Q. Code:337240

Reg. No. | | | | | | | | | | | | | |

B.E./ B.TECH. DEGREE EXAMINATIONS, MAY 2024

Second Semester

EE22201- ELECTRIC CIRCUIT ANALYSIS

(Electrical and Electronics Engineering)

(Regulation 2022)

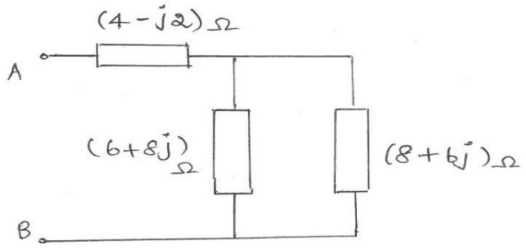
TIME:3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Apply circuit laws to analyze steady-state parameters of given electrical circuits.	**4**
CO 2	Simplify DC and AC electrical circuits by applying suitable reduction methods and network theorems.	**3**
CO 3	Analyze three phase balanced and unbalanced circuits to determine power and power factor.	**4**
CO 4	Analyze transients of electrical circuits and parameters of two-port networks.	**4**
CO 5	Realize resonance phenomenon and the effect of magnetic coupling in real time applications.	**5**

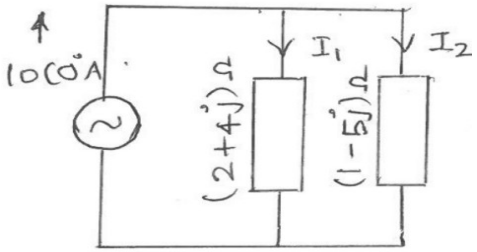
PART- A (20x2= 40Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	State Kirchoff's laws.	**1**	**2**
2.	Give two applications of both series combination and parallel combination.	**1**	**2**
3.	Find the equivalent impedance across the terminals A-B.	**1**	**2**

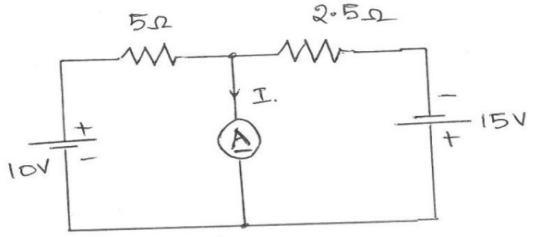


4.	Determine the currents I_1 and I_2 in the circuit shown in fig.	**1**	**3**



5.	State Norton's theorem.	**2**	**2**
6.	A current $5 \angle -30^\circ$ A is flowing through a circuit consists of series connected when excited by a source of $200 \angle 45^\circ$ V, 50Hz. Analysis the elements of circuit.	**2**	**3**
7.	The impedance of each branch of a delta connected circuit is $\sqrt{3}Z$. What will be the branch impedance of equivalent star-connected circuit.	**2**	**3**

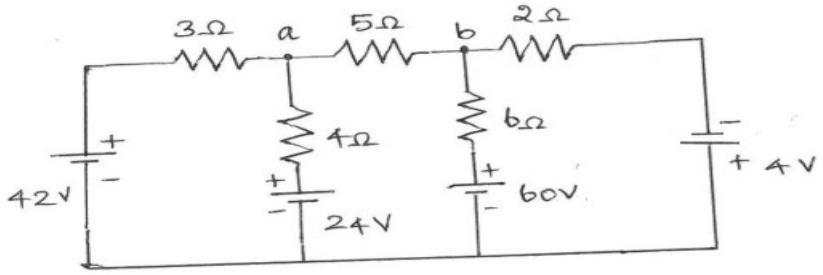
8.	Find the current through the ammeter shown in fig. by using super position theorem.	**2**	**3**	



9.	List out the advantages of three phase system over single phase system.	**3**	**2**	
10.	Compare balanced and unbalanced network.	**3**	**2**	
11.	Give the relation connecting the power factor angle with two watt meter readings.	**3**	**2**	
12.	The power input to a three phase induction motor is 20kW when connected to a 3phase, 50Hz,440V supply taking a current of 30A.Calculate the power factor at which motor is working.	**3**	**3**	
13.	Distinguish between steady state and transient state.	**4**	**2**	
14.	What is the time constant of an RC circuit with R =10kΩ and C =40μF ?	**4**	**2**	
15.	What is a two port network and List the various parameter sets that are used to model a two port network.	**4**	**2**	
16.	State the advantages of Laplace transform application to the solution of electric circuit.	**4**	**2**	
17.	Write an expression for the bandwidth of a series resonant circuit in terms of Q factor and the resonant frequency.	**5**	**2**	
18.	Write the characteristics of series resonance.	**5**	**2**	
19.	An RLC series circuit has R=10Ω and X_c =62.833Ω.Find the value of L for resonance at 50Hz.	**5**	**3**	
20.	Write the expression for the equivalent inductance of two coupled coils connected in parallel.	**5**	**2**	

PART- B (5x 10=50Marks)

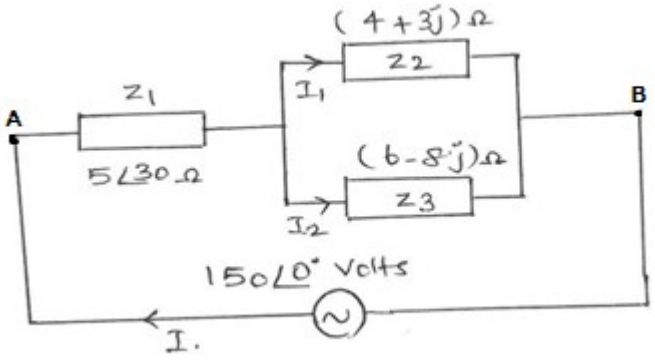
		Marks	CO	RBT LEVEL
21.(a)	Find the voltage across 5Ω resistor for the circuit shown in fig using Nodal analysis.	**(10)**	**1**	**4**



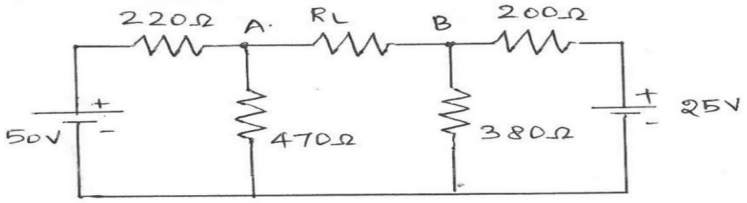
(OR)

(b)	Calculate the equivalent impedance of the network across the output terminals A-B shown in fig. If an alternating voltage of 150 ∠ 0° is connected across A-B.Calculate (i) Total Impedance (ii) The current drawn from the	**(10)**	**1**	**4**

source (iii) The current through each impedance (iv) The real power consumed.

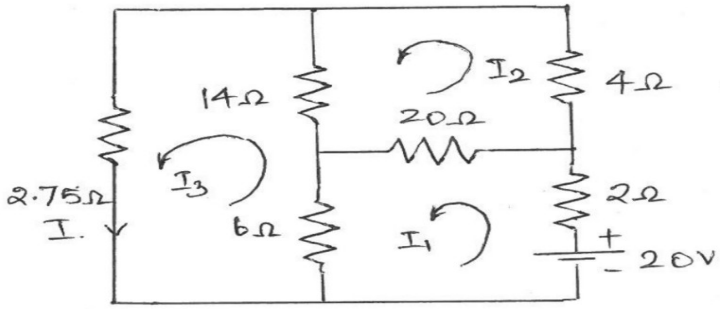


22.(a) Determine Thevenin's equivalent for the circuit shown in fig. Also, find the optimum value of R_L to derive Maximum power from the network and the Maximum power delivered by R_L. **(10) 2 4**



(OR)

(b) In the shown in figure, Find I_3 and verify the reciprocity theorem. **(10) 2 4**



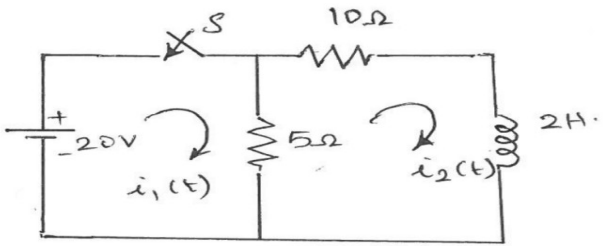
23.(a) A 3 phase star connected system with 400V (line) is connected to three loads $25 \angle 0° \Omega, 11 \angle -20° \Omega$ and $15 \angle 16° \Omega$. Find the line current ,power and the current in the neutral of the system. **(10) 3 4**

(OR)

(b) The two-watt meter produces watt meter readings W_1=1560W and W_2 = 2100W when connected to a delta connected load. If the line voltage is 220V calculate (i) Active Power (ii) Reactive Power (iii) Power factor (iv) Phase Impedance. Is the phase impedance inductive or capacitive? Justify. **(10) 3 4**

24.(a) For the circuit shown in fig, determine the currents $i_1(t)$ and $i_2(t)$ when the switch is closed at t=0.Assume that the initial current through the inductor is **(10) 4 4**

zero.



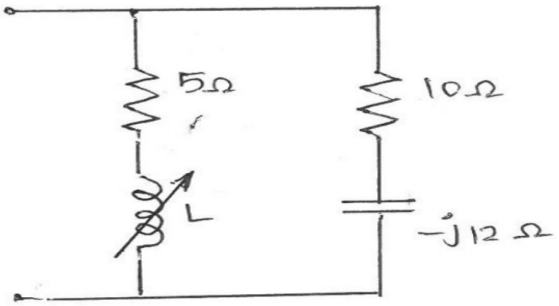
(OR)

(b)	Develop an expression for transient current, voltages and the energy stored in capacitor of a RC transient circuit excited by a DC source.	**(10)**	**4**	**4**

25.(a)	Determine the resonant frequency, bandwidth and quality factor of the coil for the series resonant circuit containing R=10Ω , L=0.1H and C =10μF.Derive the formula used for bandwidth.	**(10)**	**5**	**4**

(OR)

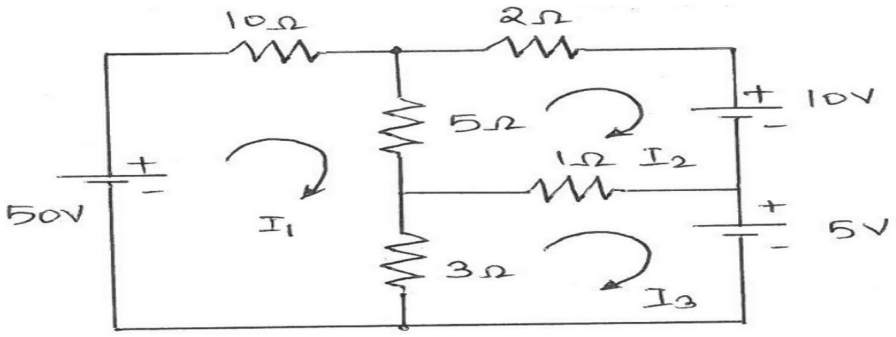
(b)	**(i)** Two coupled coils with L_1=0.02H, L_2 =0.01H and K=0.5 are connected in four different ways, series aiding, series opposing and parallel aiding, parallel opposing. What are the four equivalent inductance?	**(10)**	**5**	**4**
	(ii) Find the value of L at which the circuit resonates at a frequency of 1000rad/sec in the circuit shown in fig.			



PART- C (1x 10=10Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	Use mesh analysis, determine the current through 1Ω, 3Ω, 5Ω resistor for the given circuit.	**(10)**	**1**	**4**



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