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SAINTGITS COLLEGE OF ENGINEERING
KOTTAYAM, KERALA

(AN AUTONOMOUS COLLEGE AFFILIATED TO
APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER B.TECH DEGREE EXAMINATION(R), MARCH-APRIL 2021

Course Code: **20EST130**

Course Name: **BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING**

Max. Marks: **100** **Duration:** **3 Hours**

PART I BASIC ELECTRICAL ENGINEERING

Part I to be answered in pages 1 to 15

PART A

(Answer all questions. Each question carries 4 marks)

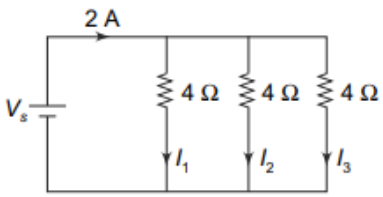
1. State and explain Kirchhoff's laws with an example
2. Define the terms i) Magnetic field strength ii) Reluctance iii) Flux density iv) MMF
3. Find the RMS value of a full wave rectified sine wave having peak value 5A.
4. A10Ω resistor and 0.36H inductor are connected in series to a 230V sinusoidal supply. The circuit current is 2A. Calculate the supply frequency and phase angle between current and voltage.
5. Define active power, Reactive power and apparent power. Draw the power triangle.

PART B

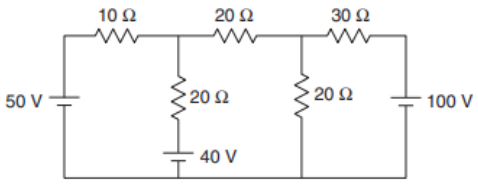
(Answer one full question from each module, each question carries 10 marks)

MODULE I

6. a) Determine the current I_1, I_2, I_3 through each resistor in the figure shown below: (4)

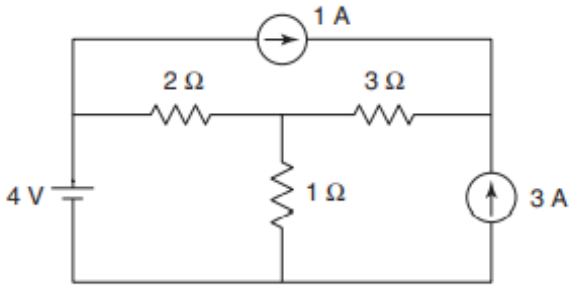


b) Find the current through 10Ω resistor in the figure shown below. Use suitable matrix method. (6)

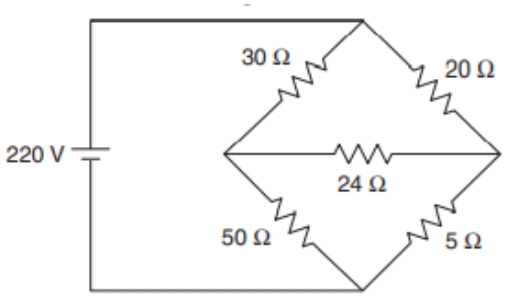


OR

7. a) Find the current in 1Ω resistor using node voltage method. Use matrix method. (6)



b) Using delta star transformation, determine the current supplied from 220V source. (4)



MODULE II

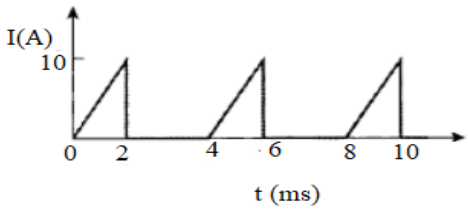
8. a) A ring-shaped electromagnet has an air gap of 3mm and cross-sectional area of 15 cm^2. The mean length of the core (excluding air gap) is 60cm. Calculate the MMF required to produce a flux density of 0.3 Wb/m^2 in the gap. Take the relative permeability of the material as 400. (5)

b) Differentiate between statically and dynamically induced emf with examples. (5)

OR

9. a) Two inductively coupled coil have self-inductances L1 = 100 mH and L2 = 20 mH. If the coefficient of coupling is 0.5, compute the value of mutual inductance between the coils. Define coefficient of coupling also. (4)

b) Find the form factor for the given waveform. (6)



MODULE III

10. A series circuit consisting of a capacitor of 4 μF and a resistance of 200 Ω. An AC source is connected to the circuit which draws a current of 25∠0 mA. The angular frequency of AC source is 200π. Draw the circuit and find (i) the source voltage (ii) the voltage across the capacitor (iii) voltage across the resistor (iv) draw the voltage phasor diagram (v) phase angle. (10)

OR

11. Three inductive coils, each with a resistance of 22 Ω and an inductance of 0.05 H are connected in (i) in star and (ii) in delta, to a three phase 415 V, 50 Hz supply. Calculate for each of the above case (i) phase current and line current and (ii) total power absorbed (10)

PART II BASIC ELECTRONICS ENGINEERING

Part II to be answered in pages 16 to 30

PART C

(Answer all questions. Each question carries 4 marks)

12. List the different types of capacitor. Explain electrolytic capacitor with neat diagram
13. A resistor has color band of Blue Grey Yellow and Gold. What are the minimum and maximum resistance values that can be obtained?
14. Illustrate public address system with suitable block diagram
15. Explain the working of a bridge rectifier
16. Explain super heterodyne AM receiver with suitable block diagram.

PART D

(Answer one full question from each module, each question carries 10 marks)

MODULE IV

17. a) Explain the formation of depletion in a PN junction diode (5)

    b) Draw and explain the V-I characteristics of PN junction diode (5)

OR

18. a) Explain the constructional details of (i)carbon composition fixed resistor (ii) wire wound fixed resistor (5)

    b) Explain about avalanche breakdown in pn junction diodes. (5)

MODULE V

19. a) Explain in detail about three configurations of transistor. Illustrate with necessary diagrams. (6)

    b) Explain the working of an RC coupled amplifier with necessary circuit diagram. (4)

OR

20. a) Explain the working of PNP transistor biased in active region (6)

    b) Show the relationship between current gains of CE and CB Configuration. (4)

MODULE VI

21. Derive expression for AM wave. Also draw and explain the frequency spectrum for the same. (10)

OR

22. Explain in detail about GSM architecture. (10)

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