C09–EC–**306**

3238

BOARD DIPLOMA EXAMINATION, (C–09)

APRIL/MAY—2015

DECE—THIRD SEMESTER EXAMINATION

CIRCUIT THEORY

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. Distinguish between DC and AC.

2. Explain phase difference briefly.

3. Distinguish between series and parallel resonance circuits.

4. Define the following terms :
   (a) Branch
   (b) Loop
   (c) Mesh

5. Define the driving point impedance and transfer impedance of a network.

6. Write the advantages of maximum power transfer theorem.

7. State the superposition theorem.

8. Define the time constant of an *R-C* circuit.

9. Explain dot convention used in coupled circuits.

10. Draw the high-pass *R-C* circuit and low-pass *R-C* circuit.

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PART—B   10×5=50

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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. *(a)* A sinusoidal voltage $V(t) \quad 200 \sin 1000t$ is applied across a pure capacitor of 100 microfarads. Find current and charge.   5

(b) Derive the expressions for current and power of a pure resistor circuit with a.c. source.   5

12. *(a)* Explain *V-I* characteristic of series *R-L-C* circuit with a.c. source.   6

(b) Derive the expression of resonant frequency of the series *R-L-C* circuit.   4

13. *(a)* For the following circuit, find the current in the 5 ohm resistor :   6
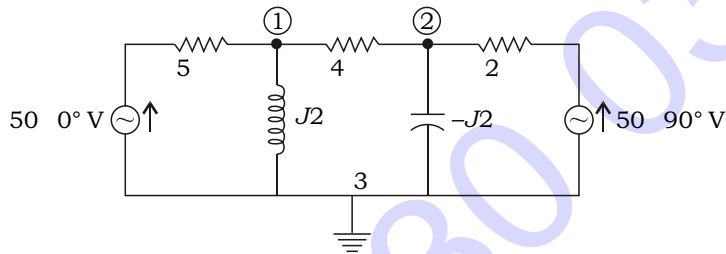
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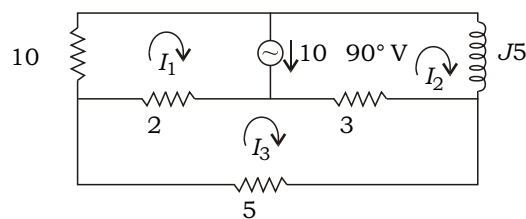
(b) Obtain the star-equivalent circuit for the delta-connected circuit shown below : 4

$$A \xrightarrow{\quad 13 \quad \text{(\!\!\!/\!\!\!/\!\!\!/)} \quad} B$$

12 ⟋⟋   14 ⟋⟋

• C
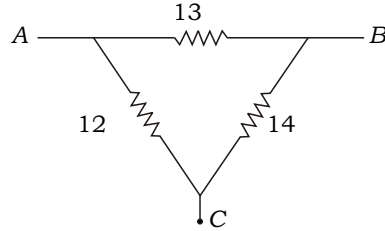
14. (a) Determine the voltage of nodes 1 and 2 in the network shown below : 6
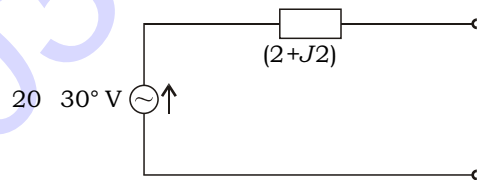
5   4   2

50 0° V   J2   −J2   50 90° V

3

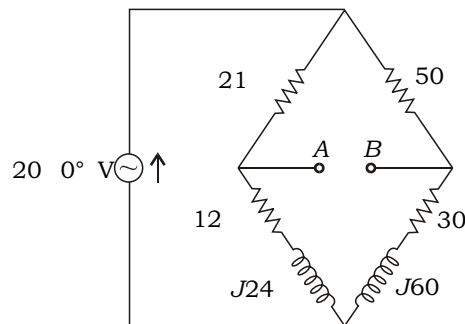(b) Write the limitations of Ohm's law. 4

**15.** (a) Convert the given voltage source into equivalent current source : 4

(2+J2)

20 30° V

(b) Obtain the Thevenin's equivalent circuit for the bridge circuit shown below : 6

*

20 0° V

21 ⟋⟋   50 ⟋⟋

A   B

12 ⟋⟋   30 ⟋⟋

J24   J60

16. *(a)* State the reciprocity theorem and give the limitations. 5

(b) Find the value of load resistance for which the source delivers maximum power to it and also find the maximum power transferred : 5
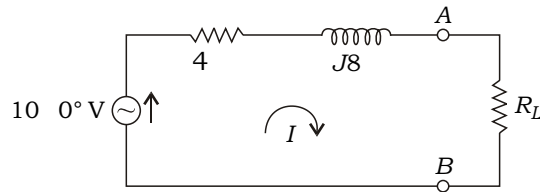
17. *(a)* Explain how a low-pass *R-C* circuit works as an integrator. 5

(b) Explain the reflected impedance significance in coupled circuit and give the expression for the reflected impedance. 5

18. *(a)* Explain the response of a high-pass *R-C* circuit for pulse input. 5

(b) Mention the applications of integrator and differentiator circuits. 5

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