

March 2023

B.Tech. - 1st SEMESTER

Basic Electrical Technology (ESC-101A)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.
2. Answer any four questions from Part-B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.
4. Assume data if missing.

PART-A

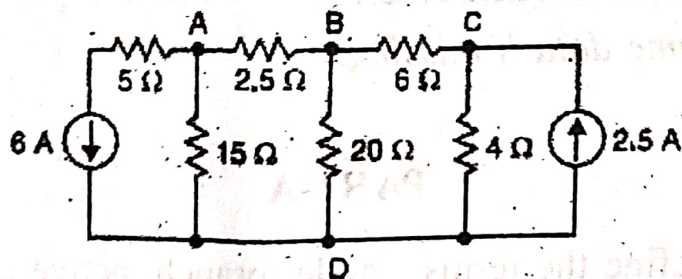
1. (a) Define the terms : node, branch, active element and passive element. (1.5)
- (b) State superposition theorem. (1.5)
- (c) Define the terms: active power, reactive power and apparent power. (1.5)
- (d) An alternating voltage is given by $v = 200 \sin 314 t$. Find its rms value, maximum value and frequency. (1.5)

020102/1340/111/3

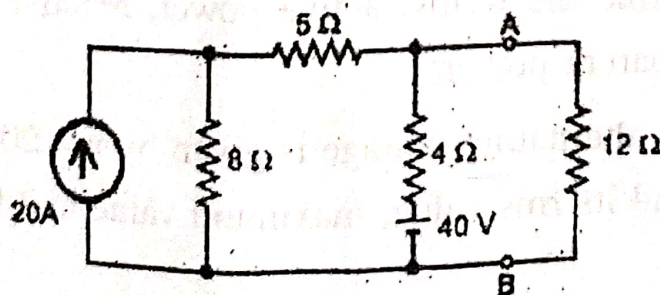
385 [P.T.O.

- (e) What do you understand by the balanced load in three phase system? (1.5)
- (f) What are the effects on wattmeter readings in two wattmeter method of power measurement for three phase system if the load power factor is unity? (1.5)
- (g) Why transformer cores are laminated? (1.5)
- (h) Define the term voltage regulation for transformer. (1.5)
- (i) What is the function of damper winding in the three phase synchronous motor? (1.5)
- (j) Why earthing is provided in the electrical system? (1.5)

2. (a) For the given circuit determine current in each branch using node analysis. (7.5)



- (b) Determine the Thevenin's and Norton's equivalent for the given circuit across terminal AB. (7.5)



020102/1340/111/3

3. (a) Find the average value, r.m.s. value, form factor and peak factor for full wave rectified alternating current. (7.5)
- (b) A coil of resistance 50Ω and inductance 318 mH is connected in parallel with a circuit consisting of a 75Ω resistor in series with a $159 \mu\text{F}$ capacitor. The circuit is connected to a 230 V , 50 Hz supply. Determine the supply current and circuit power factor. (7.5)
4. (a) What are the advantages of three phase ac system over single phase ac system? Derive the relationship between "line voltage and phase voltage" and "line current and phase current" related to three phase delta connection. (7.5)
- (b) Two-wattmeter method is used to measure the power taken by a 3-phase induction motor on no load. The wattmeter readings are 375 W and -50 W . Calculate (i) power factor of the motor at no load (ii) phase difference of voltage and current in two wattmeters (iii) reactive power taken by the load. (7.5)
5. (a) Explain working of single phase transformer at no load and on load condition. Draw the phasor diagram for single phase transformer with lagging power factor load condition. (7.5)

(b) Discuss in brief about auto transformer. Differentiate between two winding transformer and auto transformer. (7.5)

6. (a) Enlist various parts of a DC machine and explain the function of each part. (7.5)

(b) Explain the working of three phase induction motor with suitable diagrams. Also, define the term 'slip'. (7.5)

7. (a) Describe with suitable diagram the construction and working of earth leakage circuit breaker. (7.5)

(b) Define the term power factor. What are the disadvantages of low power factor? Explain various methods of power factor improvement. (7.5)