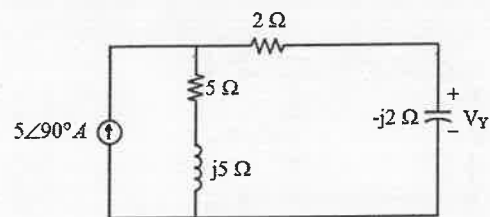


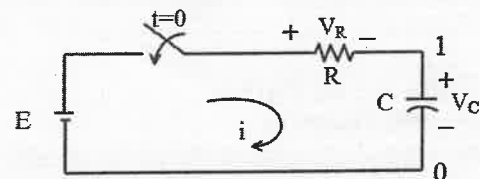
- b. In the circuit shown, find the voltage V_Y and verify reciprocity theorem.

8 2 3 2



24. a. A series RC circuit has a constant voltage of E , applied at time, $t=0$ as shown in the figure. The capacitor has no initial charge. Find the equations for i , V_R and V_C .

8 2 4 2

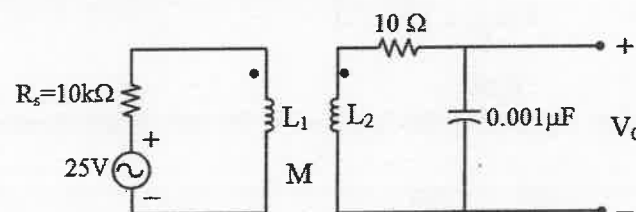


$E=100V, R=5k\Omega, C=20\mu F.$

(OR)

- b. Consider the single tuned circuit shown in the figure. It has $L_1=12.5\mu H$, $L_2=50\mu H$ and coefficient of coupling as 0.6. Assume $R_s \gg \omega L_1$. Determine (1) angular resonance frequency (2) output voltage at resonance.

8 2 4 2



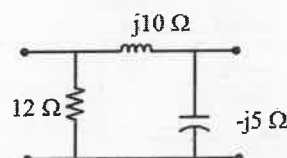
25. a. Two wattmeters are connected to measure the power in a 3-phase 3-wire balanced load. Determine the total power and power factor, if the two wattmeters read 100W each both positive.

8 2 5 2

(OR)

- b. Determine the 'y' parameters for the circuit shown in the figure.

8 2 5 2

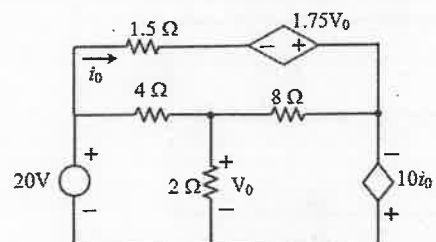


PART - C (1 × 15 = 15 Marks)

Answer ANY ONE Question

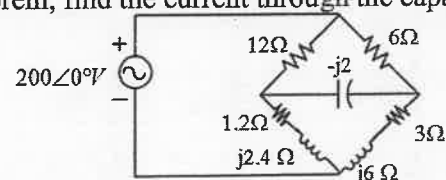
26. Using mesh analysis, compute the power consumed by the resistors and the powers applied by the sources.

Marks 15 BL 2 CO 1 PO 2



27. Using Thevenin's theorem, find the current through the capacitor in the circuit.

15 2 3 2



Reg. No.

B.Tech. / M.Tech (Integrated) DEGREE EXAMINATION, MAY 2023

Second Semester

21EEEC101J – ELECTRIC CIRCUITS

(For the candidates admitted from the academic year 2021 - 2022 & 2022 - 2023)

Note:

- (i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
(ii) **Part - B** and **Part - C** should be answered in answer booklet.

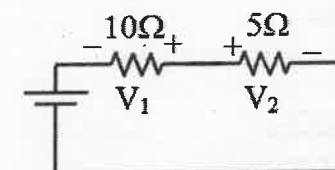
Time: 3 Hours

Max. Marks: 75

PART - A (20 × 1 = 20 Marks)

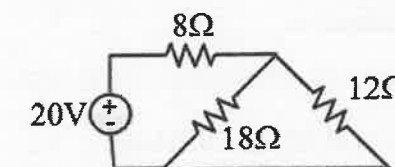
Answer ALL Questions

1. An electric kettle is rated for 250V and 500W its conductance is
(A) $2\sqrt{5}$ (B) $0.5\sqrt{5}$
(C) $0.5m\sqrt{5}$ (D) $8m\sqrt{5}$
2. In the circuit shown, the ratio of $\frac{V_2}{V_1}$ is



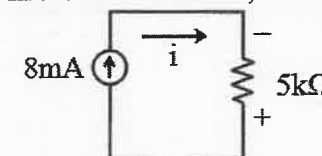
- (A) -0.5 (B) 0.5
(C) -2 (D) 2

3. A bulb having resistance of 360Ω is connected to 120V supply. How much current is drawn by the bulb?
(A) 33.3 A (B) 0.333A
(C) 133mA (D) 13.3A
4. Determine the current through 12Ω resistor in the given circuit.



- (A) 3A (B) 1.5 A
(C) 2.5 A (D) 1.67 A

5. In the circuit shown, calculate the power.



- (A) 320 W (B) 3.2 W
(C) 320 W (D) 32 W

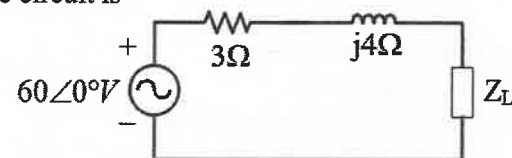
6. As the angular frequency increases from a low value to high value, the inductive reactance _____.

- (A) Remains the same (B) Increases
(C) Decreases (D) Becomes zero

7. The angular frequency does not depend on the value of _____.

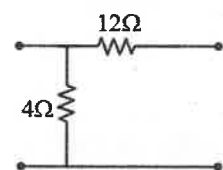
- (A) Inductor (B) Capacitor
(C) Resistor (D) Frequency

8. In an RLC series circuit, $R = 10\Omega$, $L = 10\text{mH}$ and $C = 1\mu\text{F}$. At resonance, the inductive reactance is _____.
- (A) $10\mu\Omega$ (B) 100Ω
(C) $100\text{m}\Omega$ (D) $10\text{m}\Omega$
9. Thevenin's equivalent circuit consists of _____.
- (A) Voltage source in series with an impedance (B) Voltage source in parallel with an impedance
(C) Current source in series with an impedance (D) Current source in parallel with an impedance
10. The maximum real power that could be transmitted to the complex variable load impedance Z_L in the circuit is _____.



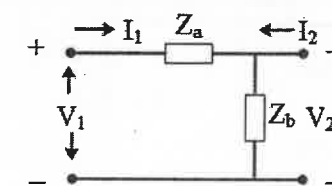
- (A) 150 W (B) 100 W
(C) 300 W (D) 50 W
11. Superposition theorem can be applied only to circuits having _____.
- (A) Linear bilateral elements (B) Resistive elements
(C) Passive elements (D) Non-linear elements
12. For maximum transfer of power, internal resistance of the source should be _____.
- (A) Less than source resistance (B) Equal to load resistance
(C) Less than load resistance (D) Greater than source resistance
13. Determine the value of capacitor, in an RC circuit having $R = 12.5\Omega$ and $i(t) = 0.16e^{-200t}$ A is the charging current.
- (A) 2F (B) $400\mu\text{F}$
(C) 2.5mF (D) 2mF
14. The time constant of a RL circuit with $R = 40\Omega$ and $L = 5\text{H}$ is _____.
- (A) 5 ms (B) 8 ms
(C) 0.125sec (D) 200 sec
15. A capacitor of 0.2F has zero initial charge. Its transform impedance is _____.
- (A) $5/s$ (B) 5s
(C) 0.2s (D) $0.2/s$
16. Determine the coefficient of coupling when two inductors of 0.3H and 0.8H are mutually connected with mutual inductance of 0.34H.
- (A) 0.7 (B) 0.12
(C) 0.5 (D) 0.9

17. For the two port network shown in the figure, Z_{11} is _____.



- (A) 4Ω (B) 5Ω
(C) 6Ω (D) 7Ω
18. The transmission parameter A is _____.
- (A) Impedance (B) Admittance
(C) Voltage ratio (D) Current ratio
19. Which of the following is the correct relation?
- (A) $Y_{11} = 1/h_{11}$ (B) $Y_{11} = h_{11}/h_{12}$
(C) $Y_{11} = h_{11}$ (D) $Y_{11} = h_{12}/h_{11}$

20. For the two – port network shown in figure, the transmission parameter C is _____.

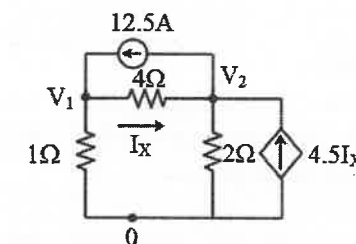


- (A) Z_a (B) $1 + \frac{Z_a}{Z_b}$
(C) Z_b (D) $1/Z_b$

PART – B (5 × 8 = 40 Marks)

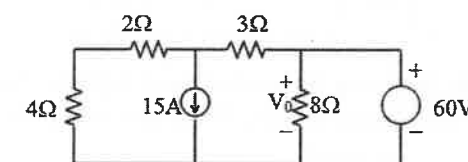
Answer ALL Questions

21. a. Determine V_1 and V_2 using node voltage equation in the given circuit.

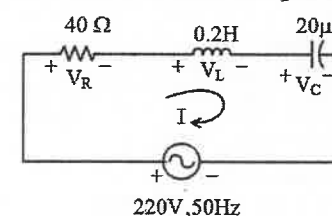


(OR)

- b. Using source transformation, determine the value of V_0 in the circuit shown in the figure.

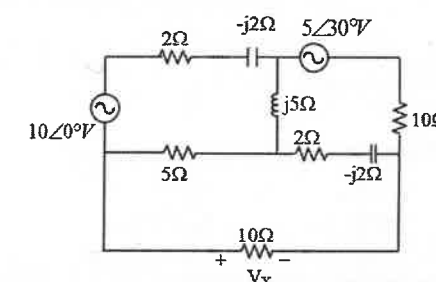


22. a. Calculate the impedance of the circuit, the power factor of the circuit, the current following and the voltage across each of the three parameters.

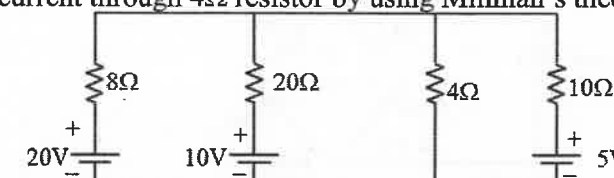


(OR)

- b. Find V_x in the given circuit by mesh analysis.



23. a. Determine the current through 4Ω resistor by using Millman's theorem.



(OR)