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C09–EC–306

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BOARD DIPLOMA EXAMINATION, (C–09)
MARCH/APRIL—2018
DECE—THIRD SEMESTER EXAMINATION

CIRCUIT THEORY

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer **all** questions.

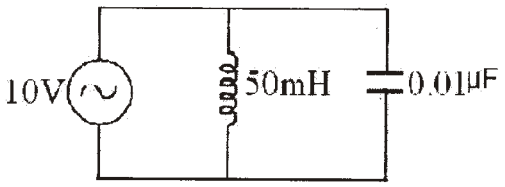
(2) Each question carries **three** marks.

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

1. A coil has an inductance of 1H. If the current flowing through it changes at the rate of 2A/s, what would be the voltage induced in the coil?

2. Distinguish between DC and AC.

3. Find the resonant frequency in the ideal parallel LC circuit shown below :

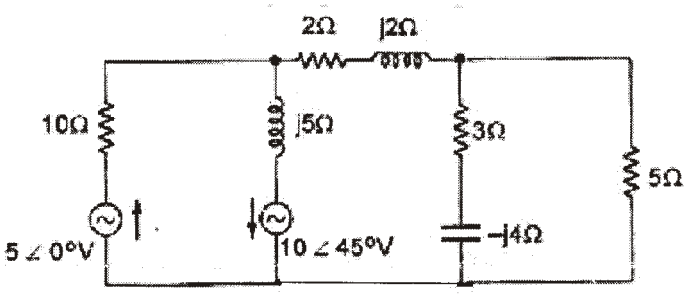


4. Define the following :

(a) Driving point admittance

(b) Transfer admittance

5. Determine the number of node voltage equations required to solve the network shown below :



6. A 16 mA current source has an internal resistance of 10 k . How much current will flow in a 2·5 k load connected across its terminals?

7. State the reciprocity theorem.

8. Two coupled coils with L_1 20 mH, L_2 10 mH and k 0 5 are connected in series aiding. Find their equivalent inductances.

9. Give the expression for the reflected impedance of a coupled circuit.

10. Define time constant of series RC circuit.

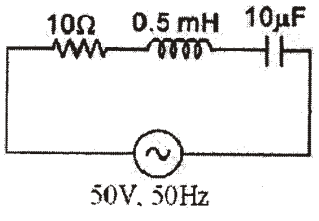
PART—B 10×5=50

Instructions : (1) Answer *any* **five** questions.

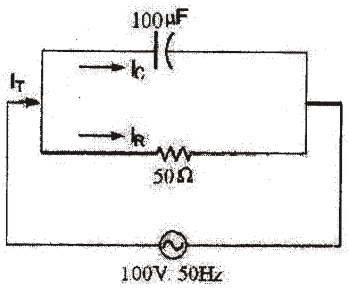
(2) Each question carries **ten** marks.

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

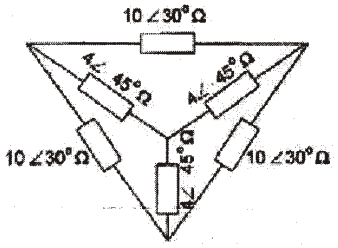
11. Find the half powers frequencies, resonant frequency and bandwidth of the series RLC circuit shown below :



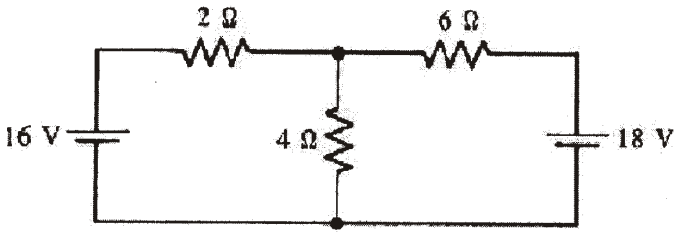
12. For the circuit shown below, determine the total current, phase angle and total impedance :



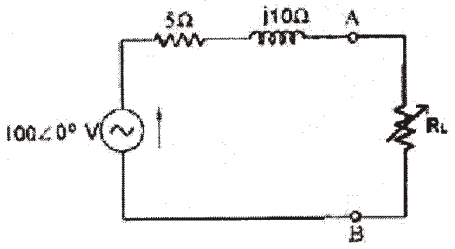
13. In the following figure, a balanced delta connected circuit with Z 10 30 is parallel with a balanced star-connected circuit with Z 4 45 . Obtain the star-connected equivalent :



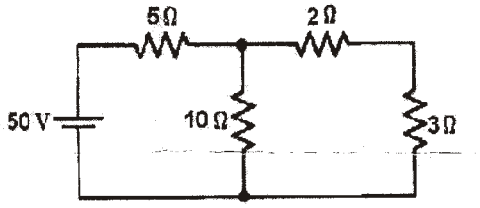
14. Using Mesh analysis, find the current in each resistor shown in the figure below :



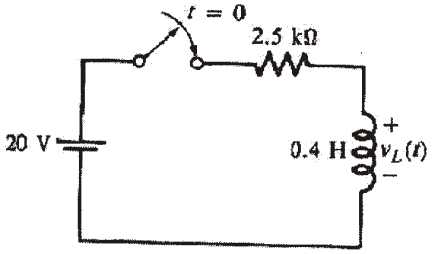
15. For the circuit shown below, find the value of R_L which results in maximum power transfer. Also calculate the value of the maximum power.



16. Using Thevenin's theorem, find the current in 3 resistor in the circuit shown below :



17. At what time after the switch is closed in the following figure does $V_L(t)$ reach 15 V :

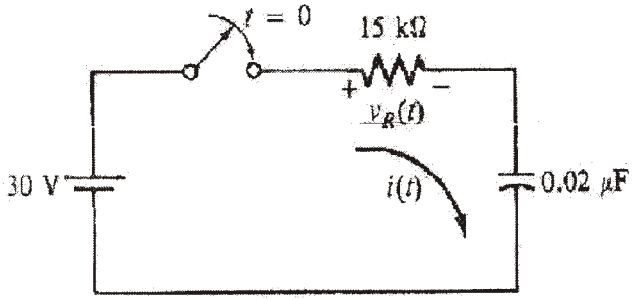


18. For the circuit shown below, find the

(a) time constant;

(b) value of $i(t)$ after the switch has been closed for 1·5 time constants;

(c) voltage $V_R(t)$ at t 1 5 .



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