C09–EC–306

3238

BOARD DIPLOMA EXAMINATION, (C–09)
MARCH/APRIL—2016
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. Differentiate between AC and DC.

2. Define active and passive elements and give examples.

3. Define quality factor in resonance circuit.

4. Write the formula for star-to-delta transformation.

5. Define *(a)* branch, *(b)* node, and *(c)* loop.

6. Write the limitations of Thevenin's theorem.

7. State superposition theorem.

8. Define steady-state and transient response.

9. Draw a circuit of high-pass and low-pass RC circuit.

10. Define linear wave shaping.

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. *(a)* Derive the expression for alternating current through series RC circuit and obtain *V-I* relation. 5

(b) A capacitor having *C* 10 f is connected in series with a resistance of 120 across 100-V, 50-Hz supply. Calculate current, phase angle and power consumed. 5

12. *(a)* Distinguish between series and parallel resonance circuits. 4

(b) A series circuit *R* 5 , *L* 20 mH and a variable capacitance *C* has an applied voltage with a frequency *f* 1000 Hz. Find the capacitance for series resonance. 3

(c) Define half-power frequencies. 3

13. *(a)* Define the driving-point impedance and transfer impedance. 4

(b) For the network shown in Fig. 1 below, calculate the currents I_1 and I_2 using mesh analysis : 6

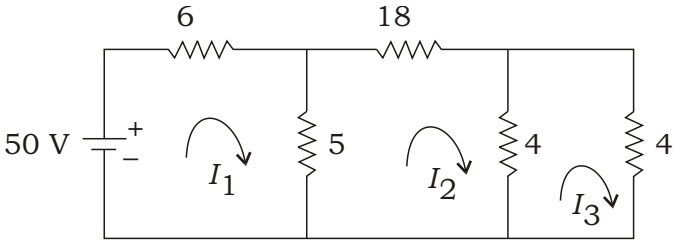

Fig. : 1

14. *(a)* For the network shown in Fig. 2 below, find the voltage transfer function V_o/V_i by using Nodal method : 6

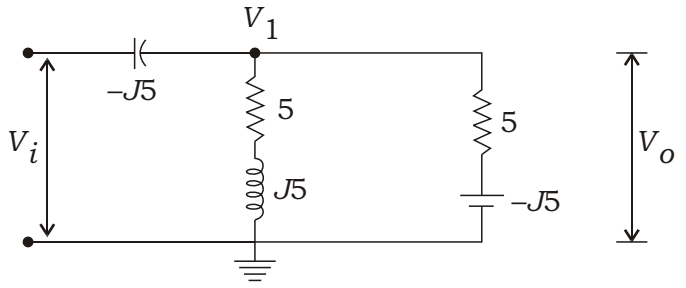

Fig. 2

(b) State Kirchhoff's current law and voltage law. 4

15. *(a)* State Norton's theorem and give its limitations. 4

(b) Find the current in (2 $j3$) branch for the network shown in Fig. 3 below using superposition theorem : 6

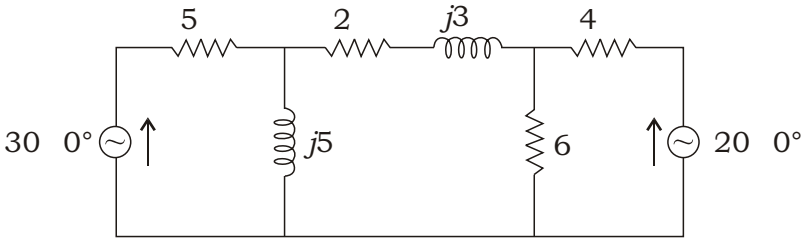

Fig. 3

16. *(a)* State the maximum power transfer theorem for DC network. 3

(b) Define the reciprocity theorem and give its limitations. 4

(c) Explain ideal current source and ideal voltage source briefly. 3

17. *(a)* Derive the relation among $L1$, $L2$, M and K. 5

(b) Two identical coils with L 0 02 H have a K 0 08. Find two equivalent inductances with the coils connected in series aiding and series opposing. 5

18. *(a)* Explain how a low-pass RC circuit works as an integrator. 5

(b) Mention the application of a high-pass and a low-pass RC circuit. 5

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