



**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

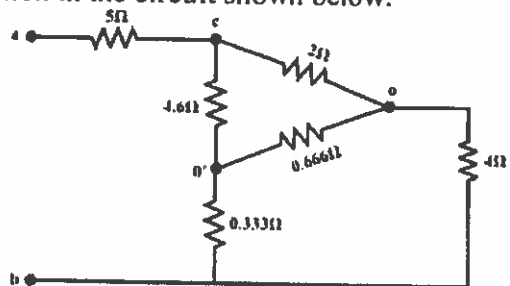
- Note:**
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

**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 $v(t)=300\sin 314t$ . 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 $6+j8 \Omega$ 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
<b>OR</b>				
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.		1	BL2



[5+5]

4	<p>a) Determine the form factor of half wave rectified sinusoidal voltage waveform.</p> <p>b) A series RLC circuit with <math>R=20\Omega</math>, <math>L=0.1H</math> and <math>C=50\mu F</math> is excited by single phase 230V, 50Hz ac source. Determine</p> <p>(i) Impedance of the circuit</p> <p>(ii) Current</p> <p>(iii) Power and</p> <p>(iv) Power factor of the load [5+5]</p>	2	BL4
OR			
5	<p>a) What are locus diagrams. Write few applications of locus diagrams.</p> <p>b) Derive an expression for band width of a series RLC circuit. [5+5]</p>	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	<p>a) Define co-efficient of coupling. Derive an expression for it.</p> <p>b) Compare magnetic and electrical circuits. [5+5]</p>	5	BL3
OR			
11	<p>a) What is incidence matrix. Write the properties of incidence matrix.</p> <p>b) Determine the tie-set matrix for the graph shown in figure. Consider the branch of tree as b,c and e. [5+5]</p>	5	BL4

