

**Question Paper Profile**

**Program Name** : Electrical Engineering Program Group  
**Program Code** : EE/EP/EU  
**Semester** : Third  
**Course Title** : Electrical Circuits  
**Max. Marks** : 70

22324

**Time: 3 Hrs.**

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**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

**Q.1 Attempt any Five of the following. 10 Marks**

- a) Draw impedance triangle for R-C series circuit. Write nature of power factor of this circuit.
- b) Define impedance and reactance related to single phase AC series circuit. Give the units of both.
- c) Define admittance with unit.
- d) Draw the sinusoidal waveform of 3-phase emf and also indicate the phase sequence.
- e) Give four steps to solve mesh analysis.
- f) State Superposition Theorem.
- g) State the maximum power transfer theorem for DC circuit.

**Q.2 Attempt any Three of the following. 12 Marks**

- a) Find active, reactive and apparent power and power factor of the A.C. Series circuit consisting of  $R=1 \text{ ohm}$ ,  $L=0.001 \text{ Henry}$  and  $C= 1 \text{ microfarad}$  supplied with 100 volt, 50 Hz power supply.
- b) A voltage of  $200 \angle 53^\circ$  is applied across two impedances in parallel. The values of impedances are  $(12 + j16)$  and  $(10 - j20)$ . Determine the kVA, kVAR and kW in each branch and power factor of the whole circuit.
- c) A delta connected induction motor is supplied by 3-phase, 400V, 50Hz supply the line current is 43.3A and the total power taken from the supply is 24 kW. Find the resistance and reactance per phase of motor winding
- d) Using mesh analysis find values of  $V_R$  as shown in Figure No. 1

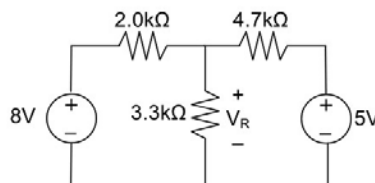


Fig. 1.

**Q.3) Attempt any Three of the following. 12 Marks**

- a) A coil of resistance  $50 \Omega$  and inductance of  $0.1 \text{ H}$  is connected in series with  $100 \text{ mF}$  capacitor. The combination is supplied with  $230 \text{ V}$ ,  $50 \text{ Hz}$  A.C. supply. Calculate voltage across each, current through the circuit, power factor and draw complete vector diagram.

- b) Two impedances  $(12 + j16)$  and  $(10 - j20) \Omega$  are connected in parallel across a supply of  $200 \angle 60^\circ$  using admittance method calculate branch currents, total current and power factor of whole circuit.
- c) Give four advantages of polyphase circuits over 1-phase circuits.
- d) Give the expression for star to delta and delta to star transformation.
- e) Using Norton's theorem, find current through  $1 \text{ohm}$  resistances in Figure No. 2.

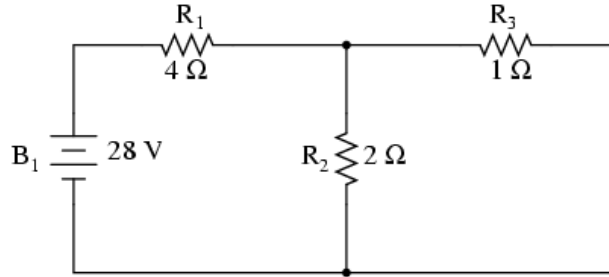


Fig.2

**Q.4) Attempt any Three of the following.**

**12 Marks**

- a) An inductive coil  $(10 + j40) \Omega$  impedance is connected in series with a capacitor of  $100 \mu\text{F}$  across  $230 \text{ V}$ ,  $50 \text{ Hz}$ , 1-Phase supply mains find :
  - (1) Current through the circuit
  - (2) P.F. of the circuit
  - (3) Power dissipated in the circuit
  - (4) Draw phasor diagram
- b) A coil having resistance of  $5 \Omega$  and inductance of  $0.2 \text{H}$  is arranged in parallel with another coil having resistance of  $1 \Omega$  and inductance of  $0.08 \text{ H}$ . Calculate the current through the combination and power absorbed when a voltages of  $100 \text{ V}$ ,  $50 \text{ Hz}$  is applied. Use impedance method.
- c) Each phase of a delta-connected load comprises a resistor of  $50 \Omega$  and capacitor of  $50 \mu\text{F}$  in series. Calculate the line and phase currents when the load is connected to a  $440 \text{ V}$ , 3 phase  $50 \text{ Hz}$  supply.
- d) Define duality of electric circuits and write duality of electrical elements.

**Q.5) Attempt any Two of the following.**

**12 Marks**

- a) A  $100 \Omega$  resistor,  $0.02 \text{ H}$  inductor and  $1.2 \mu\text{F}$  capacitor are connected in parallel with a circuit made up of resistor of  $110 \Omega$  and a capacitor of  $2.4 \mu\text{F}$ . a supply of  $230 \text{V}$ ,  $50 \text{ Hz}$  is connected across the circuit. Calculate the current taken from the supply & phase angle of it.
- b) Using source transformation, find the voltage across  $12 \Omega$  ( $v_x$ ), as shown in figure 3.

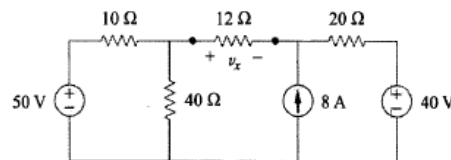


Fig.3

- c) Apply Thevenin's theorem to calculate current flowing through  $R_5 = 250 \Omega$  resistor as shown in figure.4

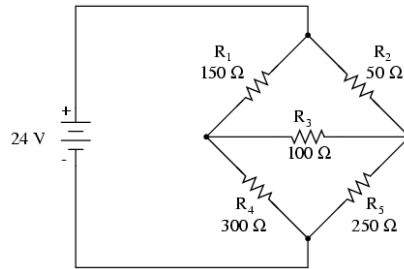


Fig.4

**Q.6) Attempt any Two of the following.**

**12 Marks**

- An a.c. series circuit has a resistance of 10  $\Omega$ , an inductance of 0.2 H and a capacitance of 60  $\mu\text{F}$ . Calculate: (a) resonant frequency (b) current (c) power at resonance. Applied voltage is 200 V.
- State relationship between line voltage and phase voltage, line current & phase current in a balanced star connection. Draw complete phasor diagram of voltages & current.
- Apply Superposition theorem to calculate current flowing through  $R_4 = 10 \Omega$  resistor as shown in figure.5

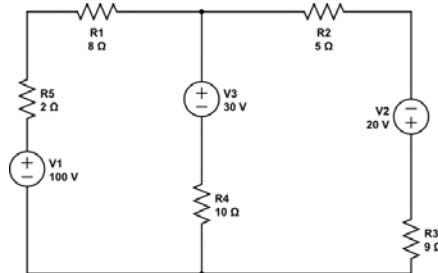


Fig.5

**'I' Scheme**

**Question Paper Profile**

**Program Name** : **Electrical Engineering Program Group**  
**Program Code** : **EE/EP/EU**  
**Semester** : **Third**  
**Course Title** : **Electrical Circuits**  
**Max. Marks** : **20**

22324

**Time: 1 Hour**

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**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

**Q.1 Attempt any FOUR.**

**08 Marks**

- a. Draw voltage triangles for R-L and R-C single phase AC series circuits.
- b. Define quality factor of series A.C. circuit.
- c. Convert  $Z = 6 + j8 \Omega$  in polar form.
- d. Define admittance and conductance in relation with parallel circuits. Give formulas for the same.
- e. Write properties of Parallel resonance.
- f. Define Quality Factor for parallel resonance. Give equation of it.

**Q.2 Attempt any THREE.**

**12 Marks**

- a. A resistance  $60 \Omega$  and inductance of  $0.5 \text{ H}$  is connected in series. The combination is supplied with  $230 \text{ V}$ ,  $50 \text{ Hz}$  A.C. supply. Calculate voltage across each, current through the circuit, power factor and draw complete vector diagram.
- b. A RC series circuit consisting of  $R = 10 \Omega$  and  $C = 100 \text{ mF}$  is connected across  $200\text{V}$ ,  $50\text{Hz}$  AC supply. Find the value of current and power factor. What will be the value of current and power factor if the value of resistance is doubled?
- c. Derive an expression for resonant frequency of a series RLC circuit.
- d. Impedances  $Z_1 = (10 + j5) \Omega$  and  $Z_2 = (8 + j6) \Omega$  are connected in parallel across  $V = (200 + j0)$ . Using the admittance method, calculate circuit current and the branch currents.
- e. A coil having resistance of  $5 \Omega$  and inductance of  $0.2\text{H}$  is arranged in parallel with capacitor of  $50 \mu\text{F}$ . Calculate the current through the combination and power absorbed when a voltages of  $100 \text{ V}$ ,  $50 \text{ Hz}$  is applied. Use impedance method.

Question Paper Profile

Program Name : Electrical Engineering Program Group  
Program Code : EE/EP/EU  
Semester : Third  
Course Title : Electrical Circuits  
Max. Marks : 70

22324

Time: 3 Hrs.

Instructions:

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR.

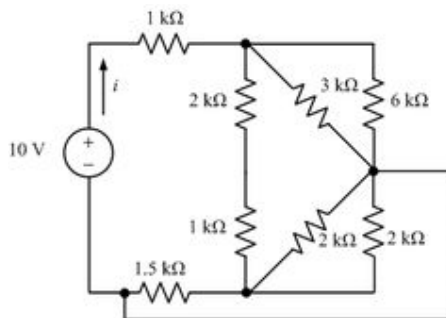
08 Marks

- a) Define line voltage and phase voltage
- b) What do you mean by balanced load and balanced supply in relation with polyphase AC circuits?
- c) Give four steps to solve nodal analysis.
- d) How current source can be converted into equivalent voltage source?
- e) State Reciprocity Theorem.
- f) State Norton's theorem.

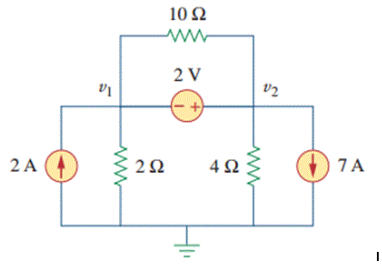
Q.2 Attempt any THREE.

12 Marks

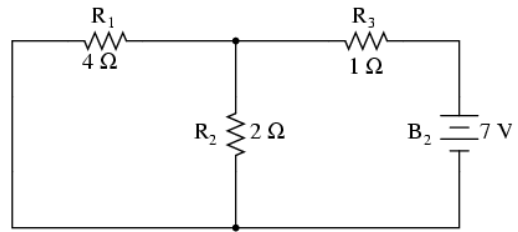
- a. Three coils each with a resistance of  $10 \Omega$  and inductance of  $0.35\text{mH}$  are connected in star to a 3-phase,  $440 \text{ V}$ ,  $50 \text{ Hz}$  supply. Calculate the line current and total power taken per phase.
- b. Derive relation between line and phase voltages of star connection of 3ph load.
- c. Find current in  $1\text{k} \Omega$  by using star delta transformation.



- d. Find the current in  $10 \Omega$  by using superposition theorem.



e. Find maximum power in  $R_1 = 4 \Omega$  by using maximum power transfer theorem.



**'T' Scheme**

**Sample Question Paper**

**Program Name** : Electrical Engineering Program Group  
**Program Code** : EE/EP/EU  
**Semester** : Third  
**Course Title** : Electrical and Electronic Measurements  
**Max. Marks** : 70

**22325**

**Time: 3 Hrs.**

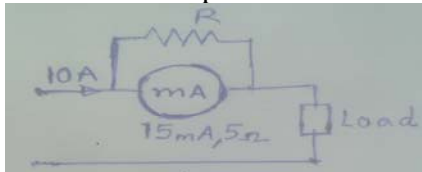
**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

**Q.1 Attempt any FIVE of the following.**

**10 Marks**

- a. Define the following terms with respect to measuring instrument :  
i) Accuracy ii) Sensitivity
- b. State the meaning of i) Deflecting Torque ii) Damping Torque.
- c. State the working principle of dynamometer type wattmeter.
- d. State any two benefits of Electronic Energy meter.
- e. Electronic Energy meter is also called as static energy meter, justify your answer.
- f. In the given diagram the range of meter having internal resistance of 5 ohm, has to be extended to read from 15mA to 10Amp. calculate the value of R



- g. In a circuit, power is to be measured with a wattmeter having specification of 15A / 400V, 1500 watts full scale deflection. The reading of wattmeter was 750 watts. State the value of actual power consumed by the load.

**Q.2 Attempt any Three of the following.**

**12 Marks**

- a. Describe with relevant sketch Instrumental errors and observational errors in measuring instruments.
- b. Compare the analog ammeter and voltmeter on the basis of following points:  
i) Connection in the circuit ii) resistance  
iii) Circuit symbol iv) Extension of range
- c. Describe the process of calibration of D.C. voltmeter using D.C. potentiometer.
- d. A moving coil instrument gives full scale deflection of 24 mA. When P.D. across it is 72 mV. Determine the value of:  
i) Series resistance for full scale deflection of 600 V  
ii) Find the power consumption in meter.

**Q.3) Attempt any Three of the following.**

**12 Marks**

- CT is used to extend the range of ammeter in an electrical circuit. Explain the effect of open circuited secondary on the function of CT.
- One wattmeter of range 20A/300V is to be used to measure the power in variable load single phase circuit. Suggest the connection of wattmeter with sketch for measurement of power in case of i) lower and ii) higher value of load.
- A wattmeter with its current coil in line R and pressure coil across Y and B reads 3.2kW for a balanced load of 0.6 lagging p.f. The supply voltage is 400 V. Determine the following :
  - current
  - power
  - and iii) reactive volt ampere of the load.
- Explain the working of single phase electronic energy meter with relevant sketch.

**Q.4) Attempt any Three of the following.**

**12 Marks**

- Draw a neat labeled block diagram of 3-phase electronic energy meter.
- Draw the neat labeled diagram showing the controls available on front panel of general purpose CRO.
- Explain the working principle of phase sequence indicator with relevant constructional diagram.
- Describe the construction of Weston type frequency meter with labeled diagram
- Describe the functions of following components of CRT :
  - Electron gun
  - vertical amplifier
  - iii) horizontal amplifier
  - iv) time base generator

**Q.5) Attempt any Two of the following.**

**12 Marks**

- Explain the working of PMMC instrument with a labeled sketch.
- Explain the working of maximum demand indicator with a neat sketch.
- Draw a neat diagram of kelvin double bridge
  - A four terminal resistor of approximately 50 micro ohm resistance was measured by means of Kelvin double bridge having the following component resistance  
Standard resistor = 100.03 micro ohm Inner ratio arm = 100.31ohm and 200 ohm  
Outer ratio arm = 100.24 ohm and 200 ohm Resistance of link connecting the standard and the unknown resistance = 700 micro ohm.  
Calculate the unknown resistance to the nearest 0.01 micro ohm.

**Q.6) Attempt any Two of the following.**

**12 Marks**

- Describe with sketch the process of calibration of single phase electronic energy meter using direct loading.
  - Explain with labeled sketches the working of function generator with the help of labeled block diagram.
  - Explain with labeled sketches the construction and working of synchroscope .
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**'I' Scheme**

**Sample Question Paper**

(40% of 5-Unit curriculum and 50% of 6-Unit curriculum)

**Program Name** : **Electrical Engineering Program Group**  
**Program Code** : **EE/EP/EU**  
**Semester** : **Third**  
**Course Title** : **Electrical and Electronic Measurements**  
**Max. Marks** : **20**

22325

**Time: 1 Hour**

**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

**Q.1 Attempt any FOUR.**

**08 Marks**

- a. State the essential requirements of indicating instruments
- b. Differentiate between null and deflection type instruments
- c. State the advantages of PMMC instrument.
- d. Design multirange dc voltmeter of range 0-100 V. Assume full scale deflection current is 5mA and internal resistance of meter is 500 ohm
- e. Draw the neat labeled circuit diagram for measurement of power in 3-phase circuit using two wattmeter method
- f. In a circuit, power is to be measured with a wattmeter having specification of 15A / 400V, 1500 watts full scale deflection. The reading of wattmeter was 750 watts. State the value of actual power consumed by the load.

**Q.2 Attempt any THREE.**

**12 Marks**

- a. List any eight static characteristics of measuring instrument.
- b. Describe gross error and instrumental error in measuring instruments.
- c. Explain the working of PMMI meter with neat sketch.
- d. CT is used to extend the range of ammeter in an electrical circuit. Explain the effect of open circuited secondary on the function of CT
- e. A wattmeter with its current coil in line R and pressure coil across Y and B reads 3.2kW for a balanced load of 0.6 lagging p.f. The supply voltage is 400 V. Determine the following :
  - i) current
  - ii) power
  - and
  - iii) reactive volt ampere of the load
- f. Describe the construction of dynamometer type single phase wattmeter

**'I' Scheme**

**Sample Test Paper - II**

(60% of 5-Unit curriculum and 50% of 6-Unit curriculum)

**Program Name** : **Electrical Engineering Program Group**  
**Program Code** : **EE/EP/EU**  
**Semester** : **Third**  
**Course Title** : **Electrical and Electronic Measurements**  
**Max. Marks** : **20**

22325

**Time: 1 Hour**

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**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

**Q.1 Attempt any FOUR.**

**08 Marks**

- a) State the working principle of single phase electronic energy meter.
- b) List any four errors occurring in single phase electronic energy meter.
- c) Give the classification of resistances stating their values.
- d) State the working principle of phase sequence indicator.
- e) Draw a neat block diagram of single beam CRO.
- f) State the significance of function generator.

**Q.2 Attempt any THREE.**

**12 Marks**

- a) Explain with a neat diagram the calibration of single phase electronic energy meter using direct loading.
- b) Draw a neat labeled block diagram of 3-phase electronic energy meter.
- c) Describe with a neat sketch the construction of ferromagnetic type frequency meter.
- d) Explain the working of Synchroscope with neat sketch.
- e) Explain the working of signal generator with basic block diagram.
- f) State the applications and advantages of tri vector meter.

**'T' Scheme**

**Sample Question Paper**

**Program Name** : **Electrical Engineering Program Group & Diploma in Industrial Electronics**

**Program Code** : **EE/EP/EU/IE**

**Semester** : **Third**

**Course Title** : **Fundamentals of Power Electronics**

**Marks** : **70**

**22326**

**Time: 3 Hrs.**

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**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

**Q.1) Attempt any FIVE of the following.**

**10 Marks**

- a) Give the merits of Power transistor (any two).
- b) State the applications of IGBT (any two).
- c) Draw the symbol of PUT and DIAC.
- d) Give the types of gate triggering.
- e) Give the difference between R and RC triggering of SCR in terms of firing angle.
- f) Define transfer time and back up time of UPS.
- g) State the requirements of SMPS.

**Q.2) Attempt any THREE of the following.**

**12 Marks**

- a) Describe with sketch the construction of IGBT.
- b) Describe SCR mounting and cooling with sketch.
- c) Explain the operation of R triggering circuit with a diagram.
- d) Explain with circuit diagram the operation of single phase full bridge controlled rectifier with R load.

**Q.3) Attempt any THREE of the following.**

**12 Marks**

- a) Explain the operation of crowbar protection circuit with diagram.

- b) Explain the operation of UJT relaxation oscillator circuit with diagram .
- c) Explain with sketch the operation of single phase fully controlled midpoint configuration with RL load.
- d) Explain the operation of Burglar alarm system with diagram.

**Q.4) Attempt any THREE of the following.**

**12 Marks**

- a) Give the types of protection circuit for overvoltage .
- b) Explain the operation of class D commutation circuit with diagram .
- c) A  $1\phi$  half controlled rectifier supplied with voltage  $V=150 \sin 314t$  ,  $\alpha = 45^\circ$  and load resistance is  $10\Omega$ . Find i) Average output dc voltage, ii) Load current.
- d) Explain the operation of AC circuit breaker with circuit diagram.
- e) Explain speed control of the motor by using TRIAC with the help of circuit diagram.

**Q.5) Attempt any TWO of the following.**

**12 Marks**

- a) For the Snubber circuit, answer the following-
  - i) Give the importance in SCR.
  - ii) Justify with circuit diagram.
- b) For a Class B commutation, answer the following -
  - i) Explain the operation with a circuit diagram.
  - ii) Interpret with waveforms.
- c) Explain the modes of operations in TRIAC with quadrant diagram.

**Q.6) Attempt any TWO of the following.**

**12 Marks**

- a) State the effect of source inductance in controlled rectifiers with waveforms.
- b) Justify with sketches the procedure to eliminate reverse power in a fully controlled rectifier with RL load.
- c) If a person use one ceiling fan (80W), one tube light (40W), 2 CFL (7 Watt per one CFL) simultaneously with UPS having 12V, 150 AH battery. Calculate back up time of UPS battery.

**'T' Scheme**

**Sample Test Paper - I**

**Program Name** : **Electrical Engineering Program Group & Diploma in Industrial Electronics**

**Program Code** : **EE/EP/EU/IE**

**Semester** : **Third**

**Course Title** : **Fundamentals of Power Electronics**

**Marks** : **20**

**22326**

**Time: 1 Hour.**

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**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

**Q.1 Attempt any FOUR.**

**08 Marks**

- a) Draw the symbol of power transistor and IGBT.
- b) Give the merits of GTO over SCR (any two).
- c) Sketch labeled VI characteristics of DIAC.
- d) Sketch two transistor equivalent circuit of SCR.
- e) Give the turn ON methods of SCR (any four).
- f) For a DC source, name any four turn off methods of SCR.

**Q.2 Attempt any THREE.**

**12 Marks**

- a) Explain the operation of IGBT with sketch.
- b) Show the effect of gate current on break over voltage of TRIAC with labelled characteristics.
- c) Interpret the VI characteristics of UJT with sketch.
- d) Describe with sketch the operation of SCR.
- e) Justify the use of pulse transformer in SCR triggering with circuit diagram.
- f) Explain with sketch the operation of Class C commutation.

**'T' Scheme**

**Sample Test Paper - II**

**Program Name** : Electrical Engineering Program Group & Diploma in Industrial Electronics

**Program Code** : EE/EP/EU/IE

**Semester** : Third

**Course Title** : Fundamentals of Power Electronics

**Marks** : 20

22326

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**Instructions:**

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- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

**Q.1 Attempt any FOUR.**

**08 Marks**

- a) Give the merits of freewheeling diode in controlled rectifier circuit (any two).
- b) Give the relation between firing angle and conduction angle with waveform.
- c) Sketch  $1\phi$  half controlled rectifier with R load.
- d) Draw labeled basic block diagram of UPS.
- e) Draw labeled basic block diagram of SMPS.
- f) Sketch light dimmer circuit using DIAC and TRIAC.

**Q.2 Attempt any THREE.**

**12Marks**

- a) Explain with sketch the working of battery charger using SCR.
- b) Describe emergency light system with sketch.
- c) Explain temperature controller using SCR with sketch.
- d) Give the operation of  $1\phi$  fully controlled midpoint configuration with R load with output voltage and output current waveform.
- e) Explain the operation of  $1\phi$  Half controlled rectifier with RL load using output voltage and output current waveform.
- f) A  $1\phi$  fully controlled rectifier with supplied with voltage  $V=150 \sin 314t$  find the average output dc voltage if  $\alpha = 45^\circ$  and load resistance is  $100\Omega$ .

**'I' Scheme**

**Sample Question Paper**

**Program Name** : **Electrical Engineering Program Group**  
**Program Code** : **EE/EP/EU**  
**Semester** : **Third**  
**Course Title** : **Electrical Materials and Wiring Practice**  
**Max. Marks** : **70**

**22328**

**Time: 3 Hrs.**

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**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Sub-questions in a main question carry equal marks.
- (5) Assume suitable data if necessary.
- (6) Preferably, write the answers in sequential order.

**Q.1 Attempt any Five of the following.**

**10 Marks**

- a) Explain the need for following safety rules while working in electrical installations.
- b) Draw the labeled hysteresis loop for an electromagnetic material.
- c) Write any two properties of electrical insulating materials.
- d) State the need for thermal classification of electrical insulating materials.
- e) Explain in brief dielectric failure of cables.
- f) Write the names of any four components used in electrical wiring.
- g) Define earthing related to electrical wiring systems.

**Q.2 Attempt any Three of the following.**

**12 Marks**

- a) Write any four of the IE rules to be followed in respect of safety while working on electrical installation systems.
- b) Explain the suitability of aluminum as a conductor with respect to its electrical and mechanical properties.
- c) Explain the electrical, mechanical and thermal properties of mica that make it useful as an electrical insulating material.
- d) A residential unit has a sanctioned load connection of 3.5 kW. Determine the ratings of the main incoming cable/conductor, main switch and the ELCB.

**Q.3) Attempt any Three of the following.**

**12 Marks**

- a) Explain the use of the following tools in carrying out electrical wiring installations, i) Nose pliers, ii) Test lamps, iii) Crimping tools and iv) Cutter.
- b) State two applications along with the insulation class and its temperature for the following materials: i) Bakelite sheets and ii) PVC.
- c) Explain with neat labeled diagram the godown wiring system for lighting with one pilot room and two subsequent store rooms.
- d) Explain the uses of safety rubber hand gloves and rubber mats in electrical engineering.

**Q.4) Attempt any Three of the following.**

**12 Marks**

- a) Explain the use of the following components in electrical wiring systems and give specifications of each; i) one MCB and ii) one ELCB.
- b) Explain with justification two uses of each of the following as electrical conductors:

- i) silver and ii) lead – tin alloy.
- c) Explain with justification with reference to properties the use of CRGO silicon steel in electromagnetic machines.
- d) Explain any four of the various points to be kept in view while laying a given cable along a given route.
- e) A residential bungalow has a total connected load of 5 kW. Explain with a labeled sketch the earthing system suitable for it giving the dimensions of its components.

**Q.5) Attempt any Two of the following.**

**12 Marks**

- a) Describe in terms of their magnetic behavior the following materials:
  - i) ferromagnetic materials, ii) paramagnetic materials and iii) diamagnetic materials.
- b) Explain four reasons for failure of each gaseous and solid dielectric materials used in electrical engineering applications.
- c) Explain with a neat circuit diagram the procedure to measure the earthing resistance for an electrical installation using plate earthing. Sketch the expected resistance variation for a good earthing system.

**Q.6) Attempt any Two of the following.**

**12 Marks**

- a) Explain the criteria to be considered while installing an earthing system for an electrical installation.
  - b) Write two examples and two applications for each example of the following class of insulation materials i) Class Y, ii) Class F and iii) Class H.
  - c) Compare the casing/capping system of electrical wiring and the concealed system of electrical wiring. Suggest one of them for a 5 room bungalow given justification.
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**'I' Scheme**

**Sample Question Paper**

**Program Name** : **Electrical Engineering Program Group**  
**Program Code** : **EE/EP/EU**  
**Semester** : **Third**  
**Course Title** : **Electrical Materials and Wiring Practice**  
**Max. Marks** : **70**

**22328**

**Time: 3 Hrs.**

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**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Sub-questions in a main question carry equal marks.
- (5) Assume suitable data if necessary.
- (6) Preferably, write the answers in sequential order.

**Q.1 Attempt any Five of the following.**

**10 Marks**

- a) Define safety related to electrical wiring works.
- b) Write any two properties of a good electrical insulation material.
- c) Define magnetostriction and name one material exhibiting it.
- d) Define dielectric failure of electrical insulating materials.
- e) Name one gaseous and one liquid electrical insulation material.
- f) Draw a labeled circuit diagram of a one lamp control circuit using one switch.
- g) Explain the need for earthing of electrical installations.

**Q.2 Attempt any Three of the following.**

**12 Marks**

- a) Explain the need to follow safety rules while carrying out electrical wiring installation works and write any two rules in this respect.
- b) Explain the suitability of copper as an electrical conductor with reference to its mechanical and electrical properties.
- c) Explain the electrical and thermal properties of transformer oil that make it suitable as an electrical insulating medium.
- d) Write down along with their functions the names of four accessories/components of electrical wiring installations.

**Q.3) Attempt any Three of the following.**

**12 Marks**

- a) Describe the use of the following tools in carrying out electrical wiring installations,  
i) Pliers, ii) Screw driver sets, iii) Crimping tools and iv) Test lamp made for 400 V.
- b) Describe with reasons the failure of porcelain insulators.
- c) Explain with neat labeled circuit diagram the staircase wiring in which a lamp is controlled from two different locations.
- d) Explain the use of the following safety accessories:  
i) rubber hand gloves ii) rubber mats and iii) rubber foot wear.

**Q.4) Attempt any Three of the following.**

**12 Marks**

- a) Explain the use of the following wiring components and write typical specifications of each; i) one MCB and ii) one RCB.
- b) Explain with justification two uses of each of the following as electrical conductors:  
i) brass and ii) lead – tin alloy.

- c) Draw labeled sketches of the hysteresis loops for hard steel and any alloyed steel.
- d) Describe with sketches the laying of underground cables by the drawing in method.
- e) Explain with labeled sketch the working of the earthing system provided using a GI plate for an independent bungalow.

**Q.5) Attempt any Two of the following.**

**12 Marks**

- a) Compare the properties of copper and aluminum as good conductors of electricity on any six points.
- b) Write two examples and two applications for each example for the insulating materials in the following classes:
  - i) class Y, ii) class B and iii) class F.
- c) Describe using neat circuit diagrams the measurement of earth resistance for a factory installation. Explain with graphical sketch the variation of the earth resistance with respect to the distance from the earth electrode.

**Q.6) Attempt any Two of the following.**

**12 Marks**

- a) Explain the criteria to be kept in view while deciding the earthing system for an electrical installation.
  - b) Write two examples and two applications for each example of the following class of insulation materials i) Class A, ii) Class E and iii) Class H.
  - c) Describe with sketches the procedure of carrying out the work of cable jointing for a single core multi strand cable.
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**'I' Scheme**

**Sample Test Paper**

**Program Name** : **Electrical Engineering Program Group**  
**Program Code** : **EE/EP/EU**  
**Semester** : **Third**  
**Course Title** : **Electrical Materials and Wiring Practice**  
**Max. Marks** : **20**

**22328**

**Time: 1 Hour**

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**Instructions:**

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Sub-questions in a main question carry equal marks.
- (5) Assume suitable data if necessary.
- (6) Preferably, write the answers in sequential order.

**Q.1 Attempt any FOUR.**

**08 Marks**

- a. Define safety related to electrical wiring works.
- b. Explain two properties of copper as a conductor in electrical engineering.
- c. Write four properties of a good electrical insulating material.
- d. Explain the use of the ELCB.
- e. Draw a labelled sketch of the hysteresis loop for an electromagnetic material.
- f. Name any two insulating materials used in electrical engineering.

**Q.2 Attempt any THREE.**

**12 Marks**

- a. Explain with circuit diagram the making of the test lamp circuit suitable for 400 V lines using 230 V incandescent lamps.
  - b. Explain the reasons for preferring aluminium as conductor in electrical circuits.
  - c. Write down any two classes of insulation along with the temperature and three examples for each class.
  - d. State the application/use of the following accessories in electrical engineering works: tester, rubber hand gloves, ceiling roses and crimping tool.
  - e. Explain significance of the mechanical and thermal properties of insulating materials.
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