

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

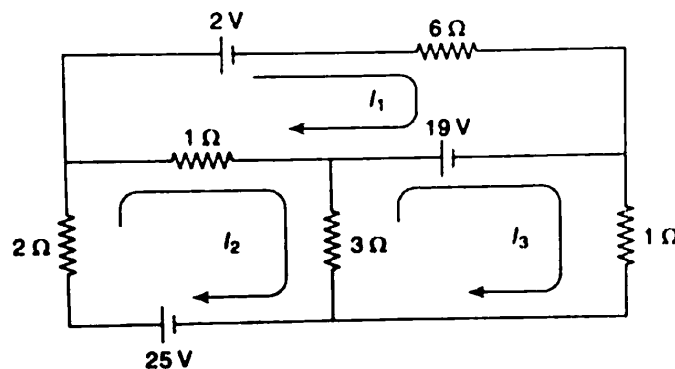
(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER B.TECH DEGREE EXAMINATION (S), FEBRUARY 2023**(2020 SCHEME)****Course Code: 20EST130****Course Name: Basics of Electrical and Electronics Engineering****Max. Marks: 60****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 the concepts of voltage and current divider rule with neat circuit diagrams.
2. Derive the expression for energy stored in capacitor.
3. A coil of 300 turns and resistance of 10 ohm is wound uniformly over a steel ring of mean circumference 30 cm, cross sectional area 9 cm². It is connected to a supply of 20 V. If relative permeability is 1500. Find (i) H and (ii) Reluctance of magnetic coil.
4. State and explain Faraday's laws of electromagnetic induction.
5. Derive the relation between line and phase values of current in a three-phase delta connected system.

PART B*(Answer one full question from each module, each question carries 10 marks)***MODULE I**

6. By mesh analysis, find mesh currents I_1 , I_2 and I_3 for the given network.



(10)

OR

7. a) State and explain Kirchhoff's voltage and current laws with neat diagrams. (6)
- b) Four resistances of ohmic values 5Ω, 10Ω, 15Ω and 20Ω are (4)

connected in series across 100V source. How is the voltage divided among the given resistors?

MODULE II

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

OR

9. a) Derive the expression for coefficient of coupling (4)
b) The total inductance of two coils, A and B, when connected in series, is 0.5 H or 0.2 H, depending on the relative directions of the current in the coils. Coil A, when isolated from coil B, has a self-inductance of 0.2 H. Calculate (6)
(i) the mutual inductance between the two coils
(ii) the self-inductance of coil B
(iii) the coupling factor between the coils.
(iv) the two possible values of the induced e.m.f. in coil A when the current is decreasing at 1000 A per second in the series circuit.

MODULE III

10. a) A 60 Hz sinusoidal voltage $v = 141 \sin \omega t$ is applied to a series R-L circuit. The values of the resistance and the inductance are 3Ω and 0.0106 H respectively. (6)
(i) Compute the r.m.s. value of the current in the circuit and its phase angle with respect to the voltage.
(ii) Write the expression for the instantaneous current in the circuit.
(iii) Compute the r.m.s. value and the phase of the voltages appearing across the resistance and the inductance.
(iv) Find the average power dissipated by the circuit.
(v) Calculate the p.f. of the circuit.
b) What is three phase balanced system? What are the advantages of three phase system over single-phase system? (4)

OR

11. a) A delta connected balanced 3 phase load is supplied from a 3 phase, 400 V supply. The line current is 20A and the power taken by the load is 10,000W. Find (i) impedance in each branch (ii) the line current and (iii) power factor. (6)
b) A 120V, 100W lamp is connected to a 220V, 50Hz AC supply. What value of pure inductance should be connected in series in order to run the lamp on the rated voltage? (4)

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 the specifications, standard values and colour coding of a resistor.
13. Summarize avalanche breakdown.
14. Explain the working of Zener voltage regulator.
15. Explain the working of capacitor filter.
16. Differentiate between Amplitude modulation and frequency modulation.

PART D*(Answer one full question from each module, each question carries 10 marks)***MODULE IV**

17. a) Outline the principle of operation of PN junction diode. (5)
- b) Explain the input-output characteristics of Bipolar Junction Transistor in Common Emitter configuration. (5)

OR

18. a) Explain with diagram the principle of operation of PNP transistor. (6)
- b) Rephrase the evolution of electronics from vacuum tubes to nano electronics. (4)

MODULE V

19. a) Explain the block diagram of a dc power supply. (5)
- b) With block diagram, summarize the electronic instrumentation system. (5)

OR

20. a) With neat circuit diagram, explain the working of RC coupled amplifier. (5)
- b) Outline the working of Full wave bridge rectifier. (5)

MODULE VI

21. a) With the help of block diagram, brief the working of super heterodyne receiver. (6)
- b) Explain the principle of operation of antenna in communication system. (4)

OR

22. a) With neat diagram, identify the GSM communication system. (5)
- b) Rephrase the basic principles of cellular communication systems. (5)
