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

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SECOND SEMESTER B.TECH DEGREE EXAMINATION (S), AUGUST 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 of 20 Ω, 30 Ω, and 50 Ω are connected in delta. Obtain the equivalent star network.
2. Mention any four differences between electric and magnetic circuits.
3. State and explain Faraday's laws of electromagnetic induction.
4. Prove that the average power for a purely capacitive circuit is zero.
5. Define active, reactive, and apparent power in an AC circuit with the help of power triangle.

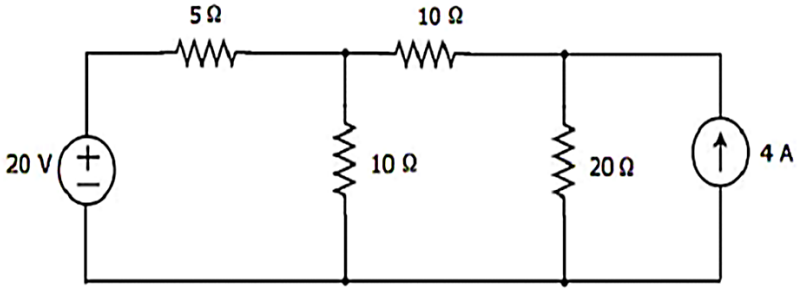
PART B

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

MODULE I

6. a) Derive the expression for energy stored in an inductor. (4)

   b) Using nodal analysis, determine the current flowing through the 20 Ω resistor in the circuit shown below. (6)

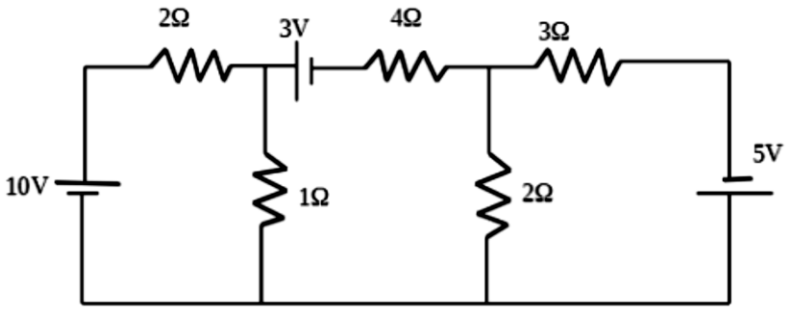


OR

7. a) A resistance R is connected in series with a parallel circuit comprising two resistances of 12 Ω and 8 Ω respectively. The total power dissipated in the circuit is 70W and applied (4)

voltage is 20 V. Calculate R and power consumed by the resistor.

b) Solve the following circuit using mesh current method and compute the power dissipated in the 1 Ω and 3 Ω resistor. (6)



MODULE II

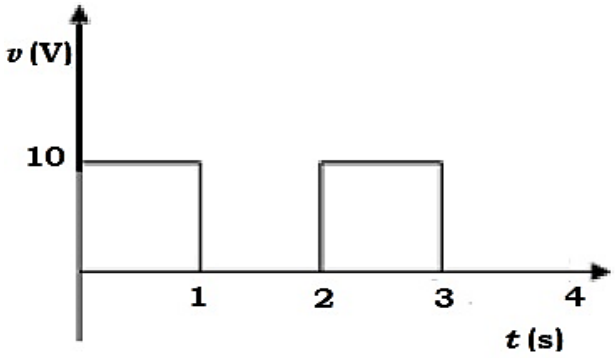
8. a) Distinguish between dynamic and statically induced emf. (4)

b) Two identical coils 'A' and 'B' each having 250 turns lie in parallel planes. When the current in coil 'A' changes at the rate of 250 Amperes/second, it induces an emf of 6 Volts in coil 'B'. Determine the mutual inductance between the coils. (6) If the self-inductance of each coil is 25 mH, calculate the flux produced in coil 'A' per ampere of current and the co-efficient of coupling between the coils.

OR

9. a) Define the terms (i) RMS value, (ii) Form factor, (iii) Peak factor. (4)

b) Determine the form factor of the following waveform. (6)



MODULE III

10. a) With the help of a neat diagram, illustrate how a sinusoidal quantity can be represented by a phasor. (3)

b) A resistance R of 4 Ω and inductance L of 10 mH are connected in series. The circuit is excited by a voltage source of 100 V, 50 Hz. Determine (i) Impedance, (ii) Line current, (iii) Voltage across R and L, (iv) Real power consumed by the resistance, and (v) Power factor. (7)

OR

11. a) A balanced 3 phase star connected load of 120 kW takes a leading current of 100 A when connected across a three phase 3.3kV/50Hz supply. Determine (i) Resistance/phase and Capacitance /phase of the load. (5)

b) Derive the numerical relationship between line and phase currents for a balanced 3-phase delta-connected load. (5)

PART II BASIC ELECTRONICS ENGINEERING

Part II to be answered in pages 16 to 30

PART A

(Answer all questions. Each question carries 4 marks)

12. List the different types of inductors. Explain.
13. A capacitor has color band of Red, Violet, Blue, Green and Yellow. What is the capacitance with tolerance and voltage rating?
14. Illustrate public addressing system with suitable block diagram.
15. Explain the concept of simple voltage regulator.
16. Draw the block diagram of heterodyne receiver.

PART B

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

MODULE IV

17. a) Explain the output characteristics of CE configuration. (5)

b) Explain about breakdown concept which can be used for voltage regulation. (5)

OR

18. a) Explain the principle of operation of PNP transistor. (5)

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

MODULE V

19. a) Explain the working of RC Coupled amplifier with its frequency response. (6)

b) Explain the block diagram of electronic instrumentation system. (4)

OR

20. a) Explain how filter improves DC output content in a power supply. (4)

b) Explain the working of full wave bridge rectifier. (6)

MODULE VI

21. Explain in detail about the principle and block diagram of GSM. (10)

OR

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

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