Register No.: …… Name: ……..

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SECOND SEMESTER B.TECH DEGREE EXAMINATION (S), SEPT 2022

(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)

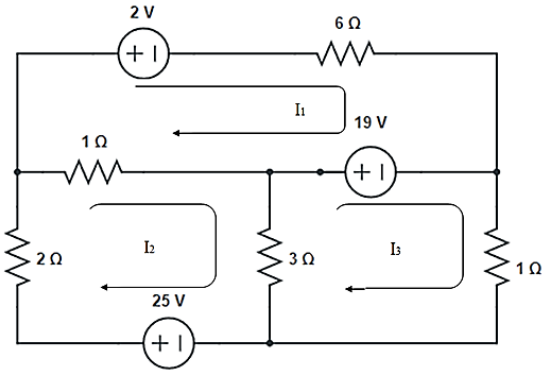
1. Derive the expression for star to delta transformation of a resistive network.
2. Define the terms: MMF, field strength, flux density, reluctance.
3. A coil of inductance 0.08H with negligible resistance is connected in series with 15Ω resistor. The combined circuit is energized from a 240V, 50Hz supply. Calculate the following: (i) Impedance of the circuit, (ii) Current flowing through the circuit, (iii) Power observed by the circuit and (iv) power factor
4. Two coils with a coefficient of coupling of 0.5 between them, are connected in series to magnetize (a) in the same direction having a total inductance of 1.9H and (b) in the opposite direction having a total inductance of 0.7H. Find the self-inductances of the two coils and the mutual inductance between them.
5. Derive the relation between line and phase values of voltage in a three-phase star connected system

PART B

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

MODULE I

6. By using mesh analysis, find the mesh currents I_1, I_2 and I_3 in the network

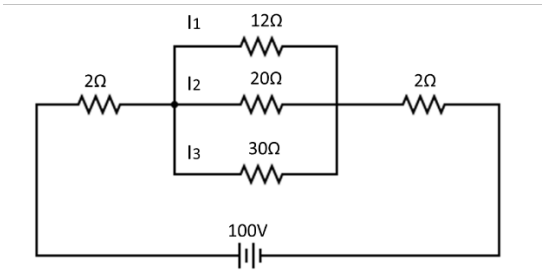


(10)

OR

7. a) Explain the concepts of voltage and current divider rule with neat circuit diagrams. (5)

b) Determine the currents flowing through the parallel branches in the network shown (5)



MODULE II

8. a) State and explain Faraday's laws of electromagnetic induction. (4)

b) A straight conductor having an active length of 20cm, is kept in a uniform magnetic field of 0.5T. Find the emf produced in the conductor when it is moved at a rate of 5m/s, in following three cases. (6)

a) Its motion is parallel to the magnetic field

b) Its motion is perpendicular to the magnetic field

c) Its motion is at an angle of 30^0 to the magnetic field

OR

9. Explain the generation of alternating voltage with neat diagrams and waveform. Also express alternating voltage and current mathematically. (10)

MODULE III

10. a) Define active, reactive and apparent power in RLC series circuit and also draw its power triangle. (4)

b) An emf of 50V, 50Hz is applied to an impedance of $Z_1=(12.5+j21)\ \Omega$. When an impedance Z_2 is added in series with Z_1, the current becomes half of the original, and leads it by 14.2^0. Determine Z_2. (6)

OR

11. A balanced three phase load consists of three coils each having resistance of 20 Ω and inductance 0.5 H. It is connected to a 400 V, 50 Hz, 3-phase AC supply. Determine the phase voltage, phase current, power factor and active power when the loads are connected in (i) star (ii) 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 three specifications of a resistor. A resistor has a color band sequence Yellow, Violet, Orange and Gold. Find its resistance value.
13. With the help of diagrams, explain the role of a capacitor filter in a DC power supply.
14. Explain the working of a simple zener voltage regulator with neat diagram.
15. Differentiate between amplitude and frequency modulation.
16. With a neat block diagram explain public address system.

PART D

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

MODULE IV

17. Explain the working of a P-N junction diode in forward and reverse biasing conditions with the help of V-I graph. (10)

OR

18. a) With the help of neat diagrams, explain the principle of operation of a Bipolar Junction Transistor. (5)
    b) Explain the input and output V-I characteristics of a BJT in common emitter configuration. Indicate the various regions of operation in the output characteristics. (5)

MODULE V

19. What is meant by an instrumentation system? Explain the block diagram of an instrumentation system. (10)

OR

20. a) Give the circuit diagram of a common emitter RC coupled amplifier and explain its working. Explain the role of each component in the circuit. (6)
    b) Give the frequency response curve of an RC coupled amplifier in CE configuration. Explain the reason for the variation in gain of the amplifier at low and high frequencies. (4)

MODULE VI

21. a) Explain AM with necessary waveforms. (5)
    b) With a neat block diagram, explain the working of a superheterodyne AM receiver. (5)

OR

22. a) Explain the concept of frequency reuse in cellular mobile communication. (4)
    b) Define GSM. With the help of block diagram, explain the principle of operation of GSM (6)

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