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C09–EC–306

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BOARD DIPLOMA EXAMINATION, (C–09)
OCT/NOV—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. Write the difference between active and passive elements.

2. Explain the phase difference.

3. Derive the expression for resonant frequency in a series resonance *R-L-C* circuit.

4. Define driving point admittance and transfer admittance.

5. Write the limitation of Ohm's law.

6. State Thevenin's theorem.

7. Write the limitations of superposition theorem.

8. Define critical coupling.

9. Define linear wave shaping.

10. Explain briefly how a high-pass *R-C* circuit acts as a differentiator.

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 AC current through series *R-L* circuit. 6

(b) A sinusoidal voltage $V(t)$ 200 sin 1000 t is applied across a pure inductor of L 0 02 H. Determine current and power. 4

12. *(a)* Derive the expression for selectivity in terms of bandwidth and quality factor in resonance circuit. 5

(b) Distinguish between series and parallel resonance circuits. 5

13. *(a)* For the circuit shown in Fig 1 given below, determine the value of V_2 such that the current in (3 $j4$) ohms impedance is zero : 5

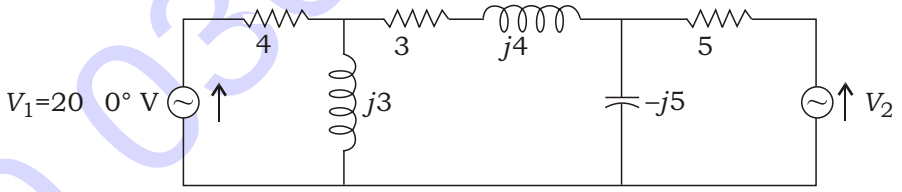

Fig. 1

(b) Obtain the star connections of three impedances equivalent to the network *CDE* shown in Fig 2 and then find out star equivalent *ABC* : 5

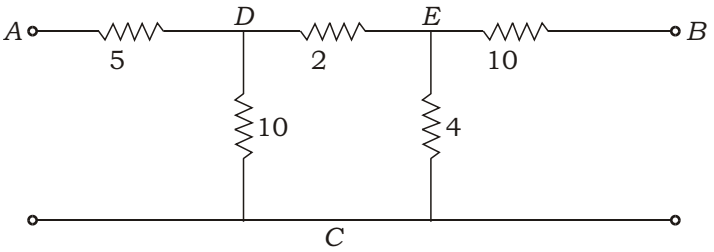

Fig. 2

14. *(a)* Define Kirchhoff's current law and voltage law. 4

(b) For the circuit shown in Fig 3 given below, determine the voltage V_{ab} : 6

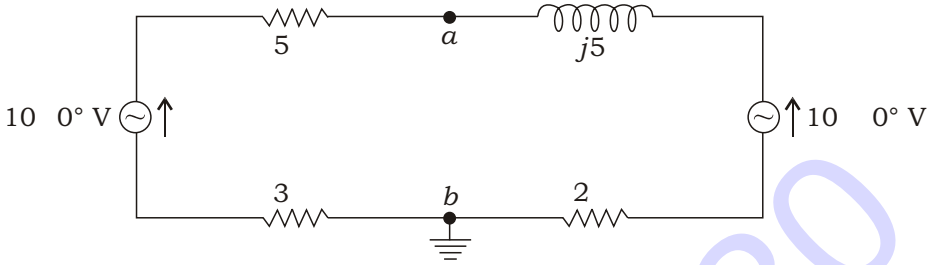

Fig. 3

15. *(a)* State maximum power transfer theorem and its limitations. 2+2=4

(b) Obtain Thevenin's equivalent network at *AB* for the given network shown in Fig 4 : 6

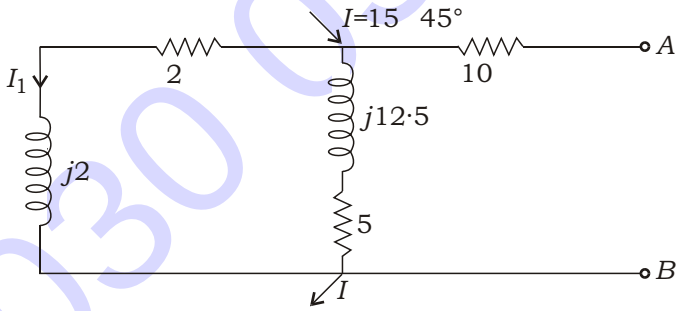

Fig. 4

16. *(a)* Define the reciprocity theorem and give its limitations. 4

(b) Find the current in (2 *j*3) impedance using super-position theorem shown in Fig 5 given below : 6

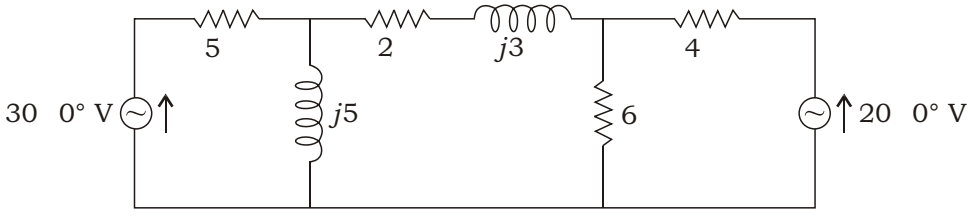

Fig. 5

17. *(a)* Two coupled coils of L_1 0 8 H and L_2 0 2 H have a K 0 9. Find the mutual inductance M, L_{SA} and L_{SO}. 6

(b) Explain briefly the dot convention used in coupled circuits. 4

18. *(a)* Mention the uses of differentiator and integrator circuits. 2+2=4

(b) A series R-L circuit with R 50 and L 10 H has a constant voltage V 100 volts applied t 0 by the closing of a switch. Find the equation for current, voltage across resistor and voltage across inductor. 6

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