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C20-EC-305

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BOARD DIPLOMA EXAMINATION, (C-20)

FEBRUARY/MARCH — 2022

DECE - THIRD SEMESTER EXAMINATION

NETWORK ANALYSIS

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

PART—A

3×10=30

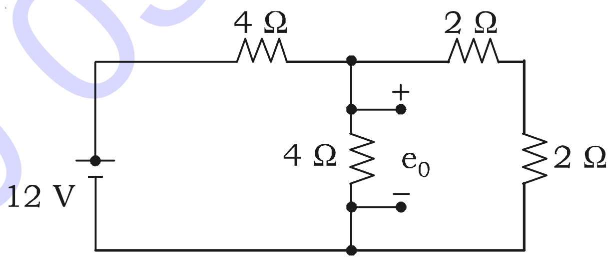
Instructions : (1) Answer **all** questions.

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

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

1. Define the terms mesh, node and loop in circuits.

2. The voltage e_0 in fig. is



3. State reciprocity theorem.

4. Write about the duality of a network.

5. Define quality factor of a coil.

6. If a circuit is at resonance then —

(a) what is the value of voltage across L and C?

(b) what is the current in the circuit for series resonance?

7. Determine the Laplace transform of $y = e^{-2t} + t$.

8. Write Laplace transforms for impulse function and ramp function.

9. Define time constant of RC circuit.

10. Draw T-type attenuator.

PART—B

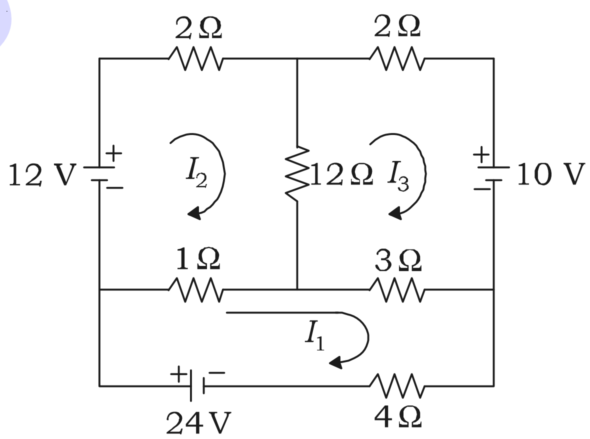
8×5=40

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

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

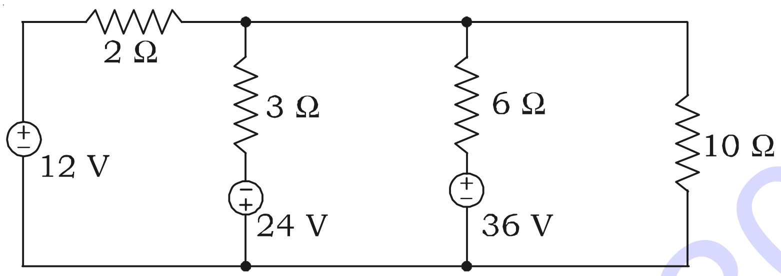
(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

11. *(a)* Solve for mesh currents using Cramer's rule for the given network below :

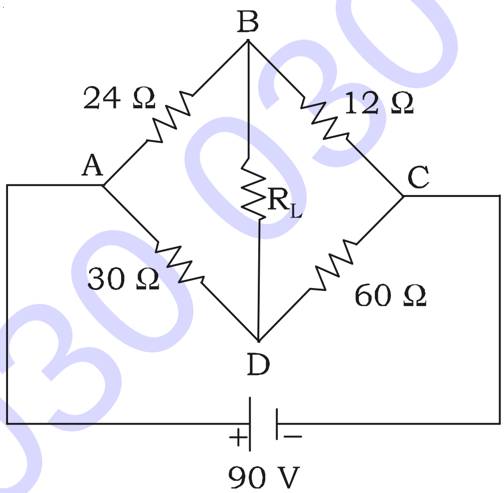


(OR)

(b) Compute the power absorbed by 10 Ω resistor in the circuit shown below using node voltage analysis :

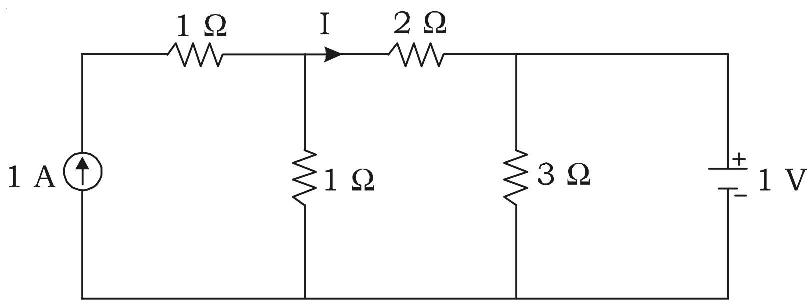


12. *(a)* Draw the Thevenin's equivalent network for the given network between B and D :



(OR)

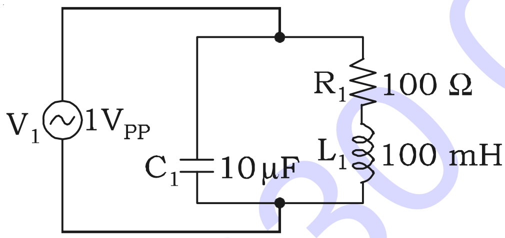
(b) Find the current through 2 ohm resistor by using superposition theorem :



13. *(a)* A series RLC circuit with L = 0.5 H has an instantaneous voltage $V = 70.7 \sin(500t + 30°) V$ and an instantaneous current $i = 1.5 \sin(500t) A$. Find the values of R and C. At what frequency (w_0) will the circuit be resonant?

(OR)

(b) Given the following parallel resonant circuit find the *(i)* resonant frequency, *(ii)* inductive reactance and capacitive reactance at resonant frequency, *(iii)* branch currents at resonant frequency.



14. *(a)* A series RL circuit with R = 25 ohm and L = 5 H has a constant voltage V = 50 V applied at $t = 0$ by the closing of a switch. Find *(i)* equations for $I(t)$, $V_R(t)$ and $V_L(t)$ and *(ii)* current at $t = 0.5$ sec.

(OR)

(b) Find the inverse lapse transform of $F(s) = \dfrac{(s+2)}{s(s+1)(s+3)}$.

15. *(a)* Explain π type attenuators with circuit diagram.

(OR)

(b) Design a high pass π filter with a cut-off frequency of 1 kHz with load resistance of 600 ohms.

PART—C

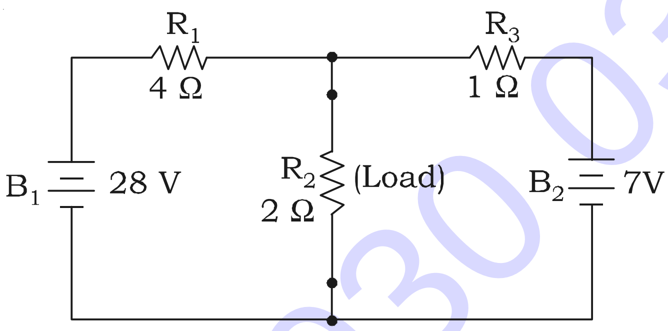
10×1=10

Instructions : (1) Answer the following question.

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

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

16. Analyze the circuit to determine the max power across RL. What will happen, if the two resistors are replaced by capacitors?



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