



C14-EE-303

4245

BOARD DIPLOMA EXAMINATION, (C-14)  
OCT/NOV—2017  
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. Define node, brach, Mesh of an electrical network.
  2. State the formulae to transform a star network into a delta network and delta network into an equivalent star network.
  3. Define the following terms :
    - (a) Form factor
    - (b) Peak factor
  4. State the relation between  $m$  and  $e$ .
  5. Perform (a)  $z_1 \parallel z_2$  and (b)  $z_1 \parallel z_2$ , where  $z_1 = 20 \angle 60^\circ$  and  $z_2 = 5 \angle 30^\circ$ .
  6. Derive an expression for power in a pure resistive circuit.

7. Define  $Q$ -factor of  $R$ - $L$ - $C$  series circuit and write down the formula for it.
8. Define the following terms :
- (a) Conductance
- (b) Susceptance
9. State the advantages of polyphase circuit.
10. What is the relation between phase and line quantities in a delta network?

**PART—B**

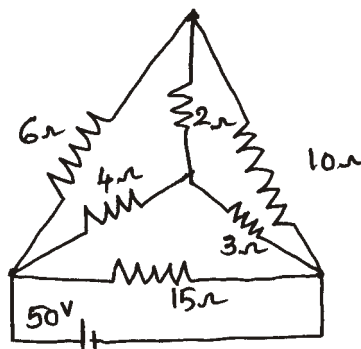
10×5=50

- Instructions** : (1) Answer *any five* questions.
- (2) Each question carries **ten** marks.
- (3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

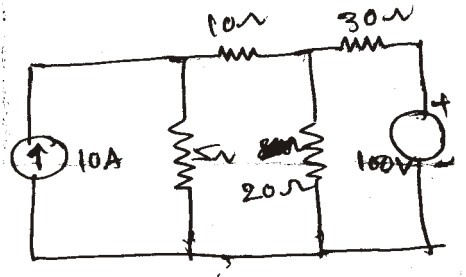
11. Four arms of a Wheatstone bridge has the following resistances :

Arm  $AB$  100 ,  $BC$  10 ,  $CD$  4 ,  $DA$  50 . A galvanometer of resistance 20 is connected across the terminals  $BD$ . A battery of 10 V is connected across the terminals  $AC$ . Find the current through the galvanometer using Kirchhoff's laws.

12. Find the current supplied by the battery.



13. Determine the current in the 20 resistor in the circuit shown below, using superposition theorem :



14. (a) Define the following terms : 4
- (i) Average value
- (ii) RMS value
- (b) Calculate the RMS and average value for a full rectified sinusoidal voltage.
15. A resistor and a capacitor are connected in series across a 150 V supply. When the frequency is 40 Hz the current in the circuit is 5 A, and when the frequency is 50 Hz the current is 6 A. Find the resistance and capacitance of the circuit.
16. A circuit having a resistance of 5  $\Omega$  an inductance of 0.5 H and a variable capacitance in series, is connected across 110 V, 50 Hz supply. Calculate at resonant condition, (a) the value of capacitance, (b) voltage across capacitor, (c) current and (d) Q-factor of the circuit.
17. A series R-L circuit having resistance of 25  $\Omega$  and inductive reactance of 32  $\Omega$  is connected in parallel to a capacitor of 100  $\mu$ F and the combination is connected across a 200 V, 50 Hz. Find the current in each branch and the total current.
18. Three identical impedances are connected in delta to a 3-phase, 400 V, 50 Hz supply. The line current is 34.65 A, and the total power taken from the supply is 14.4 kW. Calculate the resistance and reactance values of each impedance.

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