A

B.Tech. Degree I Semester Regular/Supplementary Examination in Marine Engineering December 2024

19-208-0105 BASIC ELECTRICAL ENGINEERING
(2019 Scheme)

Time: 3 Hours

Maximum Marks: 60

Course Outcome
On successful completion of the course, the students will be able to:
CO1:   Acquire knowledge of electrical circuit analysis.
CO2:   Review the basic concepts of magnetic circuits, electromagnetism and electrostatics.
CO3:   Understand AC generation, representation and analysis of AC circuits.
CO4:   Grasp the methods of electrical power generation and concept of three-phase system.
CO5:   To understand electrical power transmission, distribution, house wiring.
Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 –Analyze, L5 – Evaluate, L6 – Create
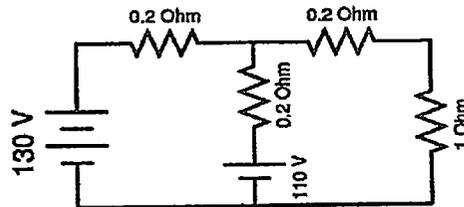PI – Programme Indicators

(Answer *ALL* questions)   (5 × 15 = 75)

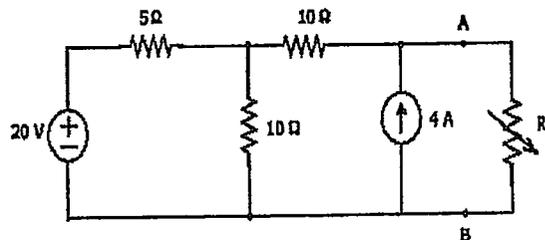|			Marks	BL	CO	PI
I.	(a)	Find the voltage across 30 Ω resistor using Mesh Analysis.	5	L2	1	1.2.1
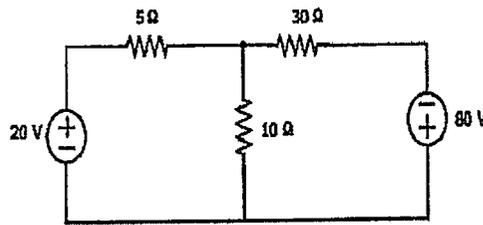
			Marks	BL	CO	PI
	(b)	State and explain the Superposition theorem. Determine the current flowing 1 Ω resistor by using Superposition theorem.	10	L3	1	1.1.1

OR

			Marks	BL	CO	PI
II.	(a)	State and prove maximum power transfer theorem.	8	L2	1	1.1.1

			Marks	BL	CO	PI
	(b)	Find the currents in the given circuit.	7	L5	1	1.3.1

(P.T.O.)
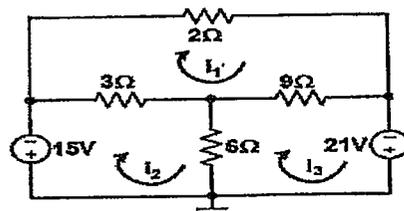
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			Marks	BL	CO	PI
III.	(a)	State and explain Coulomb's law in electrostatics.	3	L1	2	1.1.1
	(b)	Define magnetic flux, flux density and hysteresis.	8	L1	2	1.1.1
	(c)	Find the overall area of a one farad parallel plate capacitor if the separation between the plates is one millimeter and the plates are in vacuum.	4	L2	2	1.2.1
		OR				
IV.	(a)	State and explain Faraday's Law.	4	L2	2	1.1.1
	(b)	Compare self and mutual induction.	5	L2	2	1.1.1
	(c)	The current in a 2 H inductor varies at a rate of 2 A/s. Find the voltage across the inductor and energy stored in the magnetic field after 2 s.	6	L3	2	1.3.1
V.	(a)	What is resonance? Explain the RLC series resonant circuit and derive the equation for resonant frequency.	8	L3	3	1.3.1
	(b)	The R-L-C series circuit is composed of components having $R = 0.3\ \Omega$, $L = 100$ mH, $C = 90\ \mu F$. Calculate the resonance frequency and the corresponding input current at 30 V.	7	L5	3	1.3.1
		OR				
VI.	(a)	Find the average, rms and form factor of a sinusoidal alternating voltage.	5	L4	3	1.3.1
	(b)	A series circuit, having a resistance of 10 Ω, an inductance of 0.025 H and a variable capacitance is connected to a 100 V, 50 Hz single phase supply. Calculate the capacitance when the value of current is 8 A and lagging the voltage. At this value of capacitance, also calculate: (i) the circuit impedance. (ii) the circuit power factor. (iii) power consumed.	10	L5	3	1.3.1
VII.	(a)	A 220 V, three-phase voltage is applied to a balanced delta-connected three-phase load by phase impedance $(15 + j\,20)\ \Omega$. (i) Find the line current in each line. (ii) What is the power consumed per phase? (iii) What is the phasor sum of the three line currents? Why does it have this value?	6	L5	4	1.3.1
	(b)	Derive the relationship between line current and phase current in a three phase delta connected system with the help of vector diagram.	9	L4	4	1.3.1
		OR				
VIII.	(a)	Compare conventional and non-conventional sources of electrical energy.	5	L1	4	2.2.2
	(b)	Explain power generation by Thermal power plant with its schematic.	10	L4	4	2.2.2
IX.	(a)	Explain the general layout of power system.	9	L2	5	2.2 2
	(b)	Compare DC and AC transmission.	6	L2	5	2.2.2
		OR				
X.	(a)	What are the ISI rules regarding house wiring?	5	L2	5	2.4.1
	(b)	Explain		L1	5	2.4.1
		(i) MCB.	5			
		(ii) MCCB.	5			

Bloom's Taxonomy Level
L1 – 16%, L2 – 32%, L3 – 16%, L4 – 16%, L5 – 20%
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