

Time:3hours Max.Marks:75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(25 Marks)

- State Thevenin's theorem. [2]
- What is meant by apparent power? [2]
- Why are copper losses more in a transformer? [2]
- What is the necessity of a rotating magnetic field in the induction motor? [2]
- What is the difference between a fuse unit and a switch fuse unit? [2]
- What is meant by capacitor charging current, obtain its expression in terms of time constant in case of an RC circuit? [3]
- An alternating voltage $e = 300 \sin(\omega t + \frac{\pi}{4})$, what is its instantaneous voltage at $t = 10$ ms for 50 Hz frequency? [3]
- What is the difference between an ideal transformer and a practical transformer? [3]
- What are the advantages of armature winding placed in its stator? [3]
- What are the characteristics of batteries for longer life? [3]

PART-B

(50 Marks)

2.a)

State Kirchhoff's Current Law and Voltage Law, determine the values for I_x and V_y in the following given circuit shown in figure 1.

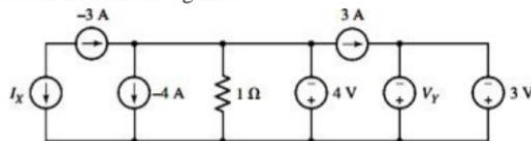


Figure:1

b) In the following given circuit shown in figure 2, calculate the v_1, v_2 and v_3 delivered to R_1, R_2 and R_3 .

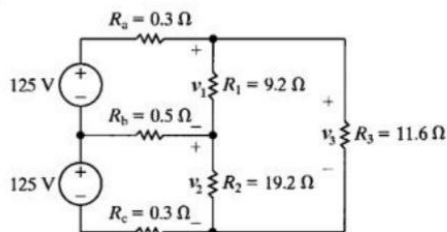


Figure: 2

[5+5]

Figure:1

- b) In the following given circuit shown in figure 2, calculate i) v_1, v_2 and v_3 delivered to R_1, R_2 and R_3 .

ii) power [5+5]

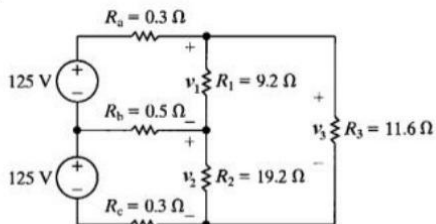
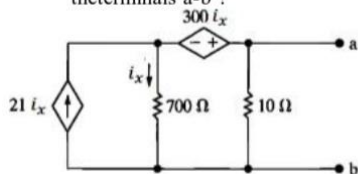


Figure: 2

- 3.a) Find the Norton equivalent circuit of the following given circuit shown in figure 3 with respect to the terminals 'a-b'?



OR

- b) State and explain superposition theorem. [5+5]
- 4.a) Describe phasor representation of RL series circuit? If admittance of a series circuit is $(0.010 + j0.004)$ S. Determine the values of the circuit components for the frequency value of 50 Hz?
- b) Balanced Y-connected load of 10 kW at 0.8 power factor lagging supplied by a 50-Hz, 300-V, three-phase system. Find the line current delivered by the source. Draw the phasor diagram. [5+5]

OR

- 5.a) Explain how the sinusoidal waveform is represented as phasor quantity with example.
- b) A coil is connected in series with a capacitor of $20 \mu\text{F}$ to a 200 V variable frequency supply. The current is a maximum at 50 A, when the frequency is set to 50 Hz. Determine the resistance and inductance of the coil. [5+5]
- 6.a) Draw and explain the phasor diagram of single phase transformer on lagging load.
- b) A 50 kVA, 1000/10000 V, 50 Hz single phase transformer has a iron loss of 1200 W. The copper loss with 5 A in the high voltage winding is 500 W. Calculate the efficiency at
i) 25%, ii) 50% iii) 100% of normal load at power factor of 0.8. [5+5]

OR

- 7.a) Describe the principle of operation of an auto transformer, what is the saving of copper in this transformer when compared with two winding transformer?
- b) Discuss the various three phase transformer groups and their significance? [5+5]
- 8.a) Describe the constructional details of three phase slip ring induction motor.
- b) Describe the torque speed characteristics of separately excited dc motor. [5+5]
- 9.a) What are the various losses occur in the three phase induction motor in their operation?

OR

- b) Describe briefly construction details of any three phase synchronous generator? [5+5]
- 10.a) Describe the operation of ELCB with its schematic diagram.
- b) What are the drawbacks of low power factor, describe how it is improved? [5+5]

OR

- 11.a) What is the difference between MCB and MCCB, describe their schematic diagrams?
- b) Calculate total energy consumed per day by the use of following loads:
i) Number of 40 W light operated 5 hours per day
ii) 1 h.p. motor is operated 2 hours per day
iii) 1 k.W. heater is operated 1 hour per day
iv) 1 computer is used for 6 hours per day with printer about 30 minutes. [5+5]

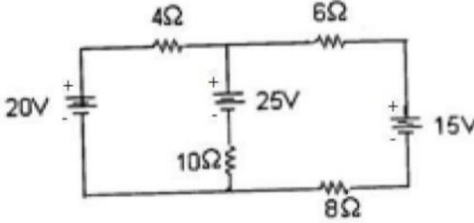


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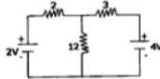
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech I Year I Semester Examinations, July - 2021
BASIC ELECTRICAL ENGINEERING
 (Common to EEE, CSE, IT, CSIT, ITE, CE(SE), CSE(CS), CSE(DS), CSE(Networks))
Time: 3 hours
Max. Marks: 75
Answer any five questions
All questions carry equal marks

- 1.a) State and explain the Kirchhoff's laws.
- b) By applying Kirchhoff's laws, determine the current through all the elements in the circuit as shown in the figure 1.



[6+9]
Figure: 1

- 2.a) State and explain Thevenin's theorem.
- b) Using superposition theorem, determine the current through 3 ohm resistor shown in following figure 2 (All resistance are in ohms).



[7+8]
Figure: 2

- 3.a) Define the following terms:
 - i) Cycle ii) Amplitude iii) R.M.S value and iv) Average value of an alternating quantity.
- b) A coil having a resistance of 10 ohms and an inductance of 0.2H is connected in series with a 100×10^{-6} F capacitor across a 230V, 50Hz, determine i) The active and reactive components of the current and power. ii) The voltage across the coil, Draw the phasor diagram.
- [6+9]
- 4.a) What are the advantages of polyphase system?
- b) Determine the line and phase current of the load, when a delta connected balanced load with an impedance of $(25+j15)$ ohms is connected to 230V, three phase balanced supply in positive sequence.
- [6+9]
- 5(a) Develop the equivalent circuit of a single phase transformer.
- b) A 220/440 V single phase transformer has 1000 turns on primary. The maximum flux density in the core is 1.2 Wb/m². Calculate the number of turns on secondary, area of cross section and maximum flux in the core.
- [6+9]
- 6.a) Explain the different 3-phase transformers connections with neat diagram.
- b) The core of a 100 kVA, 11000/550V, 50 Hz, single phase core type transformer has a cross section of 20cm × 20 cm. Determine i) the number of H.V. and L.V turns per phase and ii) the e.m.f. per turn, if the maximum core density is 1.3 tesla.
- [8+7]
- 7.a) Explain the speed control of 3-phase induction motor.
- b) A 6-pole, 100 HP, 3-phase, 440-V, 50Hz induction motor has a slip of 5% on full load. Calculate the speed of the motor?
- [9+6]
- 8.a) Describe the miniature circuit breaker with neat diagrams.
- b) Explain different types of wires used in electrical wiring.
- [7+8]

