R22 Regulation *Subject code: 4E1AE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech I Semester Regular/Supplementary Examinations, January 2024

Electrical Circuits

(EEE)

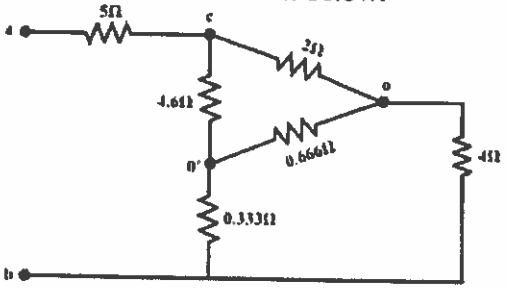
Maximum Marks: 60 Date:27.01.2024 Duration: 3 hours

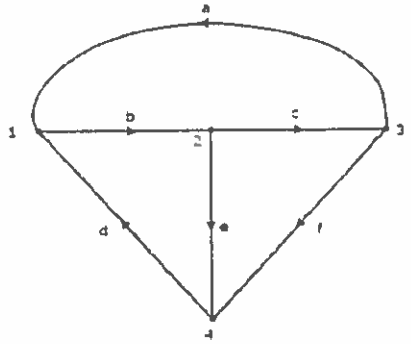
Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

		All the following questions carry equal marks (10x1M=10 Marks)	CO	Bloom Tx
1.	a	Write the expression for voltage across inductor and current through capacitor	1	BL1
	b	Two capacitors with capacitances of 3F and 6F are connected in series. Determine the equivalent capacitance	1	BL3
	c	A sinusoidal source is represented by v(t)=300sin314t.Determine the RMS value and time period of the waveform.	2	BL3
	d	Define power factor.	2	BL4
	e	Write the statement of Tellegen's theorem.	3	
	f	An ac circuit with source impedance of 6+j8 Ω delivers power to load. Determine the value of load impedance for maximum power transfer to the load.	3	BL3
	g	Write the advantages of three-phase systems over single phase systems.	4	BL2
	h	Write the significance of phase sequence.	4	BL4
	i	What is planar network. Define twig	5	BL1
	j	Define mutual inductance	5	BL1

Part-B

		Answer All the following questions. (5X10M=50Marks)		
2		a) State and explain Kirchhoff's laws. b) Compare Mesh and Nodal analysis with suitable examples. [5+5]	1	BL3
		OR		
3		a) Differentiate active and passive elements with examples. b) Determine the resistance between the terminals a and b using star-delta transformation in the circuit shown below.  [5+5]	1	BL2

4	a) Determine the formfactor of half wave rectified sinusoidal voltage waveform. b) A series RLC circuit with R=20Ω,L=0.1H and C= 50μF is excited by single phase 230V,50Hz ac source. Determine (i) Impedance of the circuit (ii) Current (iii) Power and (iv) Power factor of the load [5+5]	2	BL4
	OR		
5	a) What are locus diagrams. Write few applications of locus diagrams. b) Derive an expression for band width of a series RLC circuit. [5+5]	2	BL1
6	State and prove superposition theorem with suitable example. [10]	3	BL2
	OR		
7	State and prove maximum power transfer theorem with suitable example. [10]	3	BL4
8	Prove that two watt meters are sufficient to measure the total 3-phase active power in a 3-phase circuit. Write the advantages of two watt meter method over three watt meter method. [10]	4	BL2
	OR		
9	What is star and delta balance load. Prove that current in the neutral wire of a three phase 4 wire balanced star connected system is zero. [10]	4	BL4
10	a) Define co-efficient of coupling. Derive an expression for it. b) Compare magnetic and electrical circuits. [5+5]	5	BL3
	OR		
11	a) What is incidence matrix. Write the properties of incidence matrix. b) Determine the tie-set matrix for the graph shown in figure. Consider the branch of tree as b,c and e. [5+5] 	5	BL4