Register No.: ..... Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER B.TECH DEGREE EXAMINATION (R,S), DECEMBER 2023

(2020 SCHEME)

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)

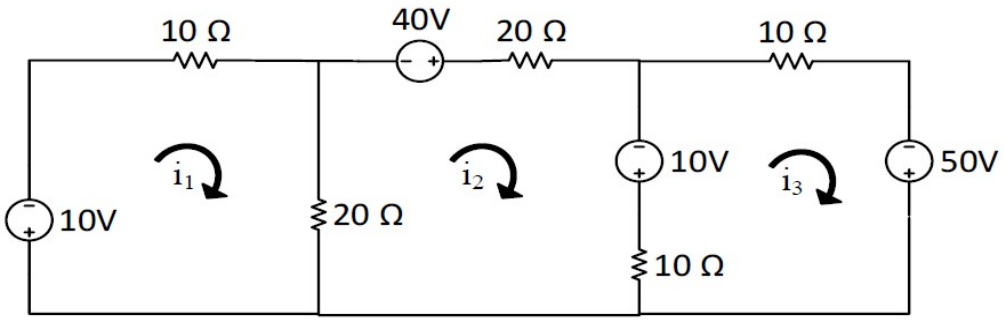
1. Three resistors 6 Ω, 10 Ω and 15 Ω are connected in star configuration. Obtain the equivalent resistances in a delta configuration.
2. State and explain Kirchhoff's law with examples.
3. Two coils, A and B, have self-inductances of 120 μH and 300 μH respectively. A current of 1 A through coil A produces flux linkages of 100 Wb turns in coil B. Calculate (i) the mutual inductance between the coils and (ii) the coupling coefficient.
4. Deduce the relationship between line and phase voltage in a star connected system.
5. An alternating voltage of 100 V is applied across a series RL circuit. If the voltage across the resistor is 70 Ω find (i) voltage across the inductor (ii) power factor.

PART B

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

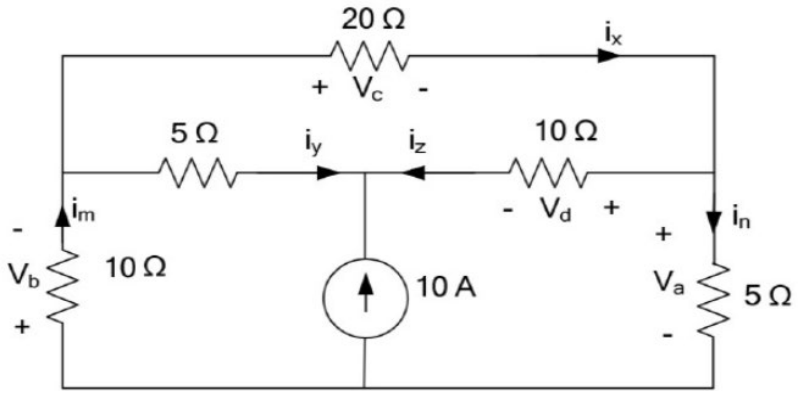
MODULE I

6. Find the mesh currents i_1, i_2, i_3 in the circuit shown below by performing mesh analysis. (10)



OR

7. Find V_a , V_b , V_c, V_d using node analysis for the given network shown below. (10)



MODULE II

8. An iron ring of cross-sectional area 1cm^2 is wound with a coil of 2000 turns. Calculate the magnetising current required to produce a flux of 0.1 mWb in the iron path if mean length of the path is 30cm and relative permeability of iron is 2500. Neglect magnetic leakages and fringing. (10)

OR

9. a) The instantaneous value of an alternating voltage is given by 110sin314t. Find the angular velocity, frequency and time period of the voltage. (6)

   b) Differentiate between statically and dynamically induced emfs. (4)

MODULE III

10. A sinusoidal voltage of $230\angle 15^0$,50 Hz is applied to a series RL circuit containing of R=5Ω and L=0.1 H. Calculate (i) rms current and its phase angle (ii) power factor (iii) average power and (iv) apparent power drawn by the circuit. (10)

OR

11. A balanced three phase load has per phase impedance of 30 +j50 ohm. If the load is connected across 400 V, 3 phase supply, find (i) phase current (ii)line current (iii) power supplied to the load when it is connected in (a) star (b) delta. (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 any four applications of electronics.
13. Specify the nominal value, tolerance, maximum and minimum value of a resistor with colour code yellow, red, orange and gold.
14. Explain the working of a simple zener voltage regulator.

15. Draw and explain the block diagram of a public address system.
16. Explain the term frequency reuse in cellular communication.

PART D

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

MODULE IV

17. a) Explain any three different types of fixed capacitors. (6)
    b) Draw and explain the VI characteristics of a PN junction diode in both forward-biased and reverse-biased conditions. (4)

OR

18. a) Find out the capacitance value in Microfarads, corresponding to the code “103M" printed on a ceramic disc capacitor. (3)
    b) Sketch and explain the input characteristics of a transistor in common emitter configuration. (7)

MODULE V

19. a) Explain the working of a full wave bridge rectifier with necessary circuit diagrams and waveforms. (7)
    b) Draw the block diagram of a DC power supply. (3)

OR

20. Illustrate the working of an RC-coupled amplifier with neat circuit diagram and frequency response. (10)

MODULE VI

21. a) Brief the need for modulation. Explain amplitude modulation with relevant waveforms. (7)
    b) Identify the basic principles of cellular communication. (3)

OR

22. a) Explain the block diagram of a superheterodyne AM receiver. (5)
    b) With a block diagram explain the working of a GSM system. (5)

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