

Course Code: EST130

Course Name: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING
(2019 -Scheme)

PART I : BASIC ELECTRICAL ENGINEERING

Max. Marks: 50

Duration: 90 min

PART A

Answer all questions, each carries 4 marks

Marks

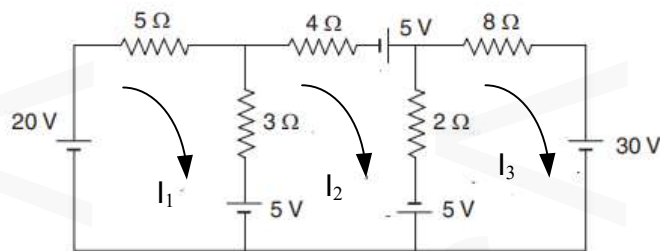
- 1 Derive the expression for energy stored in the inductor. (4)
- 2 A coil of 200 turns carrying a current of 4 A. The magnetic flux linkage with the coil is 0.02 Wb. Calculate the inductance of the coil. If the current is uniformly reversed in 0.02 s, calculate the self-induced emf in the coil. (4)
- 3 Define the following terms: (a) magnetic flux density (b) reluctance (c) magnetic field intensity (d) permeability. (4)
- 4 Draw and explain the phasor diagram and impedance triangle of a series resistive capacitive circuit excited by an AC source. (4)
- 5 With neat sketch and equations explain the variation of voltage, current and power in a pure capacitor excited by an AC source of $v = V_m \sin \omega t$. (4)

PART B

Answer one full question from each module, each question carries 10 marks.

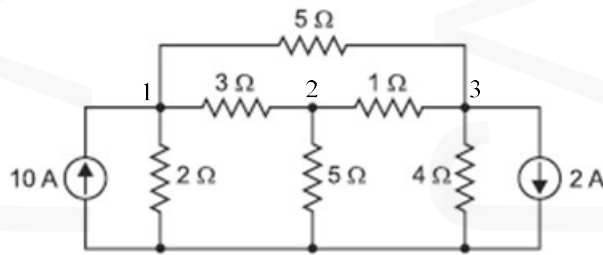
MODULE 1

- 6 Using mesh analysis determine the currents in different resistors. (10)



OR

- 7 Using nodal analysis, determine the voltage across various resistors. (10)



MODULE 2

- 8 a An iron ring of 0.15 m diameter and 0.001 m^2 in cross-section with a saw cut 2 mm wide is wound with 300 turns of wire. The gap flux density is 1T. The relative permeability of the iron is 500. Determine the exciting current and inductance. Ignore leakage and fringing. (6)
- b State and explain Faraday's laws of electromagnetic induction. (4)

OR

- 9 a An alternating voltage is $v = 100\sin 100t$. Find (i) amplitude (ii) frequency (iii) Time period (iv) angular velocity (v) form factor. (6)
- b Determine the RMS and average value of a half wave rectified alternating current. (4)

MODULE 3

- 10 A resistor of 100Ω in series with $50 \mu\text{F}$ capacitor is connected to a supply of 200 V, 50 Hz, single phase ac supply. Determine (a) impedance (b) current (c) power factor (d) voltage across resistor and capacitor. Draw the phasor diagram. (10)

OR

- 11 A balanced star connected load of $(8 + j6) \Omega$ per phase is connected to a 400V, 3 phase, AC supply. Find the (a) the line current (b) power factor (c) total power in watts (d) total reactive power. (10)

PART 2 : BASIC ELECTRONICS ENGINEERING

Max. Marks: 50

Duration: 90 min

PART A

Answer all questions, each carries 4 marks

Marks

- 12 A carbon resistor has colour code blue, orange, red and gold. Find the range of resistance value? (4)
- 13 How an N-type semiconductor is formed? (4)
- 14 Why bridge rectifier is preferred than center tapped full wave rectifier (4)
- 15 Discuss the role of coupling and bypass capacitors in a single stage RC coupled amplifier. (4)
- 16 Explain the principle of an antenna (4)

PART B

Answer one full question from each module, each question carries 10 marks.

MODULE 4

- 17 a. Explain the formation of a potential barrier in a P-N junction diode (6)
- b. Find the resistance and tolerance of each resistance marked using four-band colour code: (i) Yellow, Violet, Red, Silver (ii) Blue, Grey, Gold, Gold. (2)
- c. A $2\mu F$ capacitor is charged by a constant $3\mu A$ charging current for 6 seconds. (a) (2)
How much charge is stored in the capacitor? (b) How much is the voltage across the capacitor?

OR

- 18 a. Explain doping concentration and size of three layers in a transistor with neat diagram (6)
- b. For an npn transistor if the common base current gain is 0.99 and collector current is 20mA, Find the value of base current and emitter current? (4)

MODULE 5

- 19 Draw the block diagram of a DC power supply and mention the functions of each block with waveforms. (10)

OR

- 20 With a neat circuit diagram, explain the working of an RC coupled amplifier and draw its frequency response? (10)

MODULE 6

- 21 a. Define amplitude modulation. Derive an expression for representing amplitude modulated wave. (7)
- b. In an AM modulation, find the total power of AM signal if the carrier power is 100 watts and modulation index is 0.9 (3)

OR

- 22 Explain the concept of cells, frequency reuse and handoff in mobile communication. (10)
