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

SAINTGITS COLLEGE OF ENGINEERING
KOTTAYAM, KERALA

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

FIRST SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2022

Course Code: 20EST130

Course Name: BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

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

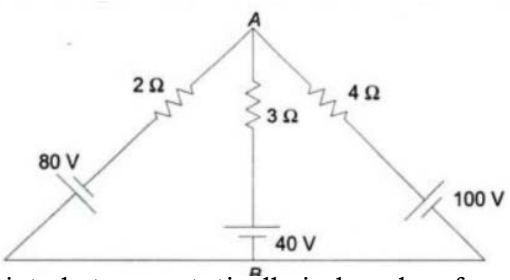
PART I BASIC ELECTRICAL ENGINEERING

Part I to be answered in pages 1 to 15

PART A

(Answer all questions. Each question carries4 marks)

1. State and explain Kirchhoff's laws.
2. In the figure shown, use mesh analysis to find out the current through the 4Ω resistor.



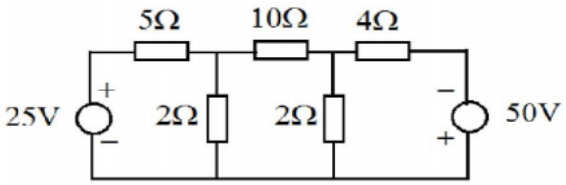
3. Differentiate between statically induced emf and dynamically induced emf
4. An alternating current is represented by i(t)=200sin(314t). Find the i) RMS value ii) frequency and ii) instantaneous value of current when t=3ms.
5. List the advantages of three phase system over single-phase system.

PART B

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

MODULE I

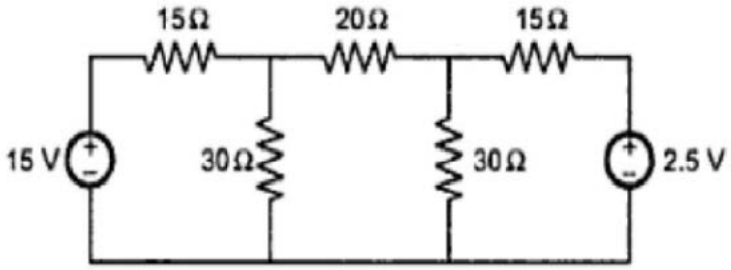
6. a) For the figure shown, find the voltage across 10 Ω resistor using mesh analysis. (6)



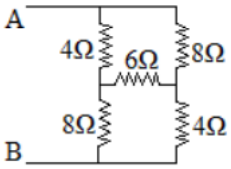
b) Derive the expression for energy stored in an inductor. (4)

OR

7. a) Find the current through 20 Ω resistor shown in the figure by using nodal analysis. (6)



b) Find the equivalent resistance R_{AB}. (4)



MODULE II

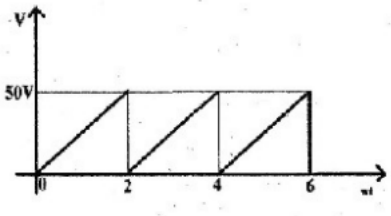
8. a) A steel ring, 30 cm mean diameter, has an air gap of 1mm long. It is wound uniformly with 600 turns of wire carrying a current of 2.5 A. Neglect magnetic leakages. The iron path has about 40% of the total mmf. Estimate the values of mmf in air gap, magnetic flux in iron path, reluctance of iron path and flux density in air gap. (6)

b) Compare electric and magnetic circuits in terms of any two similarities and two differences. (4)

OR

9. a) What is meant by the terms rms value, average value, peak factor and form factor in connection with periodic waveforms. (4)

b) Determine the form factor of the sawtooth waveform given in figure. (6)



MODULE III

10. a) Prove that the power consumed in a pure capacitor circuit is zero. (4)

b) A current of 5 A flows through a non-inductive resistance in series with a choke coil when supplied at 250V, 50 Hz. If the voltage across the resistance is 125V and that of the coil is 200V, calculate: (6)

i. Impedance, reactance and resistance of the coil.
ii. Power absorbed by the coil
iii. Total power

OR

11. a) Derive the relation between phase values of current and voltage of a delta connected 3 phase circuit to the line values with the help of phasor diagram. (5)

b) Calculate the phase and line values of voltage and current in a 3-phase star connected balanced network with phase impedance (6+j10) Ω and supply voltage 100 V, 50 Hz. (5)

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. Point out the various specifications of resistors. The color coding of a resistor is Brown, Grey, Yellow, Silver. Calculate and specify the range of values of the resistor.
13. Differentiate between Zener breakdown and Avalanche breakdown.
14. Illustrate and explain briefly the working of a full wave bridge rectifier.
15. With the help of a neat block diagram, describe a public address system.
16. Discuss the need for modulation.

PART D

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

MODULE IV

17. a) Paraphrase potentiometer, preset and LDR. (6)

    b) Describe Mica capacitor and Electrolytic capacitor. (4)

OR

18. a) Explain the working of a PN junction, when forward biased and reverse biased. (6)

    b) Sketch and describe the input and output characteristics of a common emitter transistor. (4)

MODULE V

19. a) Discuss line and load regulation of a Zener diode voltage regulator. (5)

    b) Using a block diagram, explain the working of an instrumentation system. (5)

OR

20. a) Sketch the circuit of an RC coupled amplifier and justify its output waveform. Bring forth the role of the bypass capacitor used in the circuit. (5)
    b) Draw the frequency response of an RC coupled amplifier and explain why gain roll-off happens at lower and higher frequencies. (5)

MODULE VI

21. a) Discuss the principle of working of antennas. (4)

    b) Derive the expression for an amplitude modulated wave. Draw the block diagram of an AM super heterodyne receiver. (6)

OR

22. a) State the steps involved in the process of establishing a call between two cell phones. (4)

    b) Draw and explain in detail the architecture of GSM. (6)

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