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C09–EC–306

3238

BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2017

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.

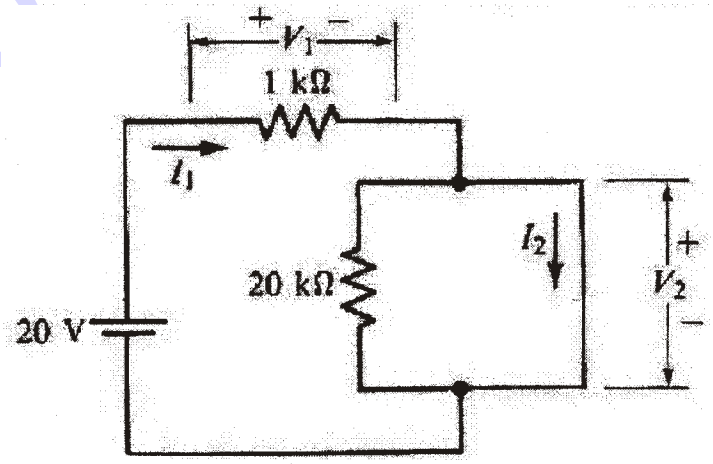
(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. What is the capacitance of a capacitor if a charging current of 100 mA flows when 40 V voltage is applied at a frequency of 50 Hz?

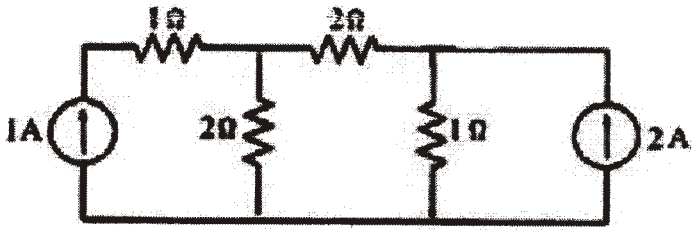
2. A coil has an inductance of *IH*. If the current flowing through it changes at the rate of 2 A/s, what would be the voltage induced in the coil?

3. Distinguish between DC and AC.

4. Find the current I_1 and voltage V_2 in the figure shown below :



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



6. A constant current source develops a terminal voltage of 9 V when a 500 resistor is connected across its terminals. What is its terminal voltage when the 500 resistor is replaced by a 1 5 k resistor?

7. State maximum power transfer theorem.

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

9. Two coils with self-inductances 0·02 *H* and 0·01 *H* are coupled with *K* 0 5. Calculate their equivalent inductance when they are connected in series aiding.

10. Define time constant of series RC circuit.

PART—B

10×5=50

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

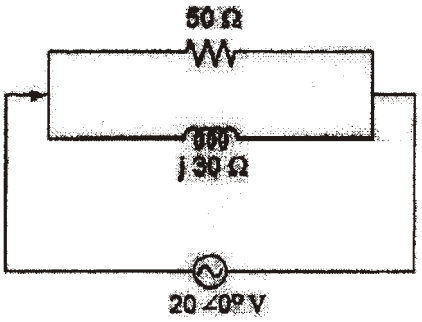
(2) Each question carries **ten** marks.

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

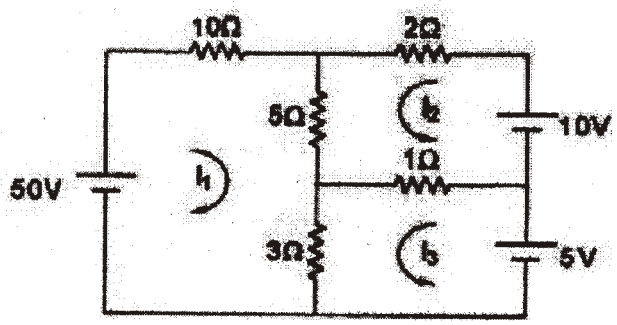
11. *(a)* Distinguish between series and parallel resonance.

(b) Find the value of inductance which should be connected in series with a capacitor of 5 F and resistor of 100 and an a.c. source of 50 Hz so that power factor of the circuit is unity.

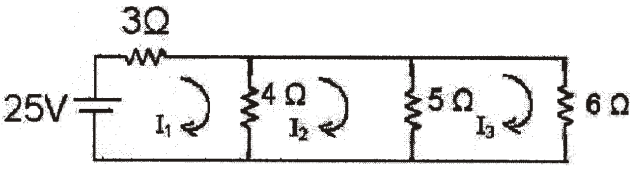
12. For the circuit shown below, determine the total current, impedance and phase angle.



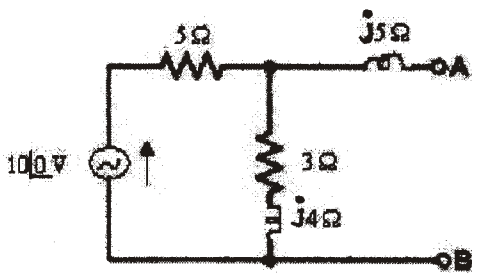
13. Determine the power absorbed by 5 resistor in the circuit shown below by using mesh analysis.



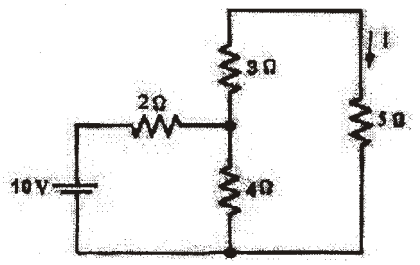
14. Compute the mesh currents in the network shown below using driving point impedance and transfer impedance.



15. Obtain Norton equivalent circuit at the terminals *A*, *B* for the circuit shown in figure.



16. Verify the reciprocity theorem in the circuit shown in figure below.

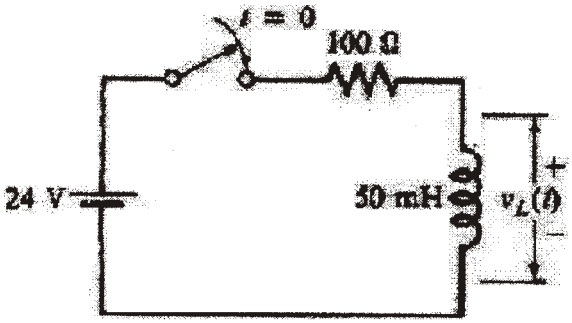


17. The switch in figure is closed at t 0.

(a) What is the time constant of the circuit?

(b) Write the equation for $V_L(t)$.

(c) Find the value of $V_L(t)$ are t 0 4.



18. *(a)* Explain the response of low-pass *R-C* circuit for a square wave input.

(b) Explain how a high-pass *R-C* circuit works as a differentiator.

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