



C09-EC-306

3238

**BOARD DIPLOMA EXAMINATION, (C-09)
OCT/NOV—2014
DECE—THIRD SEMESTER EXAMINATION
CIRCUIT THEORY**

Time : 3 hours]

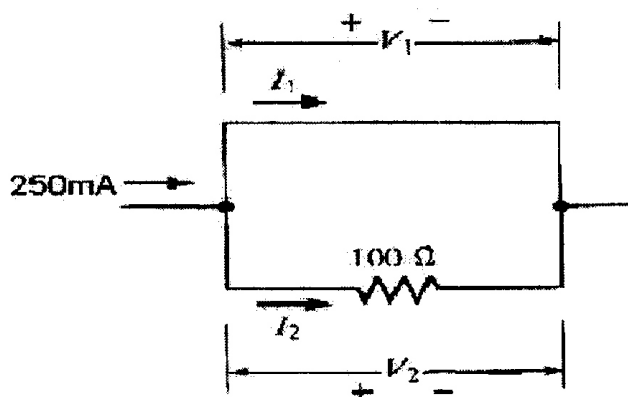
[Total Marks : 80

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

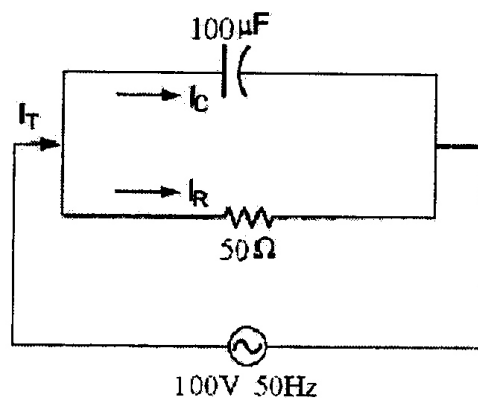
10×5=50

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

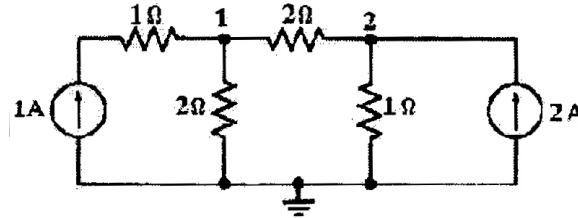
(2) Each question carries **ten** marks.

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

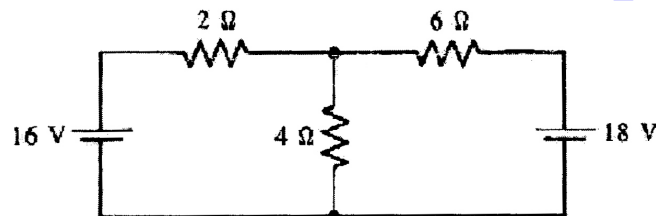
11. (a) Explain the *V-I* characteristics of a series *L-C* circuit with a.c. source.
- (b) A sinusoidal voltage $v(t) = 100 \sin 100 t$ is applied across a pure inductive coil of inductance $L = 0.01$ H. Determine (i) current $i(t)$ and (ii) instantaneous power $p(t)$.
12. For the circuit shown below, determine the total current, the phase angle and total impedances in the circuit :



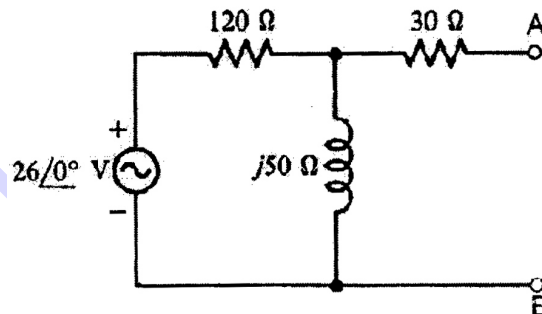
13. * Determine the voltages at nodes 1 and 2 of the network shown below by using nodal analysis :



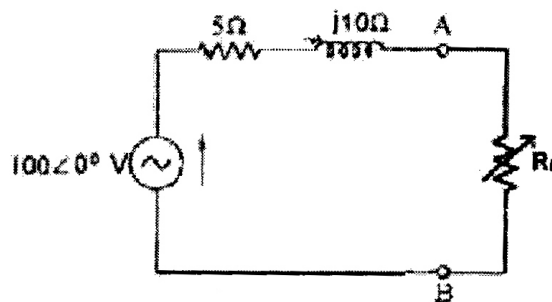
14. Using mesh analysis, find the current in each resistor shown in the circuit below :



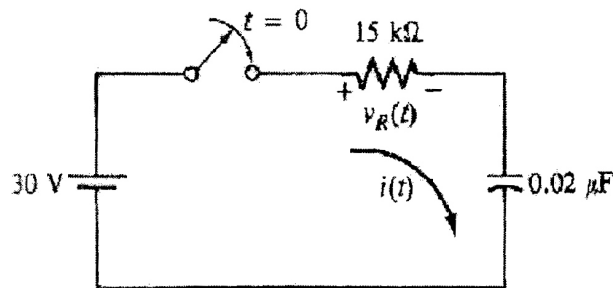
15. Find the Thevenin's equivalent circuit with respect to terminals A-B in the circuit shown below :



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.
