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SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER B.TECH DEGREE EXAMINATION (S, FE), NOVEMBER 2024

(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. Explain how to solve mesh analysis using an example.
2. The equation of an alternating current is i(t) = 60 sin 314t. Determine i) the maximum value ii) frequency iii) RMS value and iv) average value.
3. Define power factor in an AC circuit and explain its significance.
4. Three resistances of values 4,6 and 8 ohms are connected in series across a 36 V DC supply. Calculate (i) the total resistance of the circuit (ii) the total current in the circuit (iii) voltage drop across each resistance.
5. Differentiate between statically induced and dynamically induced emf. Provide examples for both.

PART B

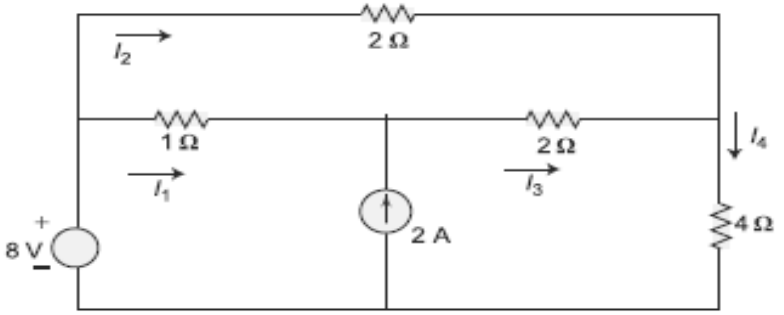
(Answer one full question from each module, each question carries 10 marks)

MODULE I

a) Explain the V-I relationship in a capacitor. 4

b) Derive an expression for the energy stored in an inductor. 6

7. Apply nodal analysis to determine the currents in all branches of the circuit. 10



MODULE II

8. a) An iron ring of 10 cm diameter and 15 cm2 cross section is wound with 250 turns of wire for a flux density of 1.5 Wb/m2 and permeability 500. Find the exciting current, the self inductance and stored energy. 5

b) For the same circuit in part (a), determine the exciting current, self inductance and the stored 5

energy if the circuit has a 2 mm air gap.

OR

9. Elucidate the following terms in a magnetic circuit giving suitable equations : 10
(a) Magnetomotive force (b) Magnetic Field Strength (c) Reluctance (d) Magnetic flux density (e) Magnetic flux

MODULE III

10. a) Explain the star connected three phase circuit. Write the expressions for the line voltage and current in terms of phase values. 5
b) A balanced star connected load of (8 + j6) Ω per phase is connected to a three phase 400 V supply. Find the line current, power factor, active power, reactive power, and apparent power. 5

OR

11. a) A voltage of v = 100 sin (314t) is applied across a resistance and inductance connected in series. A current of 10 sin (314t - 30°) flows through the circuit. Determine the resistance, inductance and power factor of the circuit. 5
b) A pure resistance of 50 Ω is connected in series with a capacitor of 100 μF across a 230 V, 50 Hz supply. Determine the (i) impedance, (ii) current, (iii) power factor and (iv) voltage across resistor and capacitor. 5

PART II: Basic Electronics Engineering

Part I to be answered in pages 16 to 30

PART A

(Answer all questions. Each question carries 4 marks)

12. Why is the forward voltage drop across a PN junction diode relatively constant over a wide range of forward currents?

13. What is the need of a voltage divider in an RC coupled amplifier?

14. Explain frequency reuse in mobile communication.

15. Explain Alpha and Beta of a BJT. Derive relationship between them.

16. Differentiate between a Rectifier and a Regulator.

PART B

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

MODULE I

17. Compare and contrast the different types of resistors commonly used in electronic circuits. Explain the specific applications where each type of resistor might be preferred. 10

OR

18. Differentiate between ceramic and electrolytic capacitors. Explain the key features and specifications of these capacitors. 10

MODULE II

19. Explain the working of simple zener voltage regulator. 10

OR

20. Explain the working of RC coupled amplifier with necessary diagrams. 10

MODULE III

21. Explain the working of a Superheterodyne receiver with a necessary block diagram. Describe the functions of each block. 10

OR

22. a) What is Amplitude modulation? Explain with necessary waveforms. 4
b) Derive the mathematical representation of an AM wave. 6

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