

**B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025**  
 Second Semester  
**Electrical and Electronics Engineering**  
**20EEPC201 - ELECTRICAL CIRCUIT ANALYSIS**  
 Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

**PART - A (MCQ) (10 × 1 = 10 Marks)**  
 Answer ALL Questions

	<i>Marks</i>	<i>K- Level</i>	<i>CO</i>
1. Nodal analysis is mainly based on _____.	1	K1	CO1
(a) KCL (b) KVL			
(c) Wheatstone bridge principle (d) Faraday's electric laws			
2. The algebraic sum of voltages around any closed path in a network is equal to _____.	1	K1	CO1
(a) Infinity (b) 1 (c) 0 (d) Negative polarity			
3. The reciprocity theorem is applicable to	1	K1	CO2
(a) Linear networks only (b) Nonlinear networks only			
(c) Linear / bilateral networks (d) Neither of the two			
4. For maximum transfer of power, internal resistance of the source should be	1	K1	CO2
(a) equal to load resistance (b) Less than the load resistance			
(c) Greater than the load resistance (d) None of the above			
5. The time constant for series RL circuit is	1	K1	CO3
(a) LR (b) L/R (c) R/L (d) e <sup>-R/L</sup>			
6. The resistance element _____ while going from the time domain to frequency domain.	1	K1	CO3
(a) does not change (b) increases			
(c) decreases (d) increases exponentially			
7. The circuit is said to be in resonance, if the current is _____ with the applied voltage.	1	K1	CO4
(a) In phase (b) 90° out of phase (c) Out of phase (d) 45° out of phase			
8. Mutual inductance is a property associated with _____.	1	K1	CO4
(a) Only one coil (b) Two or more coils with magnetic coupling			
(c) Two or more coil (d) None of these			
9. In three phase system, the three voltages (currents) differ in phase by _____ electrical degrees from each other in a particular sequence.	1	K1	CO5
(a) 30 (b) 60 (c) 90 (d) 120			
10. Phase sequence depends on _____.	1	K1	CO5
(a) Field (b) Rotation of the field			
(c) Armature (d) Rotation of the armature			

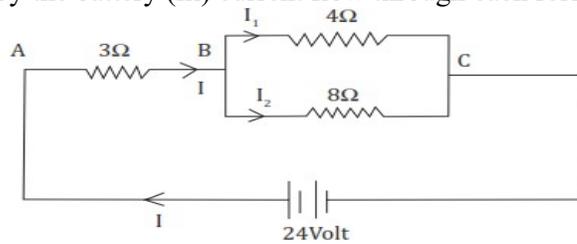
**PART - B (12 × 2 = 24 Marks)**  
 Answer ALL Questions

11. Find the resultant resistance produced by the parallel connection of two resistors of 10 Ω and 30 Ω.	2	K1	CO1
12. Define Ohm's law. Mention the limitations of ohm's law.	2	K1	CO1
13. Show the phasor diagram for RL circuit.	2	K2	CO1
14. Mention the limitations of Norton's theorem.	2	K2	CO2
15. State the super position theorem.	2	K1	CO2
16. List the steps for reciprocity theorem.	2	K1	CO2
17. Define the term 'time constant'.	2	K1	CO3
18. Distinguish between natural and forced response.	2	K2	CO3
19. Recall the quality factor of a series resonant circuit.	2	K1	CO4
20. Define co-efficient of coupling. Give the expression for coefficient of coupling.	2	K1	CO4
21. Outline the advantages of 3-phase system over 1-phase system.	2	K2	CO5

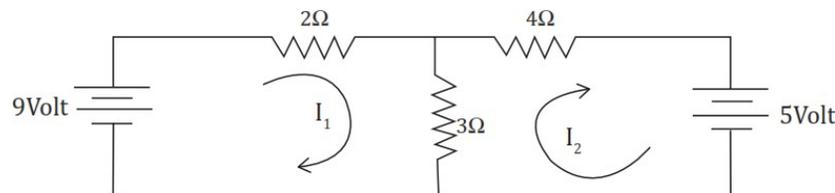
**PART - C (6 × 11 = 66 Marks)**

Answer ALL Questions

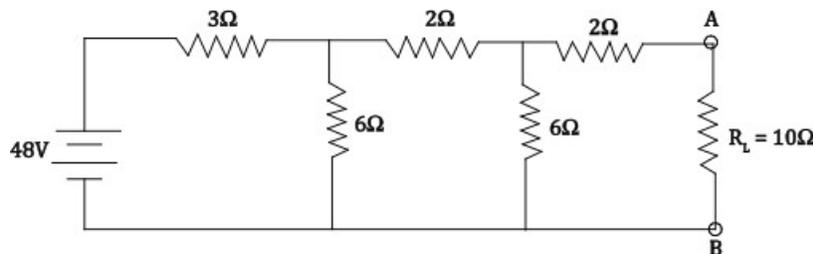
23. a) The Three resistors resistances of  $3\Omega$ ,  $4\Omega$ , and  $8\Omega$  are connected as shown in Fig. across 24 Volts battery. Infer the (i) total effective resistance in the circuit (ii) current supplied by the battery (iii) current flow through each resistor. 11 K2 CO1

**OR**

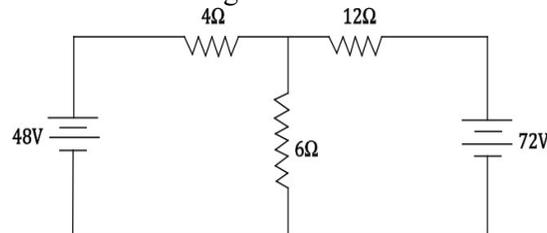
- b) Interpret the value of loop or mesh current  $I_1$  and  $I_2$  for the given circuit as shown in Fig. 11 K2 CO1



24. a) Using thevenin's theorem, solve for the current through  $R_L=10\Omega$  as shown in Fig. and identify power developed by load. 11 K3 CO2

**OR**

- b) Identify the magnitude and direction of current flow through  $6\Omega$  resistor by superposition theorem as shown in Fig. 11 K3 CO2



25. a) Derive the transient response of series R-C circuit, with DC input, using laplace transform and also sketch the transient response curve. 11 K3 CO3

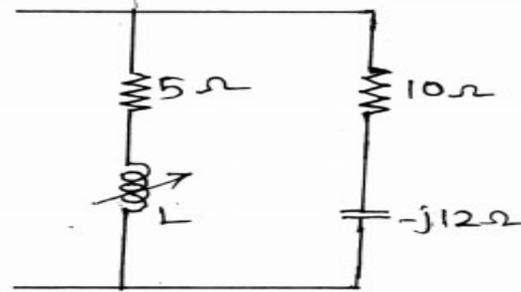
**OR**

- b) Make use of the transient response of series R-L-C circuit, with DC input, using laplace transform. (i) Discuss the cases of over-damping and under-damping. (ii) Express the solution in terms of under damped natural frequency, damped natural frequency and damping factor. Also sketch the transient response curve for the two cases. 11 K3 CO3

26. a) Two coupled coils of self inductance  $L_1 = 2\text{H}$  and  $L_2 = 4\text{H}$  are coupled in (i) series aiding (ii) series opposing (iii) parallel aiding (iv) parallel opposing. If the mutual inductance is  $0.5\text{H}$ , infer the equivalent inductance in each case. 11 K2 CO4

**OR**

- b) Interpret for the value of  $L$  at which the circuit resonates at a frequency of  $1000\text{ rad/s}$  in the circuit shown in Fig. 11 K2 CO4



27. a) A three phase balanced delta-connected load of  $(4+j8)\Omega$  is connected across a  $400\text{V}$ ,  $3\phi$  balanced supply. Show the phase currents and line currents (Phase sequence in RYB). 11 K2 CO5

**OR**

- b) The two wattmeter produces wattmeter readings  $P_1=1560\text{W}$  and  $P_2=2100\text{W}$ , when connected to delta connected load. If the line voltage is  $220\text{V}$ , Calculate the (i) per phase average power (ii) total reactive power (iii) power factor (iv) phasor impedance. Is the impedance inductive or capacitive? Justify. 11 K2 CO5

28. a) (i) Explain briefly about the concept of parallel resonance. 6 K2 CO4  
 (ii) Discuss in detail about the three phase 3-wire circuits with star connected balanced loads. 5 K2 CO5

**OR**

- b) (i) Explain in detail in the concept of co-efficient coupling. 6 K2 CO4  
 (ii) With phasor diagram, show the power equation for three phase power measurement by two wattmeter method for star connected load. 5 K2 CO5