

Code No: 151AG

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year I Semester Examinations, May/June - 2019

BASIC ELECTRICAL ENGINEERING

(Common to EEE, CSE, IT)

Time: 3 hours

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)

- 1.a) State Thevenin's theorem. [2]
- b) What is meant by apparent power? [2]
- c) Why the copper losses are more in a transformer? [2]
- d) What is necessity of rotating magnetic field in the induction motor? [2]
- e) What is the difference between fuse unit and switch fuse unit? [2]
- f) What is meant by capacitor charging current, obtain its expression in terms of its time constant in case of R-C circuit? [3]
- g) An alternating voltage $e_1 = 300 \sin\left(\omega t + \frac{\pi}{3}\right)$, what is its instantaneous voltage at $t = 5$ ms and 10 ms for 50 Hz frequency? [3]
- h) What is the difference between ideal transformer and practical transformer? [3]
- i) What are the advantages of armature winding placing in its stator? [3]
- j) What are the characteristics of batteries for longer life? [3]

PART-B

(50 Marks)

- 2.a) State Kirchhoff Current Law and Voltage law, determine the values for I_X and V_Y in the following given circuit shown in figure 1.

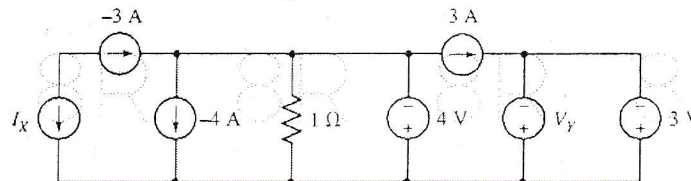


Figure: 1

- b) In the following given circuit shown in figure 2, calculate i) v_1, v_2 and v_3 ii) power delivered to R_1, R_2 and R_3 . [5+5]

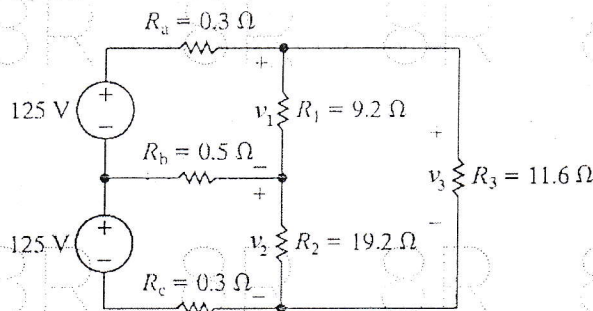


Figure: 2

OR

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

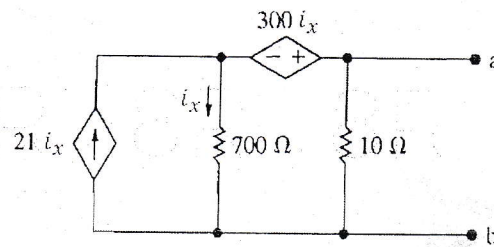


Figure: 3

- 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, 50Hz single phase transformer has iron loss of 1200W. 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 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]
- OR
- 9.a) What are the various losses occurs in the three phase induction motor in their operation?
- 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) 5 number of 40 W lights 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]