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C16-EE–303

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BOARD DIPLOMA EXAMINATION, (C-16)

AUGUST/SEPTEMBER—2021

DEEE - THIRD SEMESTER EXAMINATION

ELECTRICAL CIRCUITS

Time : 3 hours] [Total Marks : 80

PART—A

3×10=30

Instructions : (1) Answer all questions.

(2) Each question carries three marks.

(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. State the methods for measurement of high resistances.

2. Define the terms (a) branch, (b) Loop and (c) Junction.

3. State Kirchhoff's laws.

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4. State superposition theorem.

5. Define the terms (a) instantaneous value, (b) cycle and (c) time period of an alternating quantity.

6. Derive the relation between voltage and current in a pure capacitive circuit when AC supply is applied.

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7. Define series resonance and state the expression for resonance frequency.

8. Two circuits having impedances of Zl = (6 + j8)Ω and Z2 = (10 – j8)Ω are connected in parallel across an AC supply. Calculate the admittance of the combination.

9. Write the relation between line and phase values of current and voltage in 3-phase (i) star connected circuit and (ii) delta connected circuit.

10. List any three advantages of 3-phase system over single phase system.

PART—B

Instructions : (1) Answer any five questions.

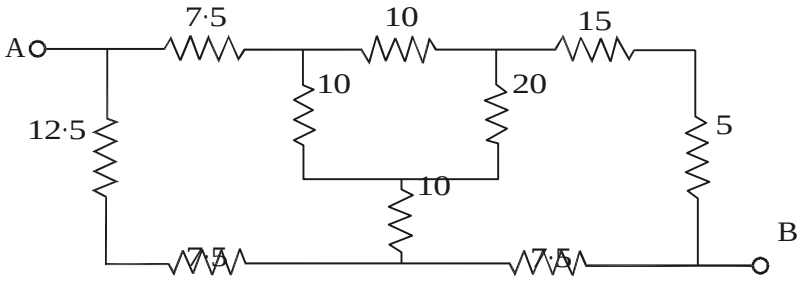
(2) Each question carries ten marks.

(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

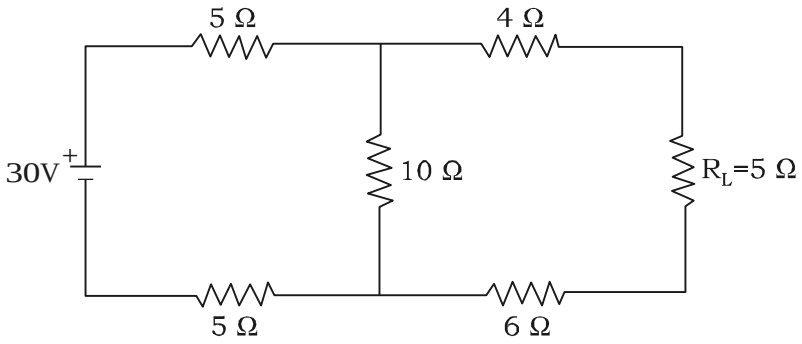
11. Explain the method of measurement of earth resistance using earth megger with a diagram. 10

12. (a) Derive an equation for transformation of delta-connected resistance into star-connected resistance. 5

(b) Determine the resistance between the terminals A and B for the circuit shown in the figure. 5



13. (a) Find the current in the load resistance R_L of the circuit shown below using Norton's theorem. 5



(b) Derive the relation between the line current and phase current for a balanced delta connected system. 5

14. (a) Derive an expression for average value of a sinusoidal varying quantity. 5

(b) Derive the expression for RMS value of a sinusoidal varying quantity. 5

15. A series RLC circuit consists of resistor of 100Ω, inductor of 0·31 H and a capacitor of unknown value when this is energized by 230∠0°, 50 Hz sinusoidal supply, the current was found to be 1·5∠60° amperes. Find (a) value of capacitor, (b) voltage across the inductor and (c) total power consumed. 10

16. (a) The current flowing through a pure inductor is 20 A. Find the inductance and power consumption when the voltage applied across the inductor is V = 200 sin314t. 5

(b) In a series RLC series circuit, R=0·5Ω, L=100 mH, C=25 μF. Determine the resonance frequency and the corresponding input current when a supply voltage of 30V is applied to the circuit. 5

17. For the network shown in the figure, determine : 10

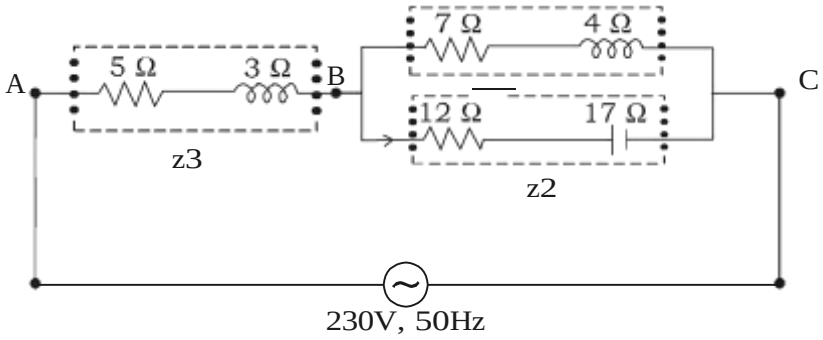
(a) The total impedance and admittance.

(b) The total current.

(c) The current in each branch.

(d) The pf of the whole network.

(e) Active and reactive power.



18. A 3-phase balanced load consists of resistance 100Ω and inductive reactance of 200Ω per phase. Determine line current, power factor and power when they are connected to 440V supply (a) star and (b) delta. 10

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