuit.
- f) Explain in brief phase control UJT triggering with neat diagram of it.

Q.6 Attempt any **TWO**

(16)

- a) i) Differentiate between SCR and IGBT ( any four points)  
ii) Draw V-I characteristic of diac and explain it.
- b) i) With neat circuit diagram, explain operation of photo tachometer.  
ii) Explain with neat circuit diagram, phase control by RC fullwave triggering.
- c) Explain operation of class A and class C commutation methods with their neat circuit diagrams and necessary waveforms.

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**EVEN TERM END EXAM April/ May 2017**

**EXAM SEAT NO.**

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**LEVEL : - FIRST**

**PROGRAM : ELECTRICAL ENGINEERING**

**COURSE CODE :- EEF102**

**COURSE NAME :- FUNDAMENTALS OF ELECTRICITY & MAGNETISM**

**MAX. MARKS : 80 TIME : 3 HRS. DATE: - 04 / 05 / 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.
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- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Marks

**Q.1 Attempt any FOUR**

(08)

- a) Define i) Electric potential ii) Electric potential difference.
- b) Explain: resistivity & resistance of a substance in brief.
- c) State expression for current division method of two resistances connected in parallel across the source.
- d) Write down with suitable sketch conversion of Star to Delta expression.
- e) Derive an expression for capacitance of two parallel plates separated by distance 'd' apart having area of plate 'A' mtr<sup>2</sup> & with dielectric medium having relative permittivity  $\epsilon_r$ .
- f) State the expression for charging voltage as a function of time for capacitor in details.

**Q.2 Attempt any FOUR**

(16)

- a) Explain the terms of electricity like electric field, electric field strength and electric flux density.
- b) State the difference between DC & AC using suitable sketch. State at least four points.
- c) Convert the given star connected resistive network in an equivalent delta connected network ( see Fig. NO.1)
- d) Solve the given network of series & parallel combination of resistances to find the equivalent resistance across terminal A & B ( see Fig. No.2)
- e) Derive an expression for capacitances of 3 nos  $C_1, C_2, C_3$  when connected in series across the source of V volts.
- f) Draw the circuit diagram of capacitor in discharging state, sketch discharging curves of voltages and current of capacitor with respect to time axis and state respective expressions.

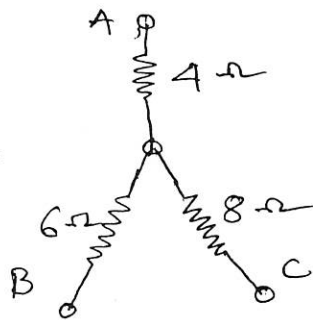
P.T.O

- Q.3 Attempt any **FOUR** (16)
- State the effect of temperature on resistance value of different types of material.
  - Explain the temperature coefficient of resistance with suitable expressions and sketches.
  - State the difference between ideal voltage source & practical voltage source also solve the given network using source conversion method to find. Current taken by  $4\Omega$  resistance across terminal A & B as shown in fig 3 to find power dissipation & voltage drop in  $4\Omega$  resistor.
  - With suitable circuit diagram and expressions, explain the voltage drop & terminal voltage in the circuit.
  - A  $100\mu\text{F}$  capacitor charged from  $200\text{V}$  dc after full charging it is disconnected from supply and connected to  $50\mu\text{F}$  initially uncharged capacitor in parallel calculate
    - Potential difference across parallel combination.
    - Electrostatic energy after the capacitors are connected in parallel.
  - What is meant by composite dielectric medium slab in series for capacitors conducting plates? Derive an expression for capacitance.
- Q.4 Attempt any **FOUR** (08)
- Define magnetic flux. State its unit.
  - Define 'absolute permeability'. State its unit.
  - Draw simple magnetic circuit.
  - Define Reluctance. State its unit.
  - What do you understand by electromagnetic induction?
  - State any two applications of iron core inductor.
- Q.5 Attempt any **FOUR** (16)
- Explain right hand rule and cork screw rule.
  - Relative permeability is unit less quantity. Justify (03)
    - State expression showing relation between magnetic flux density and field intensity. (01)
  - Define solenoid. Explain with diagram magnetic field due to current carrying solenoid.
  - What is the inductance of coil of 200 turns wound and a paper tube  $25\text{cm}$  long having  $5\text{cm}$  radius?
  - State and explain Faraday's laws of electromagnetic induction.
  - Define mutual inductance. (02)  
State its unit. (01)  
State mathematical expression for coefficient of coupling ( $k$ ). (01)
- Q.6 Attempt any **FOUR** (16)
- Explain statically induced emf with diagram.
  - Explain air core inductor with neat diagram.
  - Explain hysteresis loop of magnetic material with diagram.
  - Compare electric circuit and magnetic circuit ( any four points)
  - State difference between permanent magnet and electro magnet. (02)
    - State any two application of above. (02)
  - An iron ring of  $80\text{cm}$  mean circumference has a cross sectional area of  $10\text{cm}^2$  and has a winding of 800 turns on it. The ring has an air gap of  $1\text{mm}$ . It is observed that a current of  $3.18\text{A}$  in the winding produces a flux density of  $1.2\text{ Tesla}$  in the air gap. Calculate total ampere turns. Assume  $\mu_r = 480$ .

P.T.O.

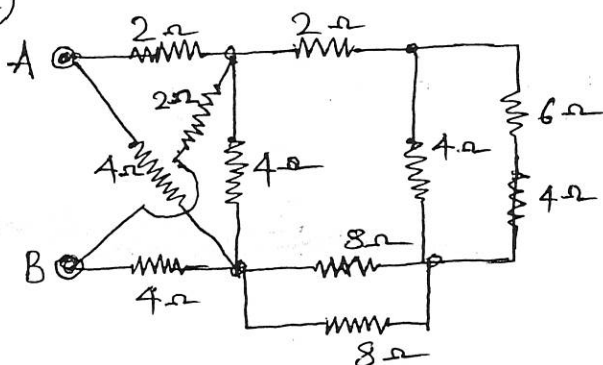
Section I:

Fig no ①  
Q.2 (c)



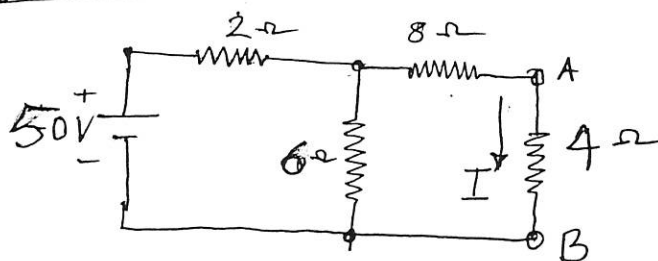
Eq.  $\Delta = ?$

Fig no ②  
Q.2 (d)



$R_{AB} = ?$

Fig no ③ Q.3 (c)



$I = ?$

→ x → x → x →



**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

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**EVEN TERM END EXAM APRIL/MAY -2017**

**EXAM SEAT NO.**

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**LEVEL: FIRST**

**PROGRAM: COMMON**

**COURSE CODE: CCF107/X105/R109/CCE107**

**COURSE NAME: ENGINEERING DRAWING -I**

**MAX. MARKS: 80**

**TIME: 4 HRS.**

**DATE: 04/05/2017**

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 TWO**

**Marks  
(08)**

- a) On a plan of a field, a line of 1m long is represented on a drawing by a line of 5cm. construct a diagonal scale to read upto 2m and mark the length of 1m, 6 decimetres & 4cm on it.
- b) Illustrate & write down application of following lines
  - i) Ruled line with zigzag.
  - ii) Short dashed medium.
- c) Construct a scale of 1cm=0.4m to show metres & decimetres and large enough to measure upto 5m. Show a distance of 4m & 6 decimetres on it.

**Q.2 Attempt any FOUR**

**(16)**

- a) Construct an ellipse when the distance of focus from directrix is equal to 60mm & eccentricity=2/3.
- b) The length of a top view of a straight line AB parallel to V.P & inclined at  $40^\circ$  to HP is 60mm. Its end A is 10mm above H.P is and 25mm in front of V.P. Draw front & Top views & determine the true length of the line AB.
- c) Draw the projections F.V & T.V of a 75mm long straight line, inclined at  $60^\circ$  to V.P and its one end 15mm in front of it, parallel to and 25mm above H.P.
- d) The top view of a 75mm long line measures 55mm. The line is in V.P, its one end being 25mm above the H.P. Draw its projections (F.V. and T.V)
- e) End A & B of a line AB is 15mm & 55mm respectively in front of the V.P Elevation length of line is 60mm. it is parallel to XY line & 15mm above it. Draw Two views of the line & find its true length & inclination with V.P
- f) The distance between the projectors through the ends of a line 75mm long is 60mm. Its end M is 15mm above HP & 20mm in front of V.P. Draw its two views when it is parallel to V.P. Determine its inclination with H.P.

**Q.3 Attempt any FOUR**

**(16)**

- a) Draw an Archimedian spiral of one convolution, the maximum & minimum radii being 80mm & 20mm respectively.
- b) Draw a Helix on a cylinder of 50mm diameter of two turns, given pitch equal to 40mm.
- c) A disc of diameter 50mm rolls without slip on a plane inclined at an angle of  $15^\circ$  to the horizontal. Trace & name the locus of point P on the circumference of the disc.
- d) Draw in involute of a hexagon of side 20mm for one complete turn.

**P.T.O**

- e) Draw a hyperbola with asymptotes  $OB=140$  &  $OA=130$  intersecting at an angle of  $70^\circ$  and passing through point P on the curve 36mm from OB & 20mm from OA.
- f) A stone is thrown upwards from a building 6m high & in its highest point of flight, it just crosses palm tree 12m high. Trace the path of the projectile, if the distance between the building and the palm tree be 3m. Take suitable scale.

**Q.4** Attempt any **TWO**

(08)

- a) A circular plate 50mm diameter has its center 30mm above HP & 35mm in front of VP. Draw the three views of the plate when the surface is perpendicular to VP & inclined at  $45^\circ$  to HP.
- b) A rhombus having diagonals 60mm & 30mm respectively is resting on a corner in VP. The longer diagonal is parallel to HP & inclined to VP such that front view appears as a square. Determine the angle made by the rhombus with VP.
- c) A pentagonal plane of side 30mm is resting on HP on one of its side with the corner opposite to that side, 25mm above HP side on HP is perpendicular to VP. Draw three views of the pentagonal plane & find its inclination with HP.

**Q.5** Attempt any **TWO**

(16)

- a) A cone of 50mm diameter & axis 70mm long is resting on HP on a point of its circumference of base such that its axis is parallel to VP & apex is 50mm above HP. Draw its projections.
- b) A pentagonal prism base 20mm side & axis 55mm long, is standing on a corner of its base on HP with its axis inclined at  $45^\circ$  to HP & parallel to VP. Draw its projections.
- c) A hexagonal pyramid base 25mm sides & axis 60mm long has a corner of base in the HP. Its axis makes an angle of  $30^\circ$  with HP & parallel to VP. Draw its projections.

**Q.6** Attempt any **TWO**

(16)

- a) A hexagonal pyramid base 30mm side & axis 70mm long has its base on HP with an edge of base parallel to VP. A section plane perpendicular to VP & inclined at  $45^\circ$  to HP cuts the axis of pyramid 30mm from the apex.  
Draw-
  - i) Front view (02 marks)
  - ii) Sectional top view (03 marks)
  - iii) True shape of section. (03 marks)
- b) A cylinder of 50mm diameter & axis 70mm long has its axis perpendicular to HP. It is cut by a section plane perpendicular to VP & inclined at  $45^\circ$  to HP & intersecting the axis 40mm above the base.  
Draw-
  - i) Front view (02 marks)
  - ii) Sectional top view (03 marks)
  - iii) True shape of section (03 marks)
- c) A square prism base 40mm side & axis 80mm long, stands vertically on HP with the edges of the base equally inclined to VP. A section plane perpendicular to VP & inclined at  $60^\circ$  to HP cuts the axis of prism 15mm from its top end.

Draw-

- i) Front view (02 marks)
- ii) Sectional Top view (03 marks)
- iii) True shape of section. (03 marks)

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**EVEN TERM END EXAM APRIL/MAY -2017**

**EXAM SEAT NO.**

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**LEVEL: FIFTH**

**COURSE CODE: EEE501/EE410**

**MAX. MARKS: 80**

**PROGRAM: ELECTRICAL ENGINEERING**

**COURSE NAME: POWER ELECTRONICS**

**TIME: 3 HRS.**

**DATE: 03/05/2017**

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
<b>Q.1</b>	Attempt any <b>FOUR</b>	<b>(08)</b>
a) List types of Uninterruptible power supply (UPS)		
b) State classification of choppers.		
c) Draw and explain block diagram of chopper.		
d) List any two applications of Inverters.		
e) Define principle of phase angle control.		
f) State classification of controlled rectifies.		
<b>Q.2</b>	Attempt any <b>FOUR</b>	<b>(16)</b>
a) Define step up chopper. Draw its circuit diagram and write its principle of operation.		
b) Describe and working of Jone's chopper with circuit diagram and waveforms.		
c) Compare series and parallel Inverters. (any four points)		
d) Describe the working of single phase half bridge inverter with circuit diagram.		
e) Draw circuit diagram of single phase full controlled half wave converter with RL load and freewheeling diode. State importance of freewheeling diode.		
f) Compare of controlled half wave rectifier and controlled full wave rectifier (any four points)		
<b>Q.3</b>	Attempt any <b>FOUR</b>	<b>(16)</b>
a) Draw and explain circuit diagram of 3-phase full converter with R-L- load.		
b) Describe operation of single phase full bridge inverter with circuit diagram.		
c) Compare symmetrical configuration and Asymmetrical configuration of semiconverter (any 4 points)		

- d) Describe the operation of basic parallel inverter.
- e) Draw and explain Block diagram of uninterrupted power supply (UPS)
- f) Draw the circuit diagram of step up chopper write its working with waveforms.

## Section – II

**Marks**

**Q.4** Attempt any **FOUR**

**(08)**

- a) Define the need of NC machine.
- b) Draw the circuit diagram of three phase to three phase cycloconverters.
- c) Define 'stability' and 'plugging' in DC motor drivers.
- d) State the classification of NC/CNC machine.
- e) State the application of cycloconverters.
- f) Draw the circuit diagram of separately excited dc motor using half controlled rectifier.

**Q.5** Attempt any **FOUR**

**(16)**

- a) Draw the circuit of speed control of 3phase induction motor by variable voltage and variable frequency.
- b) Draw the circuit diagram of speed control of DC series motor & explain its operation.
- c) State the difference between three phase and single phase cycloconverter.
- d) Draw the clock diagram of CNC machine & explain its operation.
- e) Draw the circuit of  $1\phi$  to  $1\phi$  Cycloconverter & explain its operation in detail.
- f) Define Regeneration, Inching & explain it in detail.

**Q.6** Attempt any **FOUR**

**(16)**

- a) How we can control the speed of AC motor by slip power recovery control.
- b) Draw the block diagram of single phase SCR drive with armature current & tachogenerator feedback and explain its operation.
- c) Draw the circuit of  $3\phi$  to  $1\phi$  cycloconverter & explain its operation in detail.
- d) State the advantages & application of NC machine and CNC machines.
- e) Compare AC & DC drives (Any four points)
- f) Draw the block diagram of DCN machine & explain its operation.

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**EVEN TERM END EXAM APRIL/MAY -2017**

**EXAM SEAT NO.**

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**LEVEL: FOURTH**

**COURSE CODE: EEE401/EE209**

**MAX. MARKS: 80**

**PROGRAM: ELECTRICAL ENGINEERING**

**COURSE NAME: A.C.MACHINES**

**TIME: 3 HRS.**

**DATE: 27/04/2017**

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) Synchronous speed ii) slip
- b) Name the material used for i) Brush ii) Yoke
- c) What is maximum synchronous speed in India?
- d) List methods of speed control of 3 phase induction motor.
- e) State any two applications of slip ring induction motor.
- f) Name the tests you have to perform to draw circle diagram.

**Q.2 Attempt any FOUR**

**(16)**

- a) State the necessity of starter for 3 phase induction motor.
- b) Draw neat diagram of star-delta starter used for 3 phase induction motor.
- c) Derive the condition for maximum torque of 3 phase induction motor under standstill condition.
- d) Explain with circuit connection diagram how will you control speed of 3 phase induction motor by controlling supply frequency & no. of poles.
- e) What tests are to be performed on a induction motor to be able to draw its circle diagram? What are information one can get about the performance of the motor from the circle diagram?
- f) A 12 pole 3 phase induction motor has the rotor speed of 460rpm find following
  - i) Synchronous speed
  - ii) Slip-speed
  - iii) Fractional slip
  - iv) % slip
  - v) Frequency of the current at that slip

**Q.3 Attempt any TWO**

**(16)**

- a) Draw the circle diagram for a 3.73kW, 200V, 50Hz, 4 pole, 3 $\phi$  star connected induction motor from the following data.

**P.T.O**

No load-line voltage-200V, line current-5A, total input -350W

Block rotor-Line voltage-100V, Line current-26A, total input -1700W

Estimate from the diagram for full load condition, the line current, p.f and also the maximum-torque in terms of the full load torque. The rotor Cu loss at standstill is half the total Cu loss.

- b) Draw and explain equivalent circuit of an induction motor.
- c) Describe with proper sketches the working of the soft starters of large AC motors.

## Section – II

Marks

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

- a) State the types of alternator. According to rotor constructions.
- b) State the use of damper winding in case of alternator.
- c) State the types of winding in case of alternator.
- d) State any two specific application of 3 phase synchronous motor.
- e) Explain the function of centrifugal switch in case of 1 phase induction motor.
- f) What is meant by resistance start & induction run motor.

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

- a) State any four advantages of stationary armature in case of 3 phase alternator.
- b) Derive an emf equation of 3 phase alternator by using usual notation.
- c) Explain the phenomena hunting & phase swinging in case of 3 phase synchronous motor.
- d) Compare 3 phase induction motor & 3 phase synchronous motor.
- e) Explain with neat circuit diagram capacitor start-capacitor run motor.
- f) Explain Double field revolving theory.

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

- a) Explain in detail Shaded pole induction motor w.r.t
  - i) Working principal
  - ii) Construction
  - iii) Torque-speed characteristics.
  - iv) Application
- b) Explain 'V' curves & inverted 'V' curves in case of 3 phase synchronous motor.
- c) A 550V, 55KVA, 3 phase alternator has an effective resistance of  $0.2\Omega$ . A field current of 10amp produces an armature current of 200amp on short circuit & an emf of 450V on open circuit. Calculate
  - i) Synchronous impedance.
  - ii) Synchronous reactance
  - iii) No load voltage on full load at 0.8 p.f lagging
  - iv) Voltage regulation on full load at 0.8 p.f lagging.

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**EVEN TERM END EXAM APRIL/MAY-2017**

**EXAM SEAT NO.**

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**LEVEL: FIRST.**

**PROGRAM: CE/EE/SM/MT.**

**COURSE CODE:CCF108/CCE108/X107/R110** **COURSE NAME: ENGINEERING DRAWING-II**

**MAX. MARKS: 80**

**TIME: 4 HRS.**

**DATE: 28/04/2017**

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 if necessary.
- 7) Use of Mobile is strictly prohibited.

- Marks**
- Q.1** Draw neat proportionate free hand sketches of any **FOUR** of the following. **(08)**
- a) Sellers thread.
  - b) Square nut.
  - c) Cup-headed bolt.
  - d) Slotted nut.
  - e) Eye foundation bolt.
  - f) Single riveted single strap butt joint.
- Q.2** Attempt any **ONE** **(16)**
- a) Fig.no.01 shows pictorial view of an object.  
Draw following views by using first angle method of projection.
    - i) Front view in the direction of X. (05marks)
    - ii) Top view. (05marks)
    - iii) Left hand side view. (05marks)Give all dimensions. (01marks).
  - b) Fig.no.02. Shows pictorial view of bracket. Draw following views by using first angle method of projection.
    - i) Front view in the direction of X. (05marks)
    - ii) Top view. (05marks)
    - iii) Left hand side view. (05marks)Give all dimensions. (01marks)
- Q.3** Attempt any **ONE**. **(16)**
- a) Fig.no.03 Shows pictorial view of an object. Draw following views by using first angle method of projection.
    - i) Sectional front view, in the direction of X, section along AA. (06marks)
    - ii) Top view. (05marks)
    - iii) Left hand side view. (05marks)
  - b) Fig.no.04 Shows pictorial view of an object. Draw following views by using first angle method of projection.
    - i) front view, in the direction of X. (05marks)
    - ii) Top view. (05marks)
    - iii) Sectional left hand side view, section along BB. (06marks)

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

- a) Fig. no.01 shows the front view and L.H.S.V. of an object. Draw the following views of the objects
- i) Front view. (02marks)
  - ii) L.H.S.V. (02marks)
  - iii) Top view. (missing view) (04marks)
- b) Fig. no.02 show the front view and top view of the object. Draw the following views.
- i) Sectional front view A-A. (04marks)
  - ii) Top view. (02marks)
  - iii) R.H.S.V.(02marks)

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

- a) Fig.no.03 shows the F.V. and T.V. of an object draw Isometric view taking '0' as origin.(16marks)
- b) i) Fig.no.04 shows the F.V. and T.V. of an object draw Isometric projection taking '0' as origin.(14marks)
- ii) Construct the Isometric scale for the length 100mm.(2mark)

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

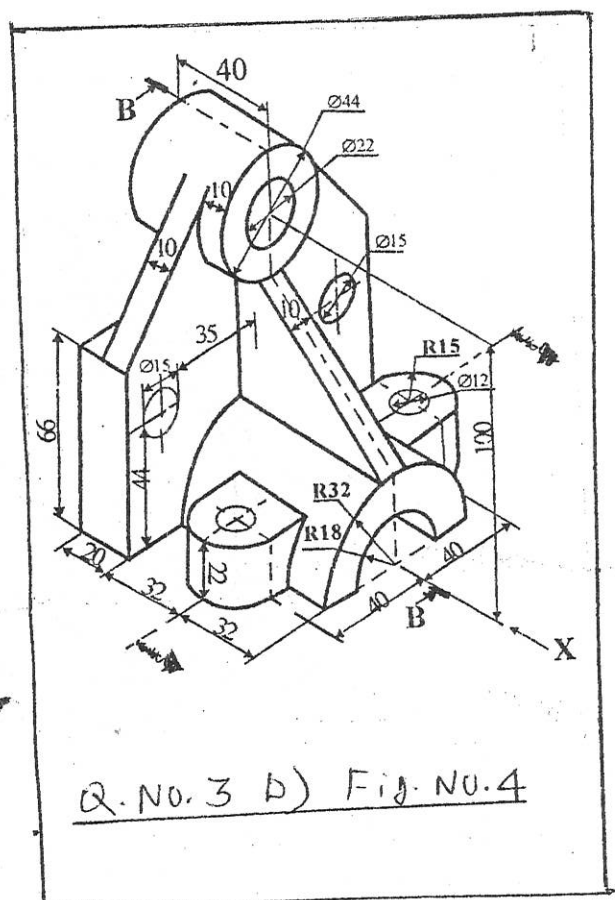
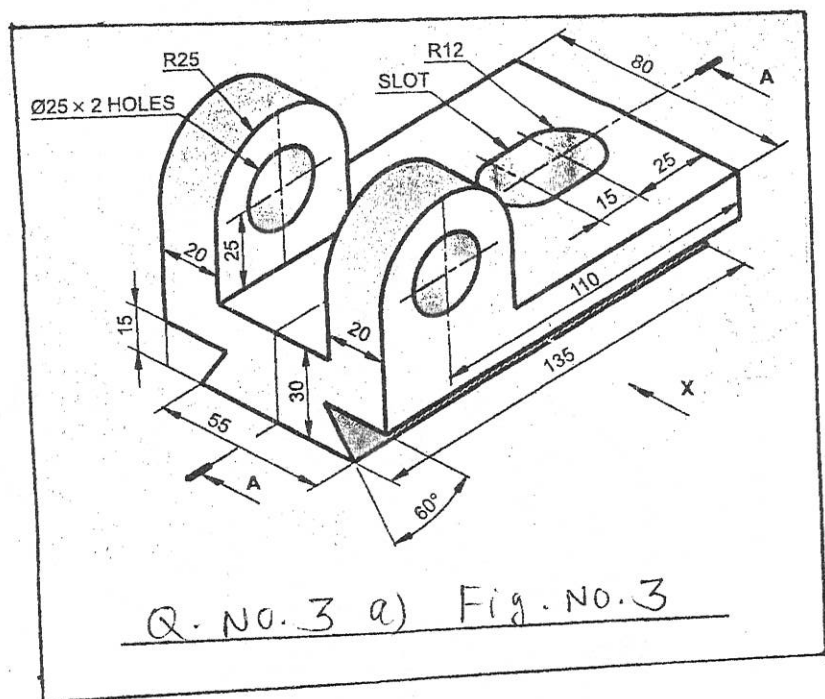
- a) Draw the development of lateral surface of a pentagonal prism with edge of base 40mm and height 90mm, kept on the H.P. on its base with one edge of base parallel to V.P., When its cut by an AIP inclined at  $30^\circ$  to H.P. and bisecting the axis of the prism.
- b) A cylinder having base diameter 50mm and axis length 70mm has its base in H.P. A square hole of side 25mm is drilled centrally having its sides equally inclined with H.P. and its axis being perpendicular to V.P. and bisecting the axis of the cylinder. Draw the DLS of the cylinder with the hole.
- c) A square pyramid 50mm edge of base axis 60mm length is resting on its base in the H.P. with edge of base equally inclined to V.P. A square hole with side 25mm is cut through the square pyramid such that its axis intersects the axis of the pyramid, 22mm above the base. The axis of hole is perpendicular to V.P. All the faces of square hole are equally inclined with H.P. Draw the DLS of the pyramid.

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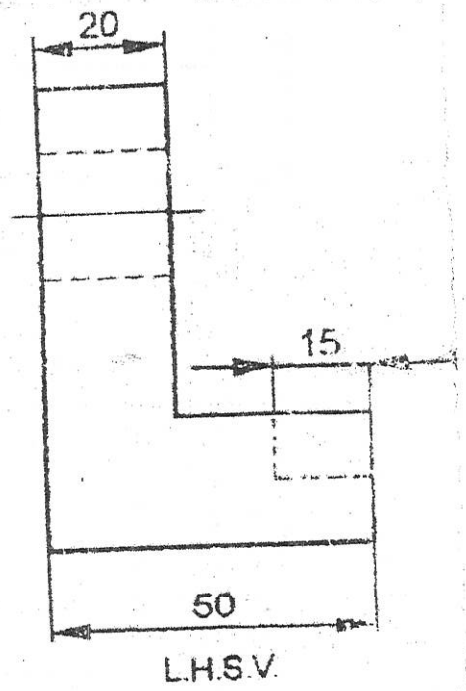
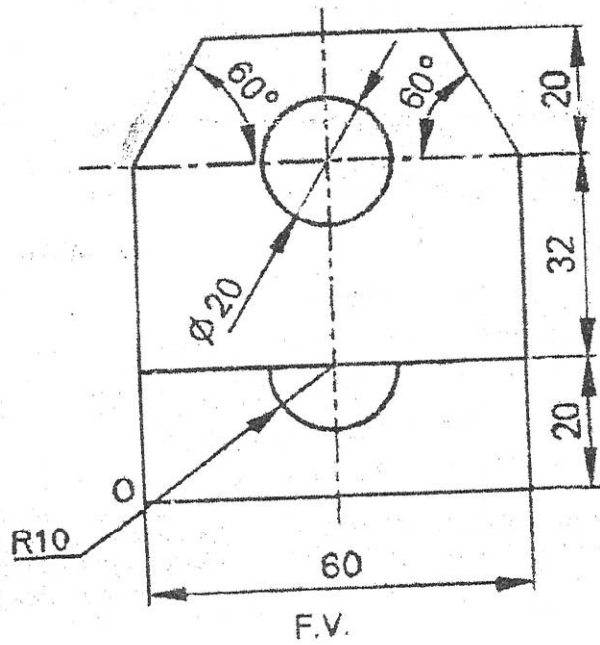






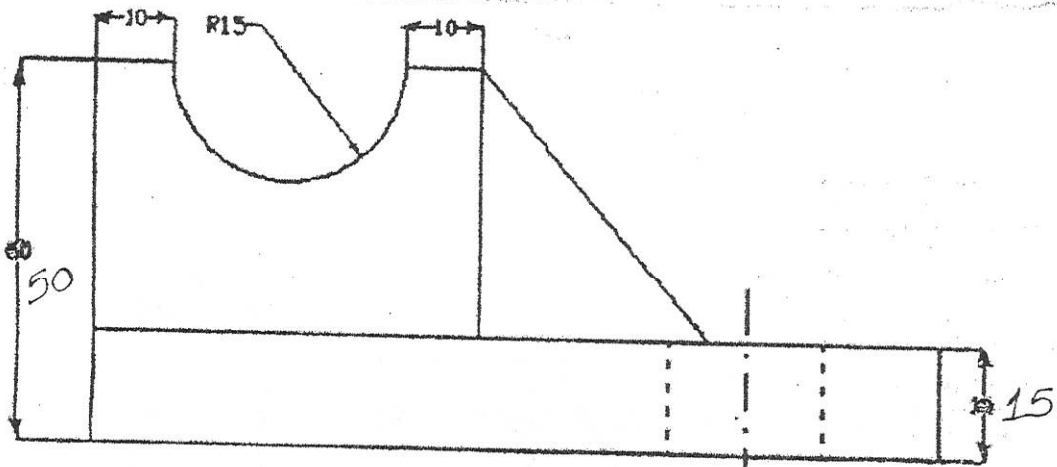


Q. 4 (a)

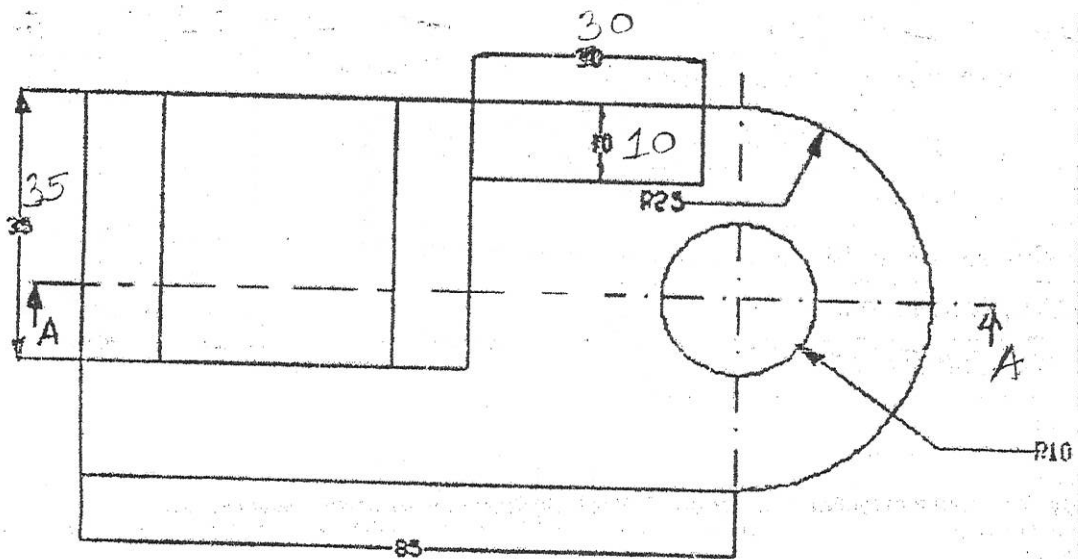


Q. 4 (a) Fig No 1

Q.4 (b)



FRONT VIEW



TOP VIEW

Q.4 (b) Fig. No-2

Q5 (a)

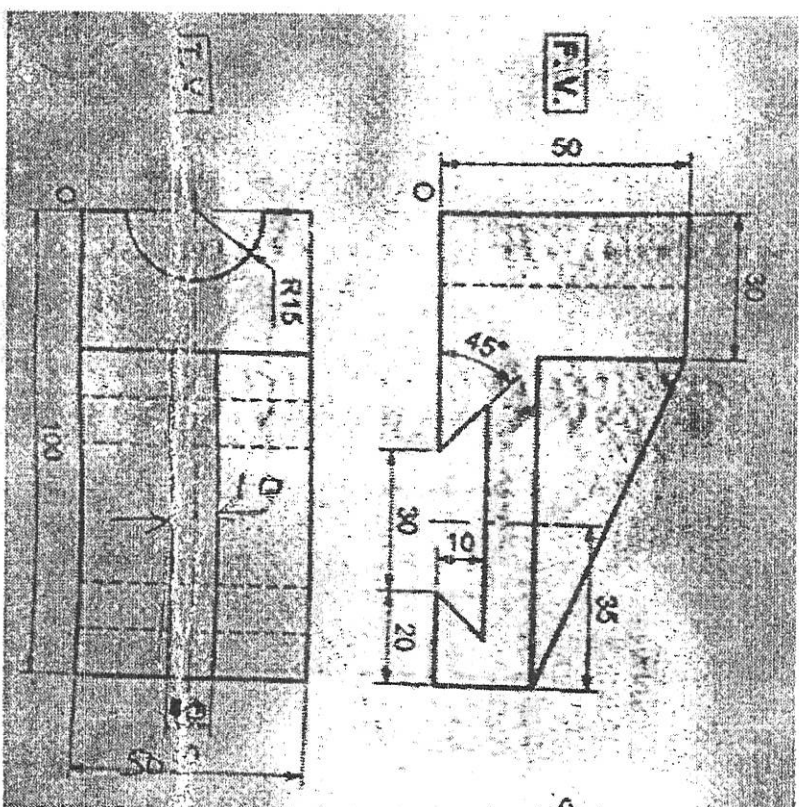


Fig. No. 3  
Q. 5 (a)

Q5 (b)

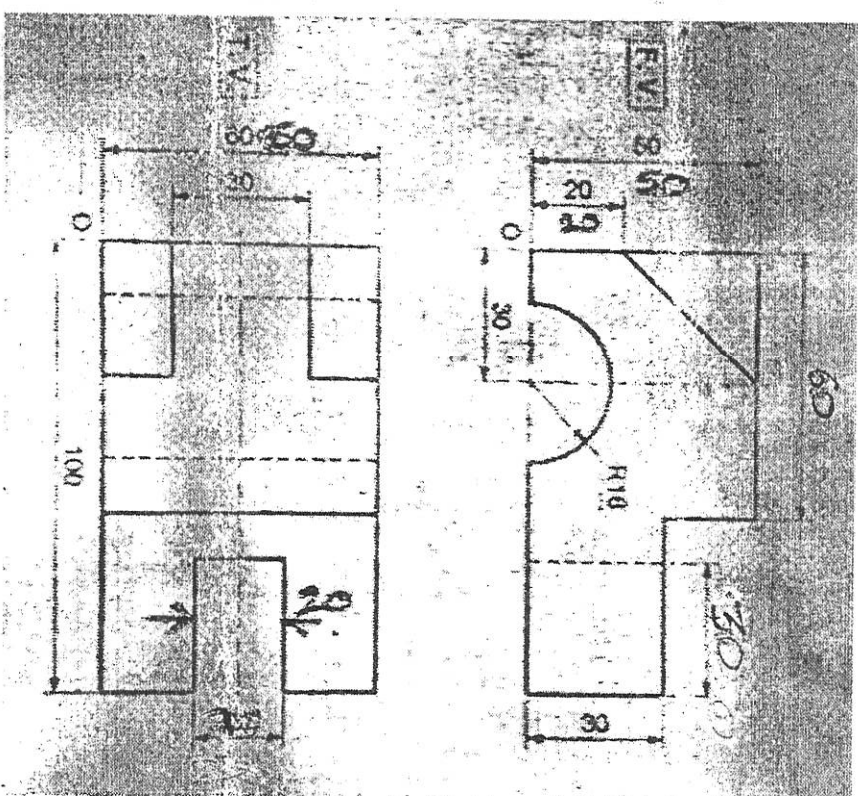


Fig No. 4  
Q. 5 (b)



**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

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**EVEN TERM END EXAM April/ May 2017**

**EXAM SEAT NO.**

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**LEVEL :- FIRST**

**PROGRAM : ELECTRICAL ENGINEERING**

**COURSE CODE :- EEE101**

**COURSE NAME :- BASIC MECHANICAL ENGINEERING**

**MAX. MARKS : 80 TIME : 3 HRS. DATE: - 25 / 04 / 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) Classify I.C. Engines on the basis of
  - i) Type of working fuel used. ii) Type of Ignition system.
- b) Write names of any four I.C. engine parts.
- c) What is boiler?
- d) Give names of any four boiler mountings.
- e) What is the function of condenser?
- f) Define Dalton's Law of partial pressure.

**Q.2 Attempt any FOUR**

**(16)**

- a) Draw a neat sketch of I.C. Engine showing various parts.
- b) What is the function of Ignition system and lubrication system in I.C. Engines?
- c) Explain the function and location of any two boiler accessories.
- d) Draw a neat labelled diagram of Lamont boiler.
- e) Differentiate between Jet condenser and surface condenser.
- f) Describe the need of cooling tower.

**Q.3 Attempt any TWO**

**(16)**

- a) Describe in detail the construction and working principle of four-stroke petrol engine.
- b) Explain the construction and working principle of Babcock and Wilcox boiler with neat sketch,
- c) i) Differentiate between petrol and diesel engine.  
ii) What is boiler draught? Give its types.

P.T.O.

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

- a) Define air conditioning.
- b) Define i) DBT ii) WBT.
- c) State the component of centrifugal compressor.
- d) State types of hydraulic turbines.
- e) State flow rate and linear velocity relationship.
- f) List the four industrial applications of meter out circuit.

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

- a) Enlist the components of a Vapour compression system. State the function of each component.
- b) Show sensible heating and heating with humidification processes on psychometric chart.
- c) Draw a neat sketch of Axial flow compressor and explain its working.
- d) State the difference in principle of action between impulse and reaction type steam turbine.
- e) State the characteristics of meter out flow control circuit.
- f) How hose pipes are specified?

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

- a) Distinguish between centrifugal and reciprocating compressor.
- b) State the purpose of steam turbine. Classify steam turbines.
- c) Enlist the components of Francis turbine and state the function of each part.
- d) Draw meter in circuit and name the parts.
- e) Enlist eight applications of hydraulics in actual practice.
- f) State the main components of pneumatic system and mention the function of each component.

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**EVEN TERM END EXAM APRIL/MAY -2017**

**EXAM SEAT NO.**

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**LEVEL:THIRD**

**PROGRAM: ELECTRICAL ENGINEERING.**

**COURSE CODE:EEE302/EE207/EE208/E207.**

**COURSE NAME: DC MACHINES & TRANSFORMER.**

**MAX. MARKS: 80**

**TIME: 3 HRS.**

**DATE: 29/04/2017**

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 if necessary.
- 7) Use of Mobile is strictly prohibited.

- |            |  |              |
|------------|--|--------------|
|            |  | <b>Marks</b> |
| <b>Q.1</b> | Attempt any <b>FOUR</b>  | <b>(08)</b>  |
|            | <ol style="list-style-type: none"><li>a) State the working principle of single phase transformer.</li><li>b) State the function of commutator of d.c. machine and name the material used for it.</li><li>c) How many parallel paths are available in lap and wave wound d.c. generator.</li><li>d) Give any two applications of d.c. series motor.</li><li>e) Give classification of d.c. generator.</li><li>f) State concept of back emf in d.c. motor.</li></ol>   |              |
| <b>Q.2</b> | Attempt any <b>FOUR</b>  | <b>(16)</b>  |
|            | <ol style="list-style-type: none"><li>a) Derive torque equation of d.c. motor.</li><li>b) Explain why the rating of transformer is always expressed in KVA.</li><li>c) Draw a neat labeled sketch showing main parts of d.c generator.</li><li>d) What is the emf generated in lap wound d.c. generator rotating at 400 rpm. If the flux per pole is 0.05Wb and the number of armature conductors is 960. All other things remaining same, at what speed the machine should be run to get 500 volts generated emf.</li><li>e) Draw the phasor diagram of loaded transformers considering resistances and leakage reactances when resistive load is connected.</li><li>f) Draw and explain three point starter.</li></ol> |              |
| <b>Q.3</b> | Attempt any <b>TWO.</b>  | <b>(16)</b>  |
|            | <ol style="list-style-type: none"><li>a) With the help of circuit connection diagram explain speed control of d.c. motor- i) Series ii) Shunt by flux control an armature voltage control method.</li><li>b) A 2200V/250Volts single phase 50Hz step down transformer has the maximum flux of 21.6mwb. Find the number of turns of primary winding and secondary winding.</li><li>c) With help of graphical representation explain load characteristics (Terminal voltage and load current) of shunt, series and compound d.c. generator.</li></ol>  |              |
| <b>Q.4</b> | Attempt any <b>FOUR</b>  | <b>Marks</b> |
|            | <ol style="list-style-type: none"><li>a) List out advantages of three phase transformer.</li><li>b) Draw the neat winding connections for vector symbol<br/>i) Yy0 ii) Dd6.</li></ol>  | <b>(08)</b>  |

**P.T.O.**

- c) State the necessity of parallel operation of single phase transformer.
- d) State the conditions to be satisfied for parallel operation of single phase transformer.
- e) Define voltage regulation of transformer.
- f) State the purpose of O.C. & S.C. test of transformer.

**Q.5 Attempt any FOUR**

**(16)**

- a) The total full load loss of a 150KVA transformer is 4.5KW which is divided equally between iron & copper loss. The transformer is loaded as follows during the 24 hours of a day calculate all day efficiency.

No. of hours	Loading
3 hours	Full load
4 hours	Half load
17 hours	No load

- b) A 25KVA, 2000/100V, 50Hz, transformer has high voltage winding resistance of 0.2Ohm and leakage reactance of 0.25Ohm. The low voltage winding resistance is 0.04Ohm and leakage reactance is 0.012Ohm. Find the equivalent winding resistance, reactance referred to i) HV side ii) LV side.
- c) Draw the figure of step-up transformer. Mark the direction of currents in all parts. Explain it.
- d) Two single phase transformers rated at 300KVA each are operated in parallel. % impedances for A&B are  $1+j6$  and  $1.2 + j4.8$  respectively. Compare the load shared by each transformer when the total load is 500KVA & 0.8 P.F. lagging.
- e) Explain voltage and current relations in Delta star connection of 3ph. Transformer with the help of phasor diagram.
- f) Explain with neat sketch construction of shell type three phase transformer.

**Q.6 Attempt any FOUR**

**(16)**

- a) A 20KVA, 1000/250V, 50Hz single phase transformer gave following test results.  
O.C. test (with LV open) ; 1000V, 2A, 250W  
S.C. test (with HV short); 5V, 50A, 200W  
Calculate percentage regulation at half load 0.8 P.F. lagging.
- b) Explain the method of finding efficiency & regulation of transformer by direct loading.
- c) Derive the expression of sharing of the load by two transformers having equal % impedance.
- d) Explain with phasor diagram voltage & current relations in star-delta connection of 3ph. Transformer with the help of phasor diagram.
- e) State advantages & disadvantages of 3ph. Autotransformer.
- f) Calculate the load shared by each transformer when connected in parallel to a common load of 100KVA 0.8PF lagging. Rating of transformer A is 50KVA & has resistance & reactance 0.8% & 10% respectively. Rating of transformer B is 50KVA & has resistance & reactance of 1.0% & 5% respectively.

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**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

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**EVEN TERM END EXAM April/ May 2017**

**EXAM SEAT NO.**

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LEVEL : - **THIRD** PROGRAM : **ELECTRICAL ENGINEERING**

COURSE CODE :- **EEE306/EE204**

COURSE NAME :- **ELECTRICAL MEASUREMENTS**

MAX. MARKS : **80** TIME : **3 HRS.** DATE : - **24 / 04 / 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 is meaning of absolute instruments?
- b) What is the necessity of damping torque in indicating instruments?
- c) How ammeters and voltmeters are connected in the circuit?
- d) State any two advantages of PMMC instruments.
- e) Write down equation for three phase active power and also state the unit for same.
- f) Write down equation for multiplying factor of wattmeter.

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

- a) Depending upon accuracy how measuring instruments can be classified? Explain.
- b) Explain air friction damping system with neat diagram.
- c) Draw neat diagram of attraction type moving iron instruments.
- d) How Ammeter can be calibrated with the help of potentiometer.
- e) State and explain any four errors in Wattmeters.
- f) Draw neat diagram of single phase dynamometer type of wattmeter.

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

- a) What are the common errors in Ammeter and voltmeters?
- b) Explain the calibration of voltmeters with the help of potentiometer.
- c) The reading of two Wattmeters connected to measure the total power in a three phase 3-wire circuit are 10KW and 1KW the later reading being obtained after reversal of the current coil connections. Calculate the total power and power factor of the load.
- d) Explain the effect of power factor on wattmeter reading in two wattmeter method for power measurement.
- e) How C.T. and P.T. can be used for measurement of power?
- f) Draw neat diagram to measure reactive power in 3-phase circuit using one wattmeter

PTD

Q.4 Attempt any **FOUR**

(08)

- a) State different methods of calibration of energy meter.
- b) Give technical specifications of a 1-phase energy meter as given on its name plate.
- c) State the advantages of digital multimeter.
- d) Classify frequency meters according to construction.
- e) Give application of phase-sequence indicator.
- f) State the disadvantages of shunt and multiplier.

Q.5 Attempt any **FOUR**

(16)

- a) State the comparison between CT's and PT's used as instrument transformers.
- b) Design multirange d.c. voltmeter of ranges 0 to 5 V and 0 to 100V. Assume  $I_{fsc}$   
= 5mA and  $R_m = 500\Omega$  ( $I_{fsc}$  = Deflection current of movement,  
 $R_m$  = Resistance of movement).
- c) Describe with neat sketch Trivector meter.
- d) Draw neat sketch of two element 3-phase induction type energy meter and state its working principle.
- e) Explain with neat sketch, single phase dynamometer type power factor meter.
- f) State eight applications of multimeter.

Q.6 Attempt any **FOUR**

(16)

- a) For a 20 amp, 230V, energy meter, the number of revolutions per kWh is 480.  
If test taken at 4600W full load. The disc makes 40 revolutions in 66 sec. Calculate the error.
- b) Draw a block diagram of electronic energy meter. Write function of each block.
- c) Draw a neat sketch of rotating type phase sequence indicator. Describe its working in brief.
- d) Explain the working of Average demand indicator with neat diagram.
- e) State the requirements for ammeter shunts.
- f) How will you extend the range of energy meter? With a neat sketch, explain the method in brief.

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**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

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**EVEN TERM END EXAM April/ May 2017**

**EXAM SEAT NO.**

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**LEVEL : - SECOND      PROGRAM : ELECTRICAL ENGINEERING**

**COURSE CODE :-   EEE201/EE206**

**COURSE NAME :-   FUNDAMENTALS OF ELECTRONICS**

**MAX. MARKS : 40    TIME : 2HRS.    DATE: - 25 / 04 / 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 is a semiconductor? Give its types.
- b) Define : Ripple factor. State the value of it for half wave rectifier.
- c) State the need of biasing for transistor.
- d) What is rectifier? Classify it.
- e) Draw symbol for AND gate and EXOR.gate.
- f) Simplify the following expression :-  $ABCD + A\bar{B}CD$

**Q.2    Attempt any FOUR**

(16)

- a) Draw and explain Zener as a voltage regulator.
- b) Explain operation of PN-junction diode under forward biased conditions.
- c) Draw and explain operation of LC filter with proper waveforms.
- d) Explain construction of NPN transistor with neat diagram.
- e) State and explain De-Morgan's theorems.
- f) Draw and explain any one method of biasing transistor.

**Q.3    Attempt any FORU**

(16)

- a) Draw logical symbol and truth table for following gates i) NOR gate ii) NAND gate.
- b) Draw V-I characteristics of PN-junction diode. Explain operation of it under reverse biased condition.
- c) Explain how transistor works as a switch.
- d) Draw full-wave centre-tapped rectifier circuit. State the values of ripple factor and rectifier efficiency for it.
- e) Define intrinsic and extrinsic semiconductor. Give two example of each.
- f) Explain operation of PNP transistor in active region.





# GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.

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**EVEN TERM END EXAM APRIL/MAY -2017**

**EXAM SEAT NO.**

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LEVEL: **THIRD**

PROGRAM: **ELECTRICAL**

COURSE CODE: **EEE307/EE202/EE203**

COURSE NAME: **DC & AC CIRCUITS**

MAX. MARKS: **80**

TIME: **3 HRS.**

DATE: **26/04/2017**

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**

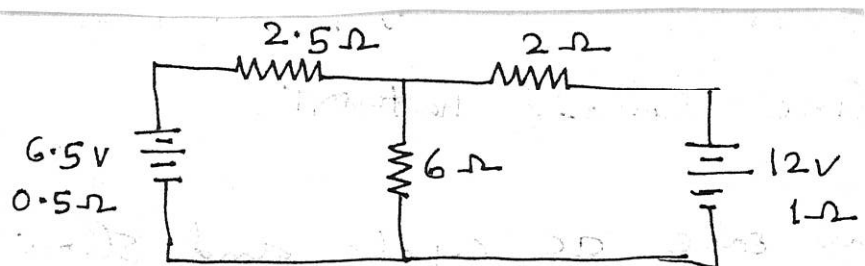
**Marks  
(08)**

- a) Define the term
  - i) Active power
  - ii) Power factor
- b) Define linear network.
- c) Draw one ac cycle and show maximum time.
- d) Represent the following by their symbols
  - i) Ideal and practical voltage source
  - ii) Ideal and practical current source.
- e) Define R.M.S value
- f) Show active and reactive component of current in a capacitive circuit.

**Q.2** Attempt any **FOUR**

**(16)**

- a) State and explain Norton's Theorem.
- b) Draw and explain labeled circuit and phasor diagram for purely inductive circuit. What is the power factor of the circuit?
- c) With reference to a single phase ac circuit differentiate clearly between the active power, the reactive power and the apparent power.
- d) What is the phase difference between voltage and current in purely capacitive circuit? Justify your answer analytically.
- e) Find current in different branches by superposition theorem.



- f) Draw and explain circuit diagram, waveform and phasor diagram for purely Resistive AC circuit.

**Q.3** Attempt any **TWO**

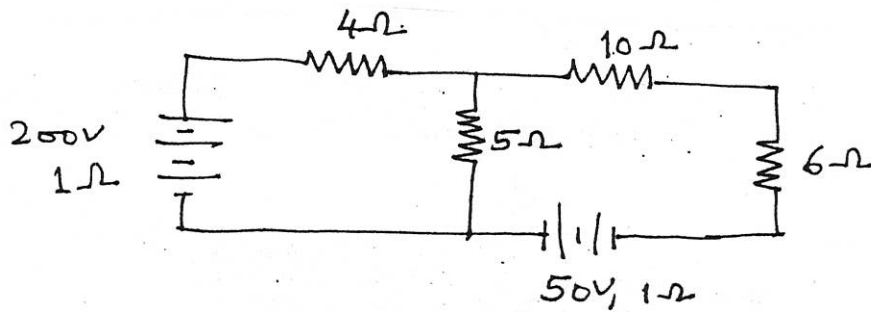
**(16)**

- a) Sketch and explain the phasor diagrams of R-L-C series circuit for i)  $X_C > X_L$  ii)  $X_L > X_C$  iii)  $X_L = X_C$
- b) Derive the formula of R.M.S value of full wave sinusoidal current. Show the parameters on waveforms.

P.T.O.



- c) Find the current through  $6\Omega$  resistance by Thevenins theorem.



**Q.4** Attempt any **FOUR**

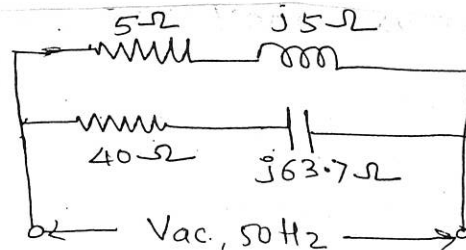
(08)

- Define balanced 3 phase load.
- State two advantages of 3 phase over 1 phase system.
- Define terms dynamic impedance and quality factor related to parallel resonance circuit.
- Why series circuit called as acceptors circuit?
- Why parallel circuit is called rejection circuit?
- Derive expression for resonance frequency for series R-L-C circuit.

**Q.5** Attempt any **FOUR**

(16)

- Find the admittance of each branch and total admittance of circuit shown in fig.no.5



- Compare star and delta connection in case of 3 phase A.C.
- An AC circuit has resistance of  $10\Omega$ , inductance of  $0.2H$  and capacitance of  $60\mu f$ . Calculate i) The resonance frequency ii) Current at resonance.
- A.C. circuit containing resistor of  $30\Omega$  and inductance of  $0.15H$  are connected in parallel across  $230V$ ,  $50Hz$  supply. Determine i) Admittance ii) Circuit Current iii) P.F iv) Power.
- In R-L-C circuit has  $R=1.5\Omega$ ,  $L=0.2H$ , &  $C=100\mu f$ . Calculate frequency of resonance. If applied voltage is  $230V$  at this frequency calculate i) Current ii) Voltage across inductance iii) Q-factor.
- A star connected balanced load consumes  $3000W$  power when connected to 3phase,  $400V$ ,  $50Hz$  supply. If the pf of load is  $0.8$  lagging. Calculate values of resistance and inductance in each branch of load.

**Q.6** Attempt any **FOUR**

(16)

- How 3 phase emfs are generated? Explain.
- Explain different types of 3 phase supply systems according to no. of conductors
- A circuit having resistance of  $5\Omega$  and an inductance of  $0.4H$  and a variable capacitance in series connected across a  $100V$ ,  $50Hz$  supply. Calculate.
  - Value of capacitance to get resonance
  - Current at resonance
  - Voltage across inductance
  - Q factor of circuit
- Compare series and parallel resonance circuits.
- Explain admittance method to solve AC parallel circuit.
- A three phase load having phase impedance of  $(3+j4)\Omega$  is supplied from 3 phase,  $440V$ , and  $50Hz$  Ac supply. Calculate power absorbed by load when
  - When load is star connected
  - One of phase blows out & load is star connected.

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

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**EVEN TERM END EXAM APRIL/MAY-2017**

**EXAM SEAT NO.**

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**LEVEL:FIRST.**

**PROGRAM: EE/IE/IF/ET.**

**COURSE CODE:CCF102/CCE102/R103/R104/X102/X108**

**COURSE NAME: ENGINEERING PHYSICS.**

**MAX. MARKS: 80**

**TIME: 3 HRS.**

**DATE: 26/04/2017**

**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 if necessary.
- 7) Use of Mobile is strictly prohibited.

**Q.1 Attempt any FOUR**

**Marks  
(08)**

- a) Define 1) Deforming force.  
2) Restoring force.
- b) Which is more elastic steel or rubber? Why?
- c) Define 1) Specific volume.  
2) Specific weight.
- d) Define velocity gradient with S.I. unit.
- e) What is Resonance effect? Give one example.
- f) State any two examples of Nanostructured material.

**Q.2 Attempt any FOUR**

**(16)**

- a) Define stress. Explain its types.
- b) A wire of diameter 2mm and of length 2.5mm extends by 1.5mm by applying a force of 15N. Find Young's modulus of wire.
- c) Derive an expression for coefficient of viscosity of liquid by Stokes method.
- d) 1) Define Surface Tension with S.I. unit.  
2) What is the effect of Temperature and Adulteration on Surface Tension.
- e) State any four applications of Nanotechnology.
- f) Differentiate between Longitudinal wave and Transverse wave.(any four).

**Q.3 Attempt any FOUR**

**(16)**

- a) State & explain Newton's Law of viscosity. Define coefficient of viscosity and state its S.I. unit.
- b) Derive expression for Surface Tension by capillary rise method.
- c) State any four applications of Surface Tension.
- d) Define 1) Cohesive force. 2) Adhesive force.  
2) Molecular range. 4) Sphere of influence.
- e) 1) State any two characteristics of Longitudinal wave.  
2) Define Nanoscale and Nanometer.
- f) Define 1) Amplitude 2) Wave period.  
3) Frequency 4) Wavelength.

**Q.4**

Attempt any **FOUR**

(08)

- Draw a neat ray diagram showing dispersion of white light through a prism.
- Write formula for equivalent resistance of -
  - Series combination of three resistances.
  - Parallel combination of three resistances.
- State full form of LASER.
- Write any two properties of X-rays.
- Draw a block diagram for optical communication link.
- State any two applications of optical fibers.

Q.5

Attempt any **FOUR**

(16)

- State any four laws of refraction of light.
- With a neat diagram, explain construction of meter-bridge. Also write balancing condition for meter-bridge.
- A wire of length 2.5m and radius 0.2mm has a resistance of  $15\Omega$ . Calculate the specific resistance of the wire.
- State any four characteristics of photons.
- Distinguish between spontaneous emission and stimulated emission.(any four points)
- With the help of neat labelled diagram, explain structure of optical fiber.

Q.6

Attempt any **FOUR**

(16)

- Derive prism formula. Draw the necessary ray diagram.
- State any four applications of photoelectric effect.
- Define the terms-1) Life time                      2) Optical pumping.  
                                3) Population inversion    4) Active system.
- Draw a neat diagram of Coolidge X-ray tube. Explain how quantity and quality of x-rays can be controlled in Coolidge X-ray tube.
- With the help of a neat ray diagram, explain total internal reflection.
- An accelerated electron emits a quantum of radiation of wavelength  $3800\text{\AA}$ . Calculate energy of the quantum.

Given:  $c = 3 \times 10^8 \text{ m/s}$

$$h = 6.625 \times 10^{-34} \text{ Js.}$$

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**EVEN TERM END EXAM April/ May 2017**

**EXAM SEAT NO.**

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**LEVEL : - FOURTH**

**PROGRAM : ELECTRICAL ENGINEERING**

**COURSE CODE :- EEE406/EE307/EE409/3407**

**COURSE NAME :- SWITCHGEAR & PROTECTION**

**MAX. MARKS : 80 TIME : 3 HRS. DATE :- 26 / 04 / 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 o request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I		Marks
Q.1	Attempt any <b>FOUR</b> a) State the different types of lightning arresters. b) Draw the symbols of circuit breaker and isolator used in substation. c) Define neutral earthing. d) Define Recovery voltage and RRRV. e) State any two causes of blowing off fuse. f) What are the possible faults on power system?	(08)
Q.2	Attempt any <b>FOUR</b> a) Classify and explain the current limiting reactors on the basis of their location. b) Sketch and explain the working of an HRC fuse. c) Discuss the High Resistance method of Arc extinction. d) Draw and explain working of SF <sub>6</sub> circuit breaker. e) Explain how traveling waves are generated in power system. f) Compare between indoor and outdoor substation.	(16)
Q.3	Attempt any <b>FOUR</b> a) Give the difference between equipment earthing and neutral earthing. b) With neat sketch, explain the operation of valve type lightening arrestor. c) Draw a typical electrical layout of 33/11 KV substation. d) Compare fuse and circuit breaker on the basis of operation, operating time, current rating and safety. e) Explain Arc phenomenon in circuit breaker. f) State various abnormal conditions, which can develop in electric circuits. State its effect on power system.	(16)

P.T.O.

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

- a) Classify the protective relaying for power system.
- b) State various type of comparator type relay operations.
- c) State type of faults occurs in the alternator.
- d) What are the abnormalities occurs in transformer?
- e) Which are the protective schemes used for transmission line?
- f) List the types of faults occurred in bus bar.

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

- a) What are the essential qualities of protection system?
- b) Explain with labeled diagram of induction type shaded pole relay with their applications.
- c) Explain with labelled diagram of non directional over current relay with their applications
- d) Explain the protective schemes for stator faults ( internal faults) of an alternator.
- e) How to protect internal earth fault of star connected transformer winding with neutral is earthed through impedance?
- f) Explain directional comparison type protection scheme for bus bar.

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

- a) Draw labeled block diagram and explain function of each block for static relay protection system.
- b) Draw labeled block diagram and explain function of each block, necessary flow chart and instructions for microprocessor based protective relay system.
- c) Explain the current and time setting along with their characteristic based applications of the relay.
- d) Draw labeled diagram and explain definite static over current relay.
- e) Explain with labeled diagram “Restricted earth fault protection in the generator winding”.
- f) How to protect the transformer from incipient faults of transformer ( use suitable labeled sketch in necessary)

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**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

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**EVEN TERM END EXAM April/ May 2017**

**EXAM SEAT NO.**

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**LEVEL :- FIFTH**

**PROGRAM : ELECTRICAL ENGINEERING**

**COURSE CODE :- EEE502**

**COURSE NAME :- MICROPROCESSOR & MICROCONTROLLER**

**MAX. MARKS : 80 TIME : 3 HRS. DATE :- 27 / 04 / 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 o request.
- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

Section – I		Marks
Q.1	Attempt any <b>FOUR</b>	(08)
a) State any two instructions from logical group of instruct.		
b) State any two features of 8085.		
c) What do you mean by addressing mode? State any two addressing modes in 8085.		
d) Define the term i) Machine cycle ii) Instruction cycle.		
e) Define subroutine.		
f) Give interrupt priorities of 8085.		
Q.2	Attempt any <b>FOUR</b>	(16)
a) Explain the functions of following signals of 8085: $IO/\overline{M}$ , $INTR$ , $HLDA$ & $READY$ .		
b) Explain following instruction with respect to there description, No. of bytes effect on flag, example i) STAX Rp ii) LQA 4000.		
c) Explain any four instructions of 8085 belongs to arithmetic group.		
d) Draw flow chart and write an ALP for 8085 to find smallest number in block of data. Store the result in memory location 2000H.		
e) Draw the format of SIM instruction. Explain function of each bit.		
f) Explain following stack related instructions :- i) PUSH ii) POP iii) CC iv) RET.		
Q.3	Attempt any <b>FOUR</b>	(16)
a) Explain demultiplexing of address and data bus. Which signal is used to demultiplex address/data bus? Also draw the diagram.		
b) Draw the format of flag register and explain various flags related to 8085.		
c) Explain operation of IN instruction with the help of timing diagram.		
d) Explain the following instructions: i) DAA, LHLD, SPHL, STC.		

**P.T.O.**



- e) Write an assembly language program to add two 16-bit numbers. Save the result into memory location 20A0 h onwards.
- f) Explain in detail SI & DI instructions.

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Section – II

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Marks

Q.4 Attempt any **FOUR**

(08)

- If one has memory chips of 1k X 4 and 2k X 8 memory size then how many memory chips of these sizes are required to organize a memory size of i) 5k X 8 ii) 8k X 8.
- Write any four features of 8255 PPI.
- State function of program counter and data pointer of 8051.
- Write any four architectural features of 8051.
- Define i) Register addressing mode ii) Direct addressing mode.
- If accumulator contains 1 $\phi$ H, then what will be its contents after 'DEC A' instruction and what will be the status of parity flag?

Q.5 Attempt any **TWO**

(16)

- Compare I/O mapped I/O with memory mapped I/O interfacing methods. on the basis of : ( 01 marks each )
  - Size of address of I/O.
  - Instructions for data transfer.
  - Registers involved in data transfer
  - Maximum number of input and output devices those can be interfaced.
- Describe following instructions : i) IN 8 bit ii) OUT 8 bit. ( 02 marks each )
- Compare 8051 microcontroller with 8085 microprocessor. ( any eight points )
- Describe following arithmetic instructions of 8051.
  - ADD
  - SUBB
  - MUL
  - DIV.

Q.6 Attempt any **TWO**

(16)

- Interface 8255 PPI with 8085. Assume that 8255 addresses start from 8 $\phi$ H. Draw interfacing diagram and describe chip select logic.
- Draw pin out diagram of 8051 microcontroller and describe alternate pin function of port 3.
- Assume that a switch is connected to port pin P1. $\phi$  and LED is connected to port pin P1.7. Write ALP to perform following :
  - LED is ON if switch is closed
  - LED is OFF if switch is open

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**GOVERNMENT POLYTECHNIC, KOLHAPUR – 416004.**

(An Autonomous Institute of Govt. Of Maharashtra)

**EVEN TERM END EXAM April/ May 2017**

**EXAM SEAT NO.**

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**LEVEL :- THIRD**

**PROGRAM : ELECTRICAL ENGINEERING**

**COURSE CODE :- EEF 312**

**COURSE NAME :- BASIC MECHANICAL & CIVIL ENGINEERING**

**MAX. MARKS : 80 TIME : 3 HRS. DATE :- 08 / 05 / 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 o 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 coupling?
- b) Classify keys.
- c) Give the function of bearing.
- d) List various power transmission devices.
- e) State the function of boiler.
- f) Write down the working principle of pump.

**Q.2 Attempt any FOUR**

**(16)**

- a) Explain different types of fasteners with neat free hand sketches.
- b) Describe construction and working of any one coupling with neat diagram.
- c) Elaborate the selection procedure for bearing.
- d) Classify various types of gears and draw a tooth profile for spur gear.
- e) Write applications of following energy conversion devices.
  - i) Boiler ii) Steam turbine iii) Hydraulic turbine iv) I.C. Engine.
- f) Describe the working principle of reciprocating compressor with neat sketch.

**Q.3 Attempt any FOUR**

**(16)**

- a) List down any four applications of keys.
- b) Suggest suitable power transmission devices for the following and justify your answer.
  - i) Flour Mill ii) Automobile power transmission from engine shaft to propeller shaft.
- c) Draw a neat labelled sketch of helical and bevel gear.
- d) Explain the working principle of boiler.
- e) Write the function of condenser ad cooling tower in thermal power plant.
- f) Give any four applications of compressed

**P.T.O.**

Q.4 Attempt any **FOUR**

(08)

- a) State the Necessity of external plastering.
- b) List the various types of flooring and its suitable position in various rooms in a residential building.
- c) Define :- i) Carpet Area ii) Built Up Area.
- d) What do you mean by circulation? List the various means used for vertical circulation.
- e) Draw neat sketch of odd course plan and even course plan showing Flemish bond in one brick thick wall.
- f) List the types of Door and Window.

Q.5 Answer the following Questions

(16)

- a) State and explain various type shallow foundation with neat ~~with~~ proportionate sketch.

OR

- a) State and explain various types of deep foundation with neat proportionate sketch.
- b) Define surveying and leveling. Write the different types of surveying and leveling

Q.6 Attempt any **TWO**

(16)

- a) Write a note on concreting and centering work required for R.C.C. members.
- b) Define irrigation. Also explain irrigation projects with suitable examples.
- c) Describe various components of water treatment plants.

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**EVEN TERM END EXAM APRIL/MAY -2017**

**EXAM SEAT NO.**

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**LEVEL: THIRD**

**PROGRAM: COMMON**

**COURSE CODE: EEE305/IEE301/ETE301/ITE301/EE201/IX201/EJ201/IT201/IE201/IF201/201**

**COURSE NAME: APPLIED MATHEMATICS**

**MAX. MARKS: 80**

**TIME: 3 HRS.**

**DATE: 08/05/2017**

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) Evaluate  $\int [e^{2\log x} + e^{x\log a}] dx$

b) Find  $\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$

c) Evaluate  $\int \frac{dx}{3+2x-x^2}$

d) Evaluate  $\int_1^2 \frac{dx}{3x-2}$

e) Evaluate  $\int_1^e \log x dx$

f) Find mean value of  $y=\cos x$  over the range from  $x = \frac{-\pi}{2}$  to  $x = \frac{\pi}{2}$

**Q.2 Attempt any FOUR**

**(16)**

a) Evaluate  $\int \frac{dx}{(x^2+4)(x+1)}$

b) Evaluate  $\int \frac{dx}{3\sin 2x + 2\cos 2x}$

c) Evaluate  $\int \frac{x+2}{\sqrt{x^2+5x+6}} dx$

d) Evaluate  $\int_0^{\pi/4} \log(1+\tan x) dx$

e) Evaluate  $\int_1^3 \frac{\sqrt[3]{x+5}}{\sqrt[3]{x+5} + \sqrt[3]{9-x}} dx$

f) Using integration find the area of the circle  $x^2 + y^2 = 16$

**Q.3 Attempt any FOUR**

**(16)**

a) Evaluate  $\int_{\pi/6}^{\pi/3} \frac{1}{1+\sqrt[4]{\cot x}} dx$

b) Evaluate  $\int \frac{3\sin x + 4\cos x}{2\sin x - \cos x} dx$

**P.T.O**

- c) Evaluate  $\int \cos^3 \sqrt{x} \, dx$
- d) Evaluate  $\int \frac{dx}{4 \cos^2 x + 9 \sin^2 x}$
- e) Find R.M.S value of the  $I = 10 \sin 100 \pi t$  over a complete period.
- f) Find the area enclosed by the parabola  $y = x^2 - 5x + 15$  and the line  $y - 3x = 3$ .

**Q.4** Attempt any **FOUR**

(08)

- a) From the differential equation whose solution is  $y = a \cos 3t + b \sin 3t$
- b) State order and degree of  $y = \frac{dy}{dx} + \frac{c}{dy/dx}$
- c) Show that  $y^3 \sec^2 x \, dx + (3y^2 \cdot \tan x - \sec^2 y) \, dy = 0$  is exact.
- d) Find  $x$  and  $y$  satisfying the equation  $(2 + i)x + (i - 3)y = 4$
- e) Find the value of  $i^{49} + i^{68} + i^{89} + i^{110}$
- f) Find the complex conjugate of  $\frac{3 + 5i}{1 + 2i}$

**Q.5** Attempt any **FOUR**

(16)

- a) Solve:  $\frac{dy}{dx} - \frac{2}{x}y = x^2 e^x$ , if  $y = 0$  when  $x = 1$
- b) Solve:  $(e^x + 2x^2 y + y^3) \, dx + (a^y + 2x^2 y + 3xy^2) \, dy = 0$
- c) Solve:  $x^2 y \, dx = (x^3 + y^3) \, dy$
- d) Express  $1 + i$  in  $(x + iy)$  form.
- e) Simplify using De Moivre's Theorem  $\frac{(\cos 2\theta + i \sin 2\theta)^3 (\cos 3\theta - i \sin 3\theta)^4}{(\cos \theta + i \sin \theta)^2 (\cos 2\theta - i \sin 2\theta)^{-3}}$
- f) If  $\cos(x + iy) = \alpha + i\beta$  show that i)  $\frac{\alpha^2}{\cos^2 x} - \frac{\beta^2}{\sin^2 x} = 1$  ii)  $\frac{\alpha^2}{\cosh^2 y} + \frac{\beta^2}{\sinh^2 y} = 1$

**Q.6** Attempt any **FOUR**

(16)

- a) Solve  $\frac{dy}{dx} = \sin(x + y)$
- b) Solve  $\frac{dy}{dx} = \frac{xy}{(1 - x)(1 + y)}$
- c) If the slope of the curve is  $x^2 + 2x + 1$ , find its equation if it passes through the point  $(1, 1)$
- d) Find 2 values of  $(1 - i)^{1/2}$
- e) Using Euler's formula, prove the following
- i)  $\sin 2\theta = 2 \sin \theta \cos \theta$
- ii)  $\cosh^2 x + \sinh^2 x = \cosh 2x$
- f) Show that  $\sqrt{3 + i}$  is a cube root of  $8i$

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**EVEN TERM END EXAM April/ May 2017**

**EXAM SEAT NO.**

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**LEVEL : - FIRST**

**PROGRAM : ELECTRICAL ENGINEERING**

**COURSE CODE :- EEE102**

**COURSE NAME :- FUNDAMENTALS OF ELECTRICAL ENGINEERING**

**MAX. MARKS : 80 TIME : 3 HRS. DATE: - 08 / 05 / 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 electric current and state its unit
- b) State the applications of chemical effects of electric current.
- c) State the current division formulae with two parallel branches.
- d) Define node and branch for electric circuit.
- e) A  $100\mu\text{F}$  capacitor is charged to 500V. Calculate the energy stored in the capacitor.
- f) Define relative permittivity of magnetic material.

**Q.2 Attempt any FOUR**

(16)

- a) Find the cost of electrical energy and time required for heating 2 litre of water from  $10^0\text{C}$  to boiling point in the kettle having 80% efficiency. Find also the power rating of resistance element if time required for the heating is  $\frac{1}{2}$  hour. Electrical energy tariff is 5 Rs./Unit.
- b) Differentiate between the terms:
  - i) Bi-lateral and Unilateral networks.
  - ii) Active and passive networks.
- c) Find the equivalent sources refer figure Q.2 ( c )
- d) Find effective resistance across the terminals AB. refer figure Q.2 ( d )
- e) Explain the following terms. i) Breakdown voltage ii) Dielectric strength.
- f) Derive the expressions for the equivalent capacitance of a number of capacitors in series.

**Q.3 Attempt any FOUR**

(16)

- a) What are the different types of resistors? Explain wire wound resistor.
- b) Give duality between series and parallel circuit.
- c) Write loop current equations for the network shown in figure. Hence, determine current in  $3\Omega$  resistor refer figure Q.3 (c)
- d) State and explain Kirchoff's voltage law.
- e) State the different types of capacitors. State applications of two types capacitor.
- f) Derive the expression for parallel plate capacitor with single dielectric.

**P.T.O.**

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

- a) Define magneto motive force for uniform magnetic circuit.
- b) State and elaborate reluctance of uniform magnetic circuit.
- c) What is meant by coefficient of leakage flux in the magnetic circuit?
- d) State Faraday's Law of electromagnetic induction.
- e) State Fleming left hand rule for current carrying conductor in the uniform magnetic field.
- f) Draw labelled circuit diagram for fluorescent tube lamp.

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

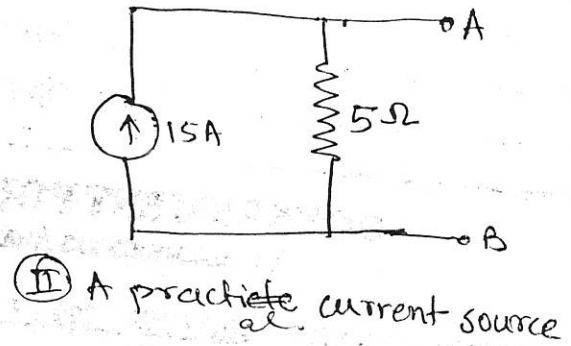
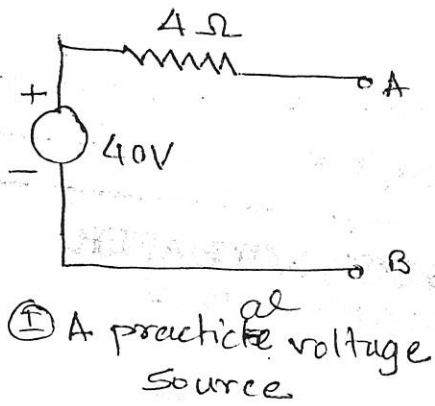
- a) Explain the phenomena of 'Hysteresis loop and Hysteresis losses' in electro magnetic circuit. Also state Stein Mertz Hysteresis loss equation.
- b) Derive formulae for magnetic flux from uniform iron ring having magnetic path length ' $\ell$ ' meters, cross sectional area of ' $A$ ' meter<sup>2</sup> & coil winding of turns ' $N$ ' carrying current ' $I$ ' amp.
- c) Explain with neat circuit diagram coefficient of mutual induction and inductance (M).
- d) Explain with suitable diagram statically and dynamical induced emf.
- e) A coil of 150 turns is linked with a flux of 0.01 Weber when carrying a current of 10A. Calculate the inductance of the coil, if this current is uniformly reversed in 0.1 seconds, calculate induced emf if a second coil of 100 turns is uniformly wound over the first coil. Find the mutual inductance between the coils.
- f) Explain the principle of working of ARC lamp with one of the type of arc lamp sketch and labels.

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

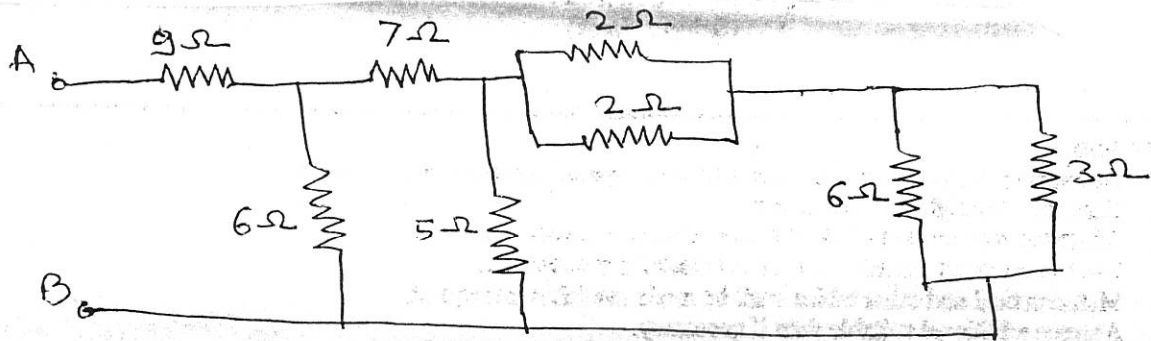
- a) i) Compare Electric and Magnetic circuit give at least four points.  
ii) A rectangular iron core, it has mean path length of 100cm cross sectional area of 4cm<sup>2</sup> and Relative permeability 1400 with air gap cut on limb-D is 5cm. The 3 coils Wounded on Limb A, B & C Limb of core carrying current  $I_A=1.6A$ ,  $I_B=4A$  &  $I_C=3A$  & having number of turns of coil  $N_A=335$ ,  $N_B=600$  &  $N_C=600$  respectively. The direction of current in coil C is anticlockwise and in coil A & B is clockwise. Find the flux established in the core.
- b) Explain complete details of Energy stored in electromagnetic field with suitable diagrams and equations.
- c) Sketch labelled circuit diagrams and explain the term 'Self induction' & 'Self inductance' in the electromagnetism.
- d) Explain with neat labelled diagram working of metal halide lamp.
- e) What is mean by energy efficient lamp? Explain with suitable Labelled diagram and example.
- f) Explain working of sodium vapour lamp with suitable labelled diagram.

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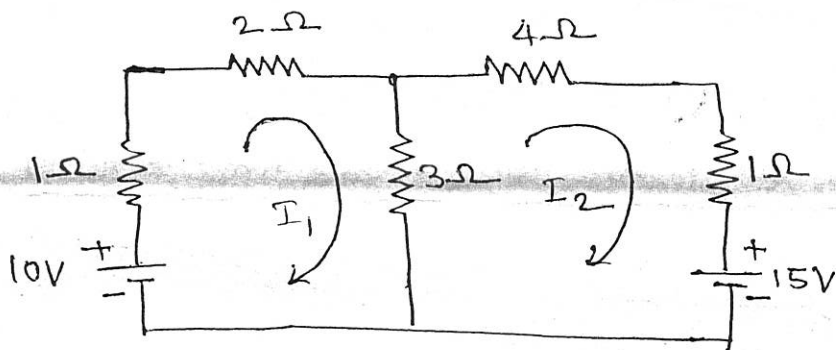
Q2c)



Q2. (d)



Q.3 (c)







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**EVEN TERM END EXAM APRIL/MAY -2017**

**EXAM SEAT NO.**

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**LEVEL: THIRD**

**PROGRAM: COMMON**

**COURSE CODE:**

**CEE301/MEE301/SME301/MTE301/CE201/ME201/SM201/MT201/C201/M201/1201/2201**

**COURSE NAME: APPLIED MATHEMATICS**

**MAX. MARKS: 80**

**TIME: 3 HRS.**

**DATE: 08/05/2017**

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) Evaluate  $\int [e^{2 \log x} + e^{x \log a}] dx$
- b) Find  $\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$
- c) Evaluate  $\int \frac{dx}{3 + 2x - x^2}$
- d) Evaluate  $\int_1^2 \frac{dx}{3x - 2}$
- e) Evaluate  $\int_1^e \log x dx$
- f) Find mean value of  $y = \cos x$  over the range from  $x = \frac{-\pi}{2}$  to  $x = \frac{\pi}{2}$

**Q.2 Attempt any FOUR**

**(16)**

- a) Evaluate  $\int \frac{dx}{(x^2 + 4)(x + 1)}$
- b) Evaluate  $\int \frac{dx}{3 \sin 2x + 2 \cos 2x}$
- c) Evaluate  $\int \frac{x + 2}{\sqrt{x^2 + 5x + 6}} dx$
- d) Evaluate  $\int_0^{\pi/4} \log(1 + \tan x) dx$
- e) Evaluate  $\int_1^3 \frac{\sqrt[3]{x+5}}{\sqrt[3]{x+5} + \sqrt[3]{9-x}} dx$
- f) Using integration find the area of the circle  $x^2 + y^2 = 16$

**Q.3 Attempt any FOUR**

**(16)**

- a) Evaluate  $\int_{\pi/6}^{\pi/3} \frac{1}{1 + \sqrt[4]{\cot x}} dx$
- b) Evaluate  $\int \frac{3 \sin x + 4 \cos x}{2 \sin x - \cos x} dx$
- c) Evaluate  $\int \cos \sqrt[3]{x} dx$
- d) Evaluate  $\int \frac{dx}{4 \cos^2 x + 9 \sin^2 x}$
- e) Find R.M.S value of the  $I = 10 \sin 100 \pi t$  over a complete period.
- f) Find the area enclosed by the parabola  $y = x^2 - 5x + 15$  and the line  $y - 3x = 3$ .

**P.T.O**

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

- Form the differential equation by eliminating arbitrary constants if  $y = A \cos 3x + B \sin 3x$
- Solve  $\sqrt{1-y^2} dx = \sqrt{1-x^2} dy$
- state order and degree of the differential equation  $\sqrt{1 + \frac{dy}{dx}} = \frac{d^2y}{dx^2}$
- Find range of the following data: 49, 13, 11, 12, 42, 29, 18, 27.
- Find the probability of getting a sum of 3 when 2 unbiased dice is thrown.
- The velocity of a body is given by  $v = t(3 + 5t)$ . How much distance does it travel in 4sec if it was initially at rest?

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

- Solve:  $\cos^2 x \frac{dy}{dx} + y = \tan x$
- Solve:  $v \frac{dv}{dx} = g - kv^2$  Where g and k are constants.
- Solve:  $(x + y + 1)^2 \frac{dy}{dx} = 1$
- Calculate mean deviation about mean of the following data

Marks	3	4	5	6	7	8
No. of student	1	3	7	5	2	2

- Calculate variance

C.I	0-10	10-20	20-30	30-40	40-50	50-60
fi	14	23	27	21	15	19

- A husband and wife appeared for an interview for two vacancies in an office. The probability of husbands' selection is  $\frac{2}{7}$  and that of wife selection is  $\frac{1}{4}$ . Find the probability that
  - Both of them are selected.
  - Only one of them is selected.

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

- If A and B are two events such that  $P(A)=0.8$ ,  $P(B)=0.6$ ,  $P(A \cap B)=0.5$ , find
  - $P(A \cup B)$
  - $p(\frac{A}{B})$
  - $p(\frac{B}{A})$
- Solve:  $(2xy + y - \tan y)dx + (x^2 - x \tan^2 y + \sec^2 y)dy = 0$
- Solve:  $y dx = x dy + \sqrt{xy} dx$
- Find the equation of curve whose slope at any point is equal to  $\frac{2y+x+1}{x}$  and which passes through the point (1, 0).
- The mean weight of 150 students is 60kg. The mean weight of boys is 70kg with a S.D of 10kg. For the girls, the mean weight is 55kg. and the S.D is 15kg. Find the number of boys and the combined S.D.
- The following table shows the marks obtained by 100 students in an examination. Calculate mean and variance.

Marks	1-10	11-20	21-30	31-40	41-50	51-60
No.of candidates	3	16	26	31	16	08

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**EVEN TERM END EXAM APRIL/MAY -2017**

**EXAM SEAT NO.**

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**LEVEL: THIRD**

**COURSE CODE: EE301/R228**

**PROGRAM: ELECTRICAL ENGINEERING**

**COURSE NAME: HIGHER ENGINEERING**

**MATHEMATICS**

**MAX. MARKS: 80**

**TIME: 3 HRS.**

**DATE: 05/05/2017**

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.
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- 6) Assume additional suitable data necessary.
- 7) Use of Mobile is strictly prohibited.

**Marks  
(08)**

**Q.1 Attempt any FOUR**

- a) With usual notations of symbols prove that  $\nabla = 1 - E^{-1}$
- b) Prove that  $\Delta \log f(x) = \log \left[ 1 + \frac{\Delta f(x)}{f(x)} \right]$
- c) Find  $\left( \frac{\Delta}{E} \right) \sin x$
- d) If  $P(A) = 0.6$ ,  $P(B) = 0.4$ ,  $P(A \cap B) = 0.36$  find  $P(A' \cap B')$
- e) Find  $\left( \frac{\Delta^2}{E} \right) e^x$
- f) Evaluate  $\int_0^{\infty} e^{-x^4} dx$

**Q.2 Attempt any FOUR**

**(16)**

- a) Find the missing terms in the following table.

x	0.0	0.5	1.0	1.5	2.0	2.5
y	0	1	--	1.2	--	3.5

- b) Express  $f(x) = 2x^4 + x - 1$  in factorial notation and find  $\Delta^3 f(x)$  at  $x = 1.5$
- c) Use Newton's forward Interpolation formula to calculate  $f(1.85)$  from the following table.

x	1.7	1.8	1.9	2.0	2.1	2.2	2.3
f(x)	5.474	6.050	6.686	7.389	8.166	9.025	9.974

- d) Evaluate  $f(9)$  using suitable Interpolation formula for the data given below.

x	5	7	11	13	17
y	150	392	1452	2366	5202

- e) A coin is tossed thrice. What is the probability of getting a) atleast two heads  
b) no head?

- f) Evaluate  $\int_0^{\infty} \frac{x^5(1+x^4)}{(1+x)^{16}} dx$

**Q.3 A] Attempt any TWO**

**(16)**

- a) Prove that  $B(x, x) = \frac{1}{2x-1} B(x, \frac{1}{2})$
- b) Evaluate  $\int_0^2 x^3 \sqrt{2-x} dx$
- c) Evaluate  $\int_0^{\infty} x^2 e^{-h^2 x^2} dx$

PTD

**B]** Attempt any **TWO**

- a) Using Gauss Seidel method solve the equations  $8x + 4y - 2z = 3$ ,  $2x - 6y + z = 15$ ,  $4x + 5y + 15z = 37$  (Three iterations only)
- b) Find an approximate root of the equation  $x^3 + x - 1 = 0$ , by using Regula-falsi method three times.
- c) Find the smallest positive root of the equation  $x^3 - 2x + 0.5 = 0$  by Newton – Raphson method.

**Q.4** Attempt any **FOUR**

**(08)**

- a) Find the Laplace transform of  $3e^{2t} \sin 2t$
- b) Find the Laplace transform of  $(t \cdot \cos 2t)$
- c) Find the inverse Laplace transform of  $\frac{3s - 12}{s^2 + 8}$
- d) For  $f(x) = x \sin x$ ,  $0 < x < 2\pi$  find Fourier constant  $a_0$
- e) Find the Fourier transform of  $f(x) = e^{-x^2/2}$
- f) Find the Fourier transform of  $f(x) = \begin{cases} \frac{1}{2\varepsilon} & |x| \leq \varepsilon \\ 0 & |x| > \varepsilon \end{cases}$

**Q.5** Attempt any **FOUR**

**(16)**

- a) Find the Fourier series of  $f(x) = x$  in  $(-\pi, \pi)$
- b) Find Laplace inverse of  $\frac{s^2}{(s^2 + 4)^2}$  by convolution theorem.
- c) Find Laplace transform of  $t^2 \cos at$
- d) Expand  $f(x)$  as Fourier series of  $f(x) = \begin{cases} -x & -\pi \leq x < 0 \\ x & 0 < x \leq \pi \end{cases}$
- e) Find the Fourier series of  $f(x) = x^2$  in  $[0, 2\pi]$
- f) Solve by Laplace transform method  $\frac{dx}{dt} + 3x = 2 + e^{-t}$  given that  $x(0) = 1$

**Q.6** Attempt any **FOUR**

**(16)**

- a) Obtain the Fourier series for  $f(x) = \sin ax$  in  $(-\pi, \pi)$
- b) Find the inverse Laplace transform of  $\frac{1}{(s+1)(s^2+1)}$
- c) Obtain Fourier expansion for  $f(x) = \sqrt{1 - \cos x}$  in  $(-\pi, \pi)$
- d) Find the inverse Laplace transform of  $\frac{4s+5}{(s-1)^2(s+2)}$
- e) Solve by Laplace transform method  $3\frac{dx}{dt} + 2x = e^{3t}$  if  $x = 1$  at  $t = 0$
- f) Solve by Laplace transform method  $\frac{dy}{dt} + 3y = 1 + e^{-t}$  given that  $y(0) = -1$

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**EVEN TERM END EXAM April/ May 2017**

**EXAM SEAT NO.**

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**LEVEL :- THIRD**

**PROGRAM : ELECTRICAL ENGINEERING**

**COURSE CODE :- EEE311**

**COURSE NAME :- NON CONVENTIONAL ENERGY SOURCES**

**MAX. MARKS : 80 TIME : 3 HRS. DATE: - 05 / 05 / 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) Write any four sources of energy.
- b) State any four non-conventional energy sources.
- c) State advantages of Wind energy conversion system.
- d) Define altitude angle.
- e) State minimum wind velocity required for wind energy conversion system.
- f) Explain how electrical energy generated from wind energy conversion system.

**Q.2 Attempt any FOUR**

(16)

- a) Derive the equation for power in wind.
- b) Explain construction and working of typical flat plate collector.
- c) Write a note on solar radiation Geometry.
- d) Explain using a diagram solar pond.
- e) Explain the need of renewable energy sources.
- f) Explain the factors to be considered while selecting site for wind energy conversion system.

**Q.3 Attempt any TWO**

(16)

- a) Describe any one method of wind energy conversion system.
- b) State working of solar cell for solar power generation. State any two materials used as solar cell.
- c) Explain in brief solar pumping and Green house.

**P.T.O.**

Q.4 Attempt any **FOUR**

(08)

- a) What are the main types of OTEC power plants?
- b) Classify geothermal sources.
- c) What is the difference between biomass and biogas?
- d) State any two advantages of fuel cell.
- e) How MHD systems are classified?
- f) State any two applications of geothermal energy.

Q.5 Attempt any **FOUR**

(16)

- a) With help of neat diagram, explain working of Pragati Biogas Plant.
- b) State the advantages and disadvantages of geothermal energy over other energy forms.
- c) Explain in brief working principle of MHD power generation.
- d) Explain with neat sketch double basin tidal power plant.
- e) Draw a layout of micro-hydro power station and explain its working.
- f) What is meant by 'energy plantation'? What are its advantages and disadvantages?

Q.6 Attempt any **TWO**

(16)

- a) Explain the constructional detail and working of KVIC digester.
- b) Explain in brief schematic layout of Tidal Power House.
- c) State and explain various applications of fuel cells referring to
  - i) domestic ii) Automotive iii) Central power stations iv) Special applications.

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**GOVERNMENT POLYTECHNIC, KOLHAPUR 416004.**

(An Autonomous Institute of Govt. of Maharashtra)

**EVEN TERM END EXAM APRIL/MAY -2017**

**EXAM SEAT NO.**

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**LEVEL: FIRST**

**PROGRAM: COMMON**

**COURSE CODE: CCF106/CCE106/X110/R108/0108**

**COURSE NAME: ENGINEERING MATHEMATICS**

**MAX. MARKS: 80**

**TIME: 3 HRS.**

**DATE: 06/05/2017**

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**

- a) Find the centroid of a triangle whose vertices are (1, 4) (2, 3) (0, -1)
- b) Find the distance between the parallel lines  $3x + 2y - 8 = 0$  and  $3x + 2y - 4 = 0$
- c) Find the acute angle between the lines  $3x - 2y + 4 = 0$  and  $2x - 3y - 7 = 0$
- d) Find the equation of a circle whose center is at origin and radius 5
- e) Find the equation of a circle whose diameter is the line segment joining the points (9, 0) & (0, 6)
- f) Starting with the approximations  $x_0 = y_0 = z_0 = 0$ , for solving a set of equations by Gauss-Seidel method. If the next approximation gives  $x_1 = 0.85$ ,  $y_1 = 1.0275$ . Find  $z_1$ . Given that  $z = \frac{1}{10}[25 - 2x + 3y]$

**(16)**

**Q.2 Attempt any FOUR**

- a) Show that the points (-2, 1), (-1, 3) and (1, 7) are collinear.
- b) Determine which of the two circles is greater:  $x^2 + y^2 - 3x + 4y = 0$  and  $x^2 + y^2 - 6x + 8y = 0$
- c) Find the equation of a circle passing through the point (2, 5) and (-5, 4) and whose center lying on the line  $2x - 3y + 5 = 0$
- d) Find the equation of a line passing through the points of intersection of the lines  $2x + 3y = 13$ ,  $5x - y = 7$  and passing through (1, -1)
- e) Find the equation of perpendicular bisector of the join of A(-2, 3) and B(8, -1)
- f) Use Jacobi's method to solve the equations  $5x + 2y + z = 12$ ,  $x + 4y + 2z = 15$ ,  $x + 2y + 5z = 20$  (Third iterations only)

**(16)**

**Q.3 Attempt any FOUR**

- a) Using Gauss Seidel method solve  $10x = 2y + 2z + 6$ ,  $10y = x + 2z + 7$ ,  $10z = x + y + 8$  (upto Third iterations)
- b) Using Jacobi's method solve  $5x - y - 2z = -3$ ,  $3x + 5y - z = 10$ ,  $-2x - y + 4z = 8$  (three iterations only)
- c) Use Regula-Falsi method to solve  $x^3 - 3x + 5 = 0$  (upto second approximation)
- d) Find  $\sqrt[3]{29}$  by Regula-Falsi method upto second iteration
- e) Find the square root of 12 by the method of bisection (upto 4 approximations)
- f) Solve  $x^3 - 6x + 2 = 0$  by Bisection method (upto four iterations)

**P.T.O**

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

- a) Test whether the function is even or odd if  $f(x) = x^3 + 5 \sin x$
- b) Evaluate  $\lim_{x \rightarrow 3} \frac{x^3 - 27}{x - 3}$
- c) Evaluate  $\lim_{x \rightarrow 0} \frac{\sin 5x}{3x}$
- d) Find  $\frac{dy}{dx}$  if  $y = \cos^2 x$
- e) Find  $\frac{dy}{dx}$  if  $y = \log(x^2 + 2x + 5)$
- f) Find the slope of tangent to the curve  $y = x^3$  at  $x = 4$

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

- a) If  $y = f(x) = \frac{x+1}{x-1}$ ,  $x \neq 1$  then show that  $x = f(y)$
- b) Evaluate  $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sin x - \cos x}{x - \frac{\pi}{4}}$
- c) If  $y = x^y$  prove that  $\frac{dy}{dx} = \frac{y^2}{x(1 - y \log x)}$
- d) Find the derivative of  $x \cdot \sin^{-1} x$
- e) Find  $\frac{dy}{dx}$  if  $y = \log[x + \sqrt{x^2 + a^2}]$
- f) Discuss the stationary (Maximum & Minimum values) of  $x^3 - 6x^2 + 9x - 2$

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

- a) If  $f(x) = 16^x + \log_2 x$  then find  $f(1/4)$  &  $f(1/2)$
- b) Evaluate  $\lim_{x \rightarrow 4} \frac{x^4 - 64x}{\sqrt{x^2 + 9} - 5}$
- c) Differentiate w. r. t  $x$ ;  $\tan^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right)$
- d) Find  $\frac{dy}{dx}$  if  $13x^2 + 2x^2y + y^3 = 1$
- e) If  $y = (\sin x)^{\log x}$  find  $\frac{dy}{dx}$
- f) If  $x = a(\theta + \sin \theta)$ ,  $y = a(1 - \cos \theta)$  find  $\frac{dy}{dx}$

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