

STESC103 - Basics of Electrical & Electronics Engineering

P. Pages : 3

Time : Three Hours



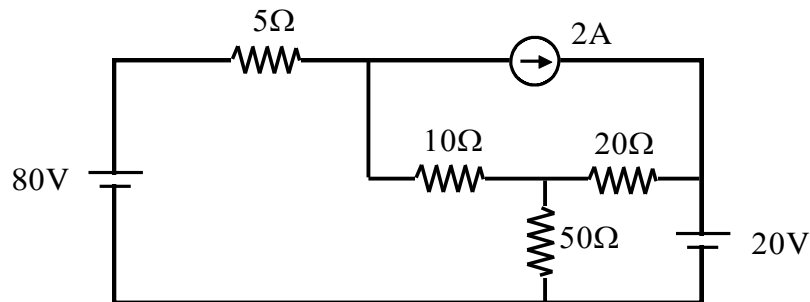
GUG/W/24/16154

Max. Marks : 80

- Notes :
1. All questions carry equal marks.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Assume suitable data wherever necessary.
 4. Illustrate your answers wherever necessary with the help of neat sketches.
 5. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted.

1. a) Calculate the branch current using superposition theorem?

8



- b) State and explain KCL and AVL with one suitable example?

8

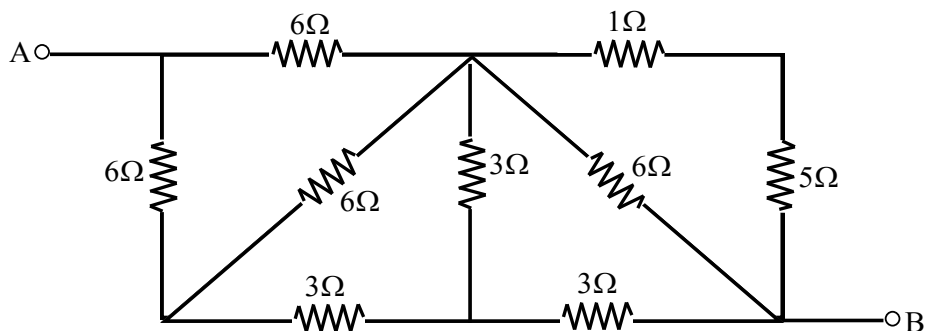
OR

2. a) Illustrate the types of sources used in electrical network. Write down the difference between ideal and practical sources used in the electrical network? Explain with a suitable diagram how we can convert current source into voltage source.

8

- b) Calculate the equivalent resistance across terminals A and B? Using star-Delta Transformation?

8



3. a) Why do we choose sinusoidal wave rather than a simple curve such as a square or triangle wave? Write down the difference between AC and DC quantities?

4

- b) Define the following terms refer to sinusoidal waveforms? 4
- i) Cycle
 - ii) Amplitude
 - iii) Time period
 - iv) Frequency

- c) An alternating voltage is represented by $v = 243 \sin 369t$, find 8
- i) Maximum value
 - ii) Frequency
 - iii) Time period
 - iv) Instantaneous value of voltage when t is 5ms
 - v) Angular velocity

OR

4. a) Explain the series R-L-C circuit with suitable Phasor diagrams? 8

- b) A three-phase power system with a line voltage of 400V is supplying a delta connected load of 1500W at 0.8 pf lagging. Determine the phase and line current and also the phase impedance. 8

5. a) Explain the working Principle and Derive the EMF expression for Transformer? 8

- b) Draw and explain briefly with the help of neat sketch the circuit model of the transformer referred to primary side, explain every parameter involved in it. 8

OR

6. a) Illustrate various similarity and dissimilarity between ideal and practical transformer. Also explain why transformer is rated in KVA not in KW? 6

- b) The emf per turn of a single phase 2200/220 V, 50 Hz transformer is 12V. Calculate: 6
- i) The number of primary and secondary winding turns,
 - ii) The net cross-sectional area of core for a maximum flux density of 1.5T.

- c) Why transformer cannot be operated using DC supply, explain briefly. 4

7. a) Explain briefly working of PN junction diode? Also explain application of diode as a half wave rectifier with neat circuit diagram and waveform? 8

- b) Derive the Gain of Non-inverting and inverting Op-amp? 8

OR

8. a) Differentiate the intrinsic and Extrinsic semiconductor? Explain the application of diode as full wave rectifier with circuit diag and waveform? 8

- b) Explain the application of op-amp as integrator and differentiator? 8

9. a) Convert Binary to decimal number for the following examples. 4
i) $(111.101)_2$
ii) $(10101)_2$
- b) Convert Binary to octal numbers for the following examples. 4
i) $(101110011)_2$
ii) $(101001110110)_2$
- c) Derive all basic gates by using universal Gates with truth table? 8

OR

10. a) Convert this hexadecimal to equivalent decimal number? 4
i) $(3AF)_{16}$
ii) $(A0F9)_{16}$
- b) Convert this decimal number into its equivalent Hexadecimal number? 4
i) $(675)_{10}$
ii) $(378)_{10}$
- c) Write down the truth table with its symbol for the following gates. 8
i) Ex-NOR
ii) EX-OR
iii) NAND
iv) NOR
