

22310

24225

3 Hours / 70 Marks

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answer with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
 - (8) Use of Steam tables, logarithmic, Mollier's chart is permitted.

Marks

SECTION – I

1. Attempt any SIX of the following: **12**

- a) Define the terms current and potential difference.
- b) Draw waveshape of AC quantity (voltage) and mark on it peak value, cycle, periodic time, instantaneous value at $\theta = 30^\circ$.
- c) Write any four advantages of single phase induction motor that made them popular in applications.
- d) Classify transformers based on construction and number of windings.
- e) Define magnetic circuit.
- f) Define RMS and average value.
- g) List out two application of auto transformer.

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2. Attempt any THREE of the following: 12

- a) Compare electric circuit and magnetic circuit on the basis of –
 - i) Flowing quantity
 - ii) Opposition to flow
 - iii) Governing laws
 - iv) Driving force.
- b) Show that in a star connected system phase voltage is $1/\sqrt{3}$ times line voltage where as phase current is equal to line current. Draw phasor diagram.
- c) Explain with neat sketch working of capacitor start single phase induction motor.
- d) Explain working of single phase transformer with suitable diagram indicating primary and secondary winding, voltages and currents.

3. Attempt any TWO of the following: 12

- a) A resistance of 10 Ohm, inductance of 30 mH and capacitance of 25 μ f are connected in series across an AC voltage of 40V.
 - i) Draw the representation of circuit.
 - ii) Calculate inductive reactance.
 - iii) Calculate capacitive reactance.
 - iv) Calculate impedance of circuit.
 - v) Current through the circuit.
 - vi) Active power dissipated in the circuit.
- b) Explain the working principle of single phase induction motor.
- c) An AC voltage represented is by $V = 141 \sin (100\pi t - \pi/3)$
Determine –
 - i) RMS value of voltage.
 - ii) Average value of voltage.
 - iii) Frequency of voltage.
 - iv) Phase angle of voltage.
 - v) Form factor of voltage.
 - vi) Power factor if current is at reference.

SECTION – II

- 4. Attempt any FIVE of the following: 10**
- a) Define the terms amplitude and frequency related to signals.
 - b) Enumerate function of rectifier and filter in an electronic circuit.
 - c) State any two functions of transistor.
 - d) List out different types of electric components with examples.
 - e) Define Rectifier. List different types of rectifier.
 - f) State any four applications of LED.
- 5. Attempt any THREE of the following: 12**
- a) Explain working of light emitting diode with suitable diagram giving constructional details of LED.
 - b) Explain working of π filter with suitable diagram.
 - c) Explain with characteristics diagram operation of BJT in cutoff, saturation and Active region.
 - d) Explain significance of α , β , input resistance and output resistance in a transistor.
- 6. Attempt any TWO of the following: 12**
- a) In designing a power supply for dc motor, it is decided to use bridge rectifier. Input AC voltage is 230 V rms.
 - i) State function of rectifier.
 - ii) Identify any two performance parameters. You will look into while selecting components of bridge rectifier.
 - iii) List two components of rectifier.
 - iv) Draw supply voltage wave shape.
 - v) Draw voltage waveshape at rectifier output.
 - vi) Draw waveshape of voltage at motor terminals.

22310

[4]

Marks

- b) A transistor is to be used to put ON and OFF a LED. Develop and draw suitable circuit and explain its operation.
 - c) i) Identify colour coding pattern of a 42 K Ohm resistance. Explain the tolerance band representation on the resistance.
ii) Differentiate between analog and digital ICs.
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