C20-EC–305

7243

BOARD DIPLOMA EXAMINATION, (C-20)

NOVEMBER/DECEMBER—2022

DECE – THIRD SEMESTER EXAMINATION

NETWORK ANALYSIS

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

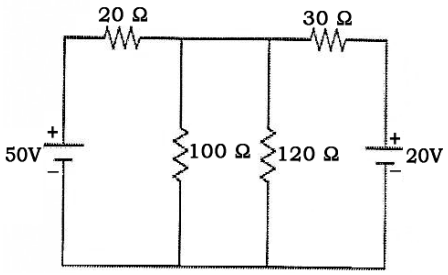
PART—A 3×10=30

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.

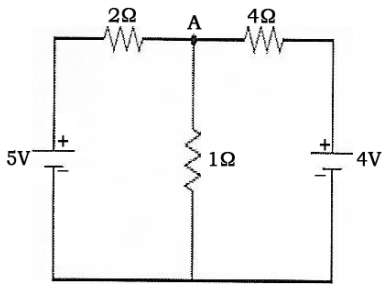
1. Draw the dual of the given network :



2. State reciprocity theorem.

3. Define the terms Branch, Junction and Mesh in circuits.

4. Find the current *I* in the circuit shown below :



5. Give formula for lower cut-off and upper cut-off frequencies.

6. A *RLC* series circuit excited by a 10 v sinusoidal source resonate at a frequency of 50 Hz. If the bandwidth is 5 Hz, what will be the voltage across capacitor?

7. Write Laplace transforms of *(a)* unit step function, *(b)* exponential function and *(c)* sine function.

8. Find the Laplace transform of $(t+2)^2 e^t$.

9. Find the final value of the given function whose Laplace transform is $I(S) = \dfrac{S+6}{S(S+3)}$.

10. Define low pass filter and high pass filter.

PART—B

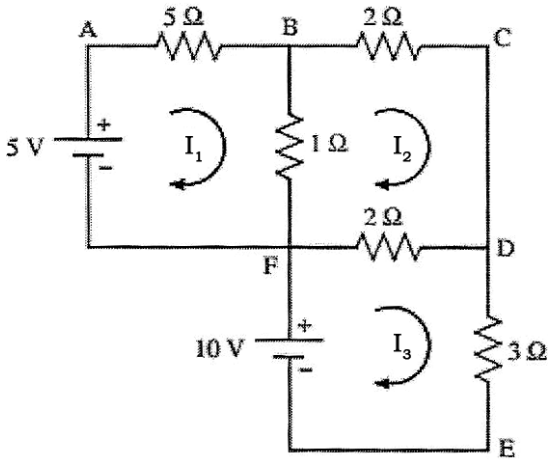
8×5=40

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

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

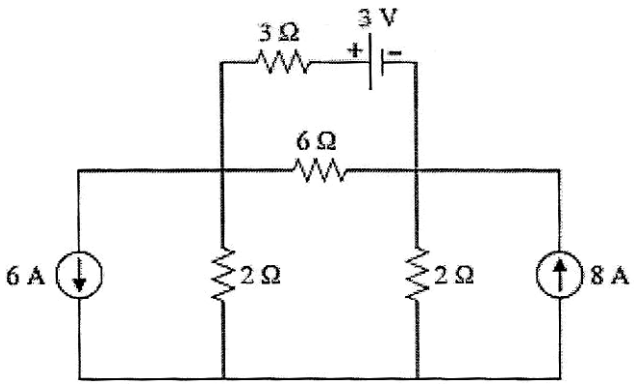
(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

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

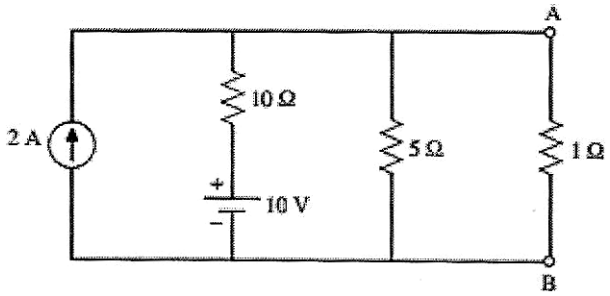


(OR)

(b) Compute the voltage across 6 Ω for the circuit shown below :

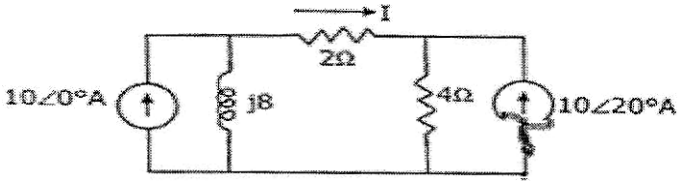


12. *(a)* Find the power loss in the 1 Ω resistor of the circuit shown below using Thevenin's theorem.



(OR)

(b) Find the current through 2 Ω resistor by using superposition theorem.



13. *(a)* A circuit, having a resistance of 4·0 Ω with an inductance of 0·5 H and a variable capacitance in series, is connected across a 100 V, 50 Hz supply. Calculate *(i)* the capacitance required to attain resonance; *(ii)* voltages across the inductance and the capacitance at resonance; *(iii)* the *Q* factor of the circuit.

(OR)

(b) A coil, of resistance *R* and inductance *L*, is connected in series with a capacitor *C* across a variable-frequency source. The voltage is maintained constant at 300 mV and the frequency is varied until a maximum current of 5 mA flows through the circuit at 6 kHz. If, under these conditions, the *Q* factor of the circuit is 105, calculate : *(a)* the voltage across the capacitor; *(b)* the values of *R*, *L* and *C*.

14. *(a)* Explain dc response of an *RL* circuit.

(OR)

(b) Explain second shifting property with one example.

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

(OR)

(b) Design a constant *k* low pass filter to match a line having characteristic impedance of 500 Ω and to pass frequency up to 5 kHz.

PART—C

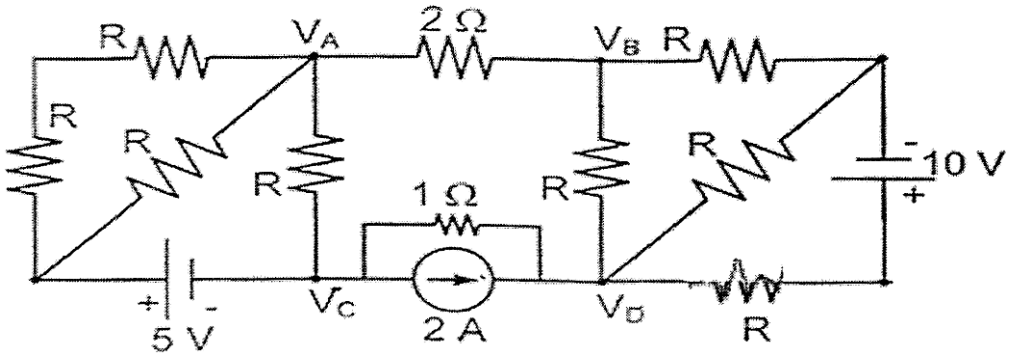
10×1=10

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. If $V_A - V_B = 6$ V then $V_C - V_D$ is :



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