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C09–EC–306

3238

BOARD DIPLOMA EXAMINATION, (C–09)
OCT/NOV—2014
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.

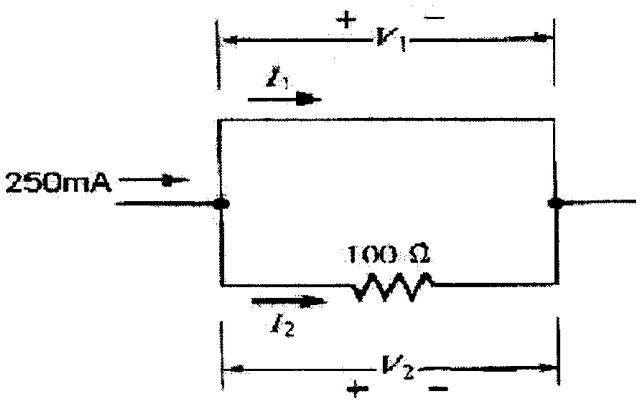
1. What is the capacitance of a capacitor if a charging current of 100 mA flows when 40 V voltage is applied at a frequency of 50 Hz?

2. Define electrical resonance.

3. Distinguish between DC and AC.

4. Define the following :
(a) Driving point impedance
(b) Transfer impedance

5. Find the current I_1 and voltage V_1 in the circuit 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 Thevenin's theorem.

8. Define *(a)* coefficient of coupling and *(b)* critical coupling.

9. Define the term linear wave shaping.

10. Define time constant of series *R-C* circuit.

PART—B

10×5=50

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

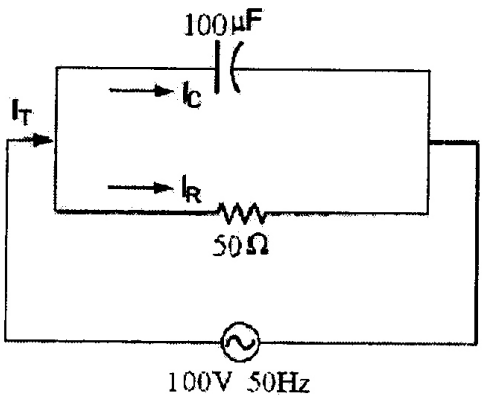
(2) Each question carries **ten** marks.

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

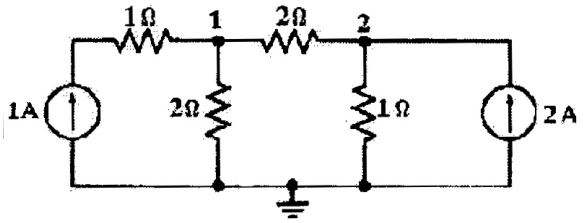
11. *(a)* Explain the *V-I* characteristics of a series *L-C* circuit with a.c. source.

(b) A sinusoidal voltage $v(t)$ 100 sin 100 t is applied across a pure inductive coil of inductance L = 0·01 H. Determine *(i)* current $i(t)$ and *(ii)* instantaneous power $p(t)$.

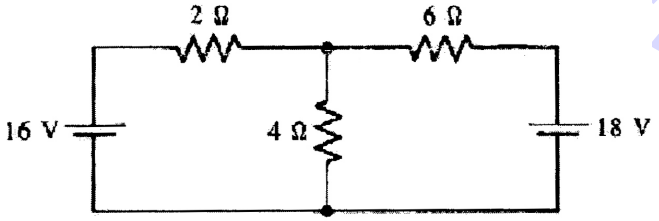
12. For the circuit shown below, determine the total current, the phase angle and total impedances in the circuit :



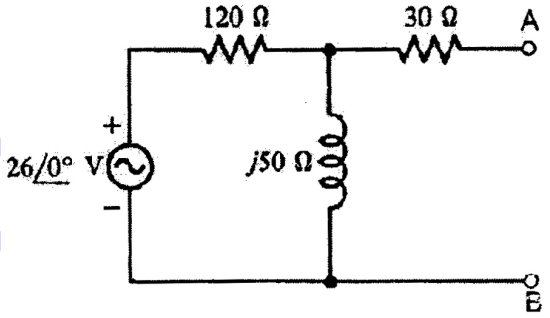
13. Determine the voltages at nodes 1 and 2 of the network shown below by using nodal analysis :



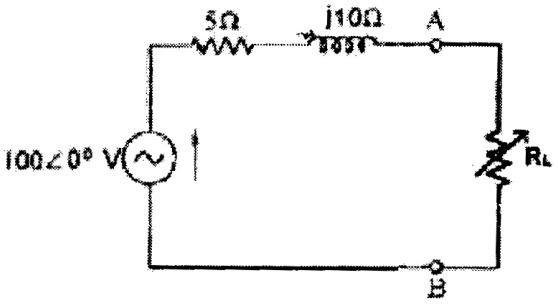
14. Using mesh analysis, find the current in each resistor shown in the circuit below :



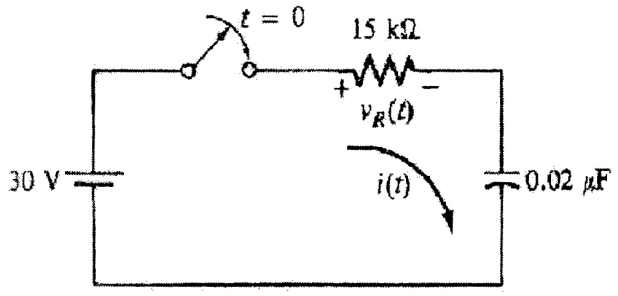
15. Find the Thevenin's equivalent circuit with respect to terminals *A-B* in the circuit shown below :



16. 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 :



17. For the circuit shown below—



(a) find the time constant;

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

(c) find the voltage $V_R(t)$ at t = 1·5 .

18. Explain the effect of reflected impedance in a double-tuned mutual inductive coupled circuit for different degrees of coupling.

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