

B.Tech. / B.E. (Model Curriculum) Semester-I & II
ESC101 - Basic Electrical Engineering

P. Pages : 3

Time : Three Hours

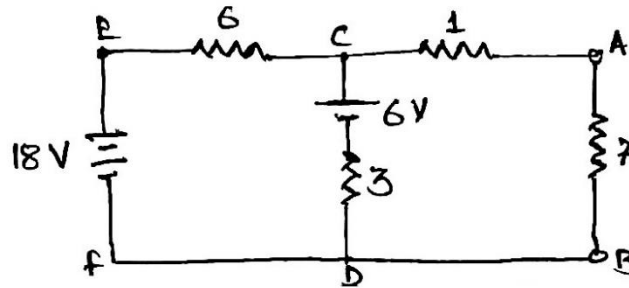


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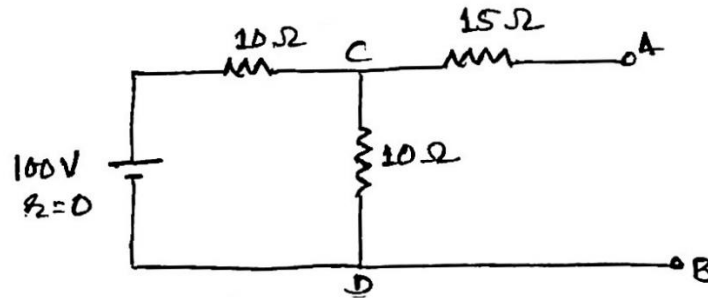
Max. Marks : 80

- 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.
 6. Non programmable calculator is permitted.

1. a) Using Thevenin's theorem, calculate the p.d. across terminals A and B in the following figure. 6



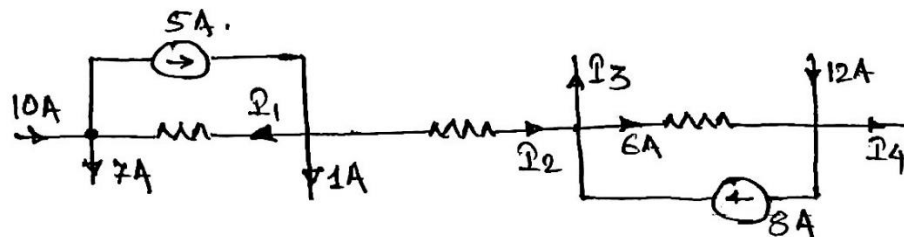
- b) State Norton's theorem and from the given circuit find the constant current equivalent using Norton's theorem. 6



- c) State steps to Nortonize a given circuit. 4

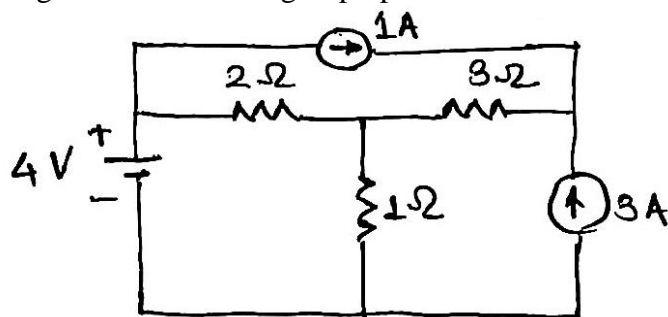
OR

2. a) Using Kirchhoff's current law, find the values of the unknown currents in the given figure. 6



- b) Find the current through 1Ω resistor using Superposition theorem.

6



- c) State steps to Thevenize a given circuit.

4

3. a) Explain RLC series circuit and resonance in detail with suitable diagrams wherever required.

10

- b) A resistance of 20Ω , an inductance of 0.2H and a capacitance of $100\mu\text{F}$ are connected in series across 220V , 50Hz mains. Determine the following.

6

- | | |
|--------------------------------|---------------------------|
| i) Impedance | ii) Current |
| iii) Voltage across R, L and C | iv) Power in watts and VA |
| v) P.f. and angle of lag. | |

OR

4. a) Define –

6

- | | |
|----------------|-----------------|
| i) Waveform | ii) Cycle |
| iii) Amplitude | iv) Time period |
| v) Frequency | vi) Phase |

Draw suitable diagram representing all the above mentioned terms.

- b) Explain production and representation of sinusoidal waveform. With neat and clean diagrams.

10

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

8

- b) The emf per turn of a single phase $1100/110\text{V}$, 50Hz transformer is 12V . Calculate-

8

- | |
|--|
| i) the number of primary and secondary winding turns, |
| ii) the net cross-sectional area of core for a maximum flux density of 1.2T . |

OR

6. a) Discuss types of Magnetic material and BH curve in detail.

8

- b) A 500kVA transformer has 97% efficiency at full load and also at 70% of full load both at 0.8 (lagging) power factor, evaluate

8

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|---|
| i) Different transformer losses. |
| ii) Determine the transformer efficiency at 75% full load, unity power factor. |

7. a) A 3-phase induction motor is wound for 4 pole and is supplied from 50 Hz system. 8
Calculate –
i) the synchronous speed
ii) speed of the motor when slip is 3%
iii) the rotor current frequency when the motor runs at 900 rpm.
- b) Discuss construction and working of single phase induction motor. 8

OR

8. a) A 4 pole 220V shunt motor has 540 lap wound conductors. It takes 32 Amps from the supply mains and develops output power of 5.595 kw. The field winding takes 1 Amp. The armature resistance is 0.09 ohm and the flux per pole is 30 m Wb. 8
- b) Discuss construction and working of Synchronous generator. 8
9. a) State type of Electrical Earthing system and explain pipe earthing in detail, with suitable diagram. 8
- b) Explain construction and working of a diode. 8

OR

10. a) State type of electrical earthing system and explain plate earthing in detail, with suitable diagram. 8
- b) Explain any two of the following with the help of neat and clean diagram. 8
i) SFU
ii) MCB
iii) ELCB
