

Reg. No.

**B.Tech. DEGREE EXAMINATION, JUNE 2023**  
Third Semester

**18EEEC201J – ANALYSIS OF ELECTRIC CIRCUITS**

(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

**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 40<sup>th</sup> minute.
- (ii) **Part - B & Part - C** should be answered in answer booklet.

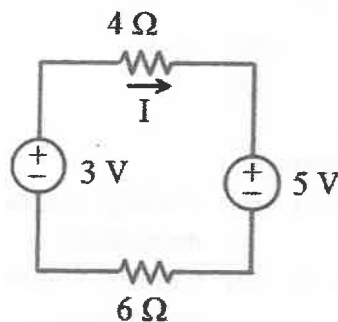
Time: 3 hours

Max. Marks: 100

**PART – A (20 × 1 = 20 Marks)**

Answer **ALL** Questions

1. Find the value of current  $I$  in the given circuit.

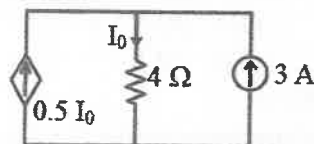


- |           |           |
|-----------|-----------|
| (A) -0.2A | (B) -0.8A |
| (C) 0.2A  | (D) 0.8A  |

2. What is the conductance value of electric kettle for 250V and 500W?

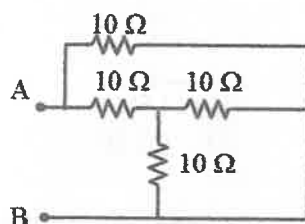
- |                         |                       |
|-------------------------|-----------------------|
| (A) $0.5\text{m}\Omega$ | (B) $8\text{m}\Omega$ |
| (C) $0.5\Omega$         | (D) $2\Omega$         |

3. Find the current  $I_0$  in the circuit.



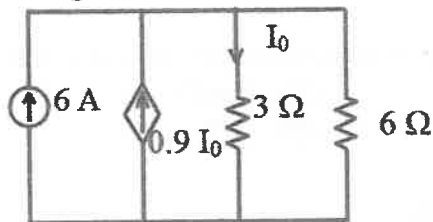
- |         |        |
|---------|--------|
| (A) 12A | (B) 9A |
| (C) 6A  | (D) 3A |

4. Determine the equivalent resistance  $R_{AB}$  in the circuit.



- |                  |                  |
|------------------|------------------|
| (A) $3.33\Omega$ | (B) $6.67\Omega$ |
| (C) $10\Omega$   | (D) $6\Omega$    |

5. What is the value of average power absorbed by an impedance  $Z = (30 - j70)\Omega$  is connected across  $120\angle 0^\circ\text{V}$ .  
 (A) 240 W (B) 120 W  
 (C) 74.48 W (D) 66 W
6. Find the value of  $\omega_0$  in a series resonance circuit. The voltage  $E = 200\angle 0^\circ\text{V}$ ,  $R = 10\Omega$ ,  $L = 10\text{mH}$  and  $C = 1\mu\text{F}$   
 (A) 10 rad/s (B)  $10^4$  rad/s  
 (C)  $10^3$  rad/s (D)  $10^2$  rad/s
7. In a two terminal passive element, the voltage across it and current through it are  $V_1 = 40\angle -15^\circ\text{V}$  and  $I_1 = 1.6\angle -105^\circ\text{A}$ .  
 (A) An inductance of reactance 25 $\Omega$  (B) An inductance of reactance 0.04 $\Omega$   
 (C) A capacitance of reactance 0.04 $\Omega$  (D) A capacitance of reactance 25 $\Omega$
8. What is the unit for complex power?  
 (A) kW (B) VAR  
 (C) Watts (D) VA
9. Thevenin's equivalent circuit consists of \_\_\_\_\_.  
 (A) Voltage source in parallel with an impedance (B) Voltage source in series with an impedance  
 (C) Current source in series with an impedance (D) Current source in parallel with an impedance
10. Find the Thevenin's voltage with respect to 6 $\Omega$  resistor.



- (A) 180 V (B) 90 V  
 (C) 9.47 V (D) 20 V
11. What is the value of maximum real power supplied in the circuit?
- 
- (A) 300 W (B) 150 W  
 (C) 100 W (D) 50 W
12. The circuit which satisfies reciprocity theorem is called as \_\_\_\_\_.  
 (A) Short circuit (B) Open circuit  
 (C) Linear circuit (D) Non-linear circuit

13. Find the time constant of a RL circuit with  $R = 40\Omega$  and  $L = 5H$ .  
 (A) 5 ms (B) 200 s  
 (C) 8 s (D) 0.125 s

14. Find the  $I(t)$  for the circuit current of  $I(s) = \frac{4}{s + 50}$   
 (A)  $4e^{-50t} A$  (B)  $4e^{-0.02} A$   
 (C)  $4e^{-12.5t} A$  (D)  $4e^{-0.08t} A$

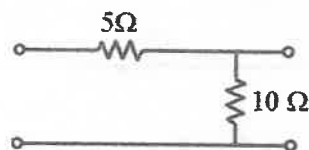
15. What is the value of phase current for balanced delta connected inductive load, having impedance of  $75.96^\circ\Omega$  receives a phase current of 25A, while phase voltage is 400V.  
 (A) 43.30 A (B) 25.30 A  
 (C) 8.3 A (D) 75 A

16. A capacitor of 0.2F has zero initial charge. Its transform impedance is  
 (A) 0.2s (B) 5 s  
 (C) 5/s (D) 0.2/s

17. Find the real power consumed by a balanced three phase load.  
 (A)  $p = \sqrt{3}E_l I_l \cos\theta$  (B)  $p = E_l I_l \cos\theta$   
 (C)  $P = \sqrt{3}E_{ph} I_{ph} \cos\theta$  (D)  $P = 3E_l I_l \cos\theta$

18. Find the current  $I_C$  for three phase sequence of ABC system, with  $I_B = 5\angle -100^\circ A$ .  
 (A)  $5\angle 140^\circ A$  (B)  $5\angle 100^\circ A$   
 (C)  $5\angle -140^\circ A$  (D)  $5\angle 20^\circ A$

19. Find  $Z_{11}$  for the two port network shown in figure.



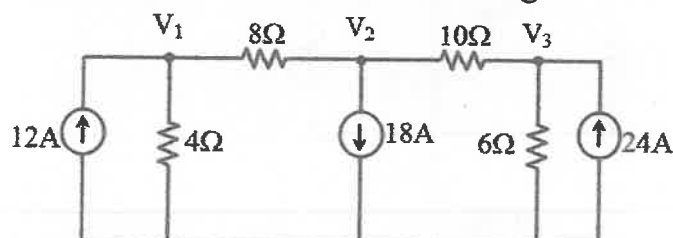
- (A) 5Ω (B) 10Ω  
 (C) 15Ω (D) 3.33Ω

20. The inverse hybrid parameter  $g_{22}$  is  
 (A) Impedance (B) Admittance  
 (C) Voltage ratio (D) Current ratio

### PART – B ( $5 \times 4 = 20$ Marks)

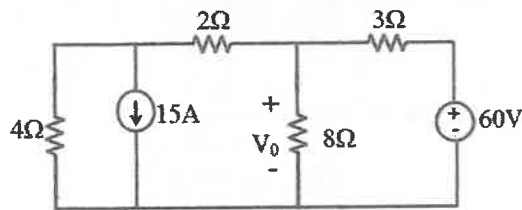
Answer ANY FIVE Questions

21. Write the node equations for the circuit shown in figure.

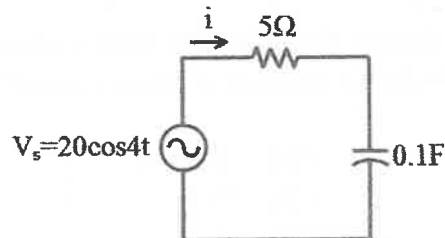


Marks	BL	CO	PO
4	1	1	2

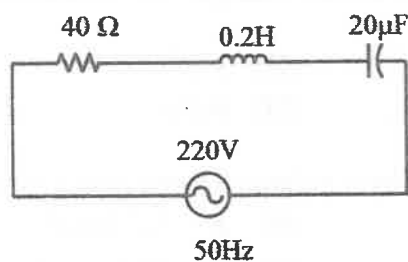
22. Using source transformation, determine the value of  $V_0$  for the circuit shown in figure. 4 1 1 2



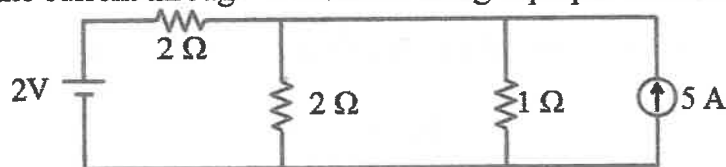
23. Determine the capacitive impedance for the circuit shown in figure. 4 1 2 2



24. Calculate the impedance of the circuit shown in figure. 4 1 2 2

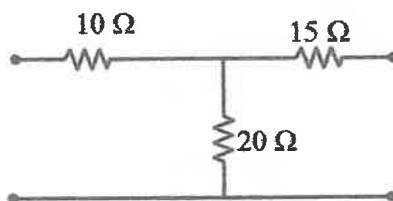


25. Calculate the current through 1Ω resistor using superposition theorem. 4 1 3 2



26. Find the time constant of a RC circuit with  $R = 20\Omega$  and  $C = 250\mu F$ . 4 1 4 2

27. Find the  $Y_{11}$  of the circuit shown in figure. 4 1 5 2

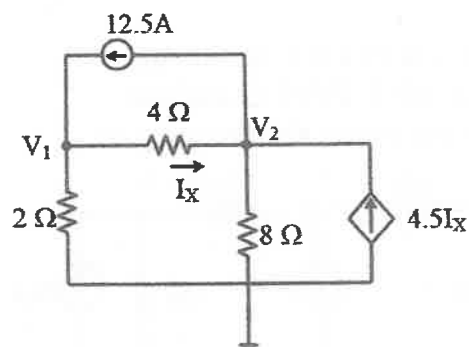


### PART – C ( $5 \times 12 = 60$ Marks)

Answer ALL Questions

Marks	BL	CO	PO
12	1	1	2

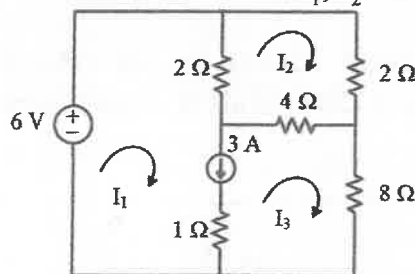
28. a. For the circuit shown in figure, determine the node voltages  $V_1$  and  $V_2$ . Also calculate the currents in the resistor.



(OR)

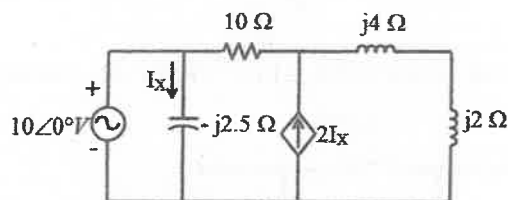
b. Using mesh analysis, calculate the currents  $I_1$ ,  $I_2$  and  $I_3$

12 1 2 2



29. a. Find the node voltages for the circuit shown in figure.

12 1 2 2



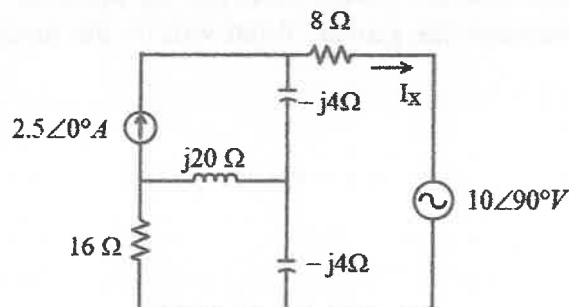
(OR)

b. Resistance of  $2\Omega$  and coil having a resistance of  $3\Omega$  and inductive reactance of  $12\Omega$  are connected in series and it is fed by a voltage of  $50\angle 0^\circ V$ . Determine the circuit current voltage across resistance, voltage across coil and draw the phasor diagram.

12 1 2 2

30. a. Calculate the current  $I_x$  using superposition theorem.

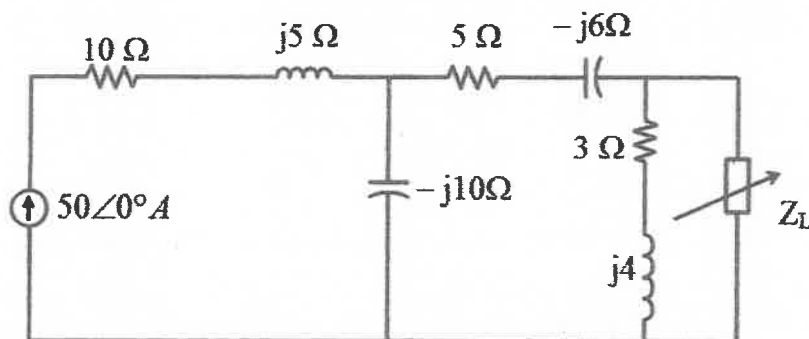
12 1 3 2



(OR)

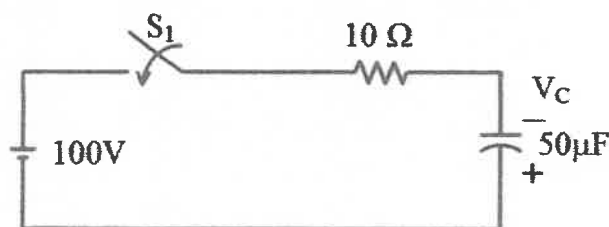
b. Determine the maximum real power delivered to the load impedance  $Z_L$ .

12 1 3 2



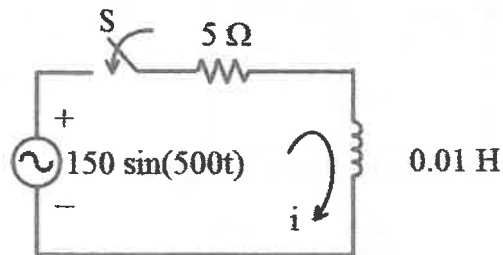
31. a. Find the circuit current for the time constant  $t > 0$ , the capacitor has initial charge  $q_0 = 2500\mu C$ , at time  $t=0$  the switch is closed.

12 1 4 2

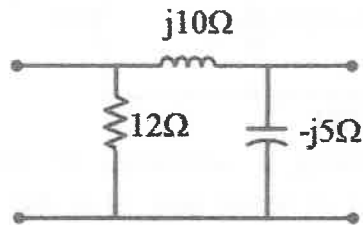


(OR)

- b. Determine the resulting transient current for the time  $t > 0$ , for the RL circuit, the source voltage of  $e = 150 \sin(500t) V$  is applied at time  $t = 0$ . 12 1 4 2



32. a. Determine the inverse hybrid parameters( $g$ ) for the given circuit. 12 1 5 2



(OR)

- b. Across 400V, 3-phase supply mains, a star connected balanced load of  $(16 + j12) \Omega$  impedance is connected. By taking phase-A as reference, determine the line currents and the power absorbed by the load if the two wattmeters are used to measure the power. What will be the reading of the wattmeters? 12 1 5 2

\* \* \* \* \*