BT MRE-III(R/S)-11-23-3007 Reg. No. | | | | | | | | |

A

B.Tech. Degree III Semester Regular/Supplementary Examination in Marine Engineering November 2023

19-208-0302 ELECTRICAL TECHNOLOGY

(2019 *Scheme*)

Time: 3 Hours Maximum Marks: 60

Course Outcome

On successful completion of the course, the students will be able to:

CO1: Understand the construction and working of transformers, transformer losses, current transformers, and potential transformers.

CO2: Study the different types, constructional details, operational principles, and performance characteristics of DC motors and DC generators.

CO3: Understand the constructional details, operational principles, and performance characteristics of induction motors and alternators.

CO4: Learn about the constructional details, operational principles, and performance characteristics of Alternators.

CO5: Understand the constructional details, operational principles, and performance characteristics of synchronous machines.

Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 –Analyze, L5 – Evaluate, L6 – Create

PI – Programme Indicators

		(5 × 15 = 75)	Marks	BL	CO	PI
I.	(a)	Explain the necessity of an Auto-transformer.	5	L1	1	1.2.1
	(b)	Prove that the saving of Copper in the Auto-transformer is K times that of the ordinary transformer, where K is the transformation ratio.	10	L2	1	1.2.1
		OR				
II.		Obtain the equivalent circuit of a 200/400- V, 50 Hz, 1- phase transformer from the following test data: O.C. Test: 200 V, 0.7 A, 70 W - on L.V. side S.C. Test: 15 V, 10 A, 85 W - on H.V. side Calculate the secondary voltage when delivering 5 kW at 0.8p.f. lagging, the primary voltage is 200 V.	15	L4	1	4.3.3
III.		What is the necessity of a starter in a DC motor? Explain the 3-point starter with a neat sketch.	15	L3	2	1.2.1
		OR				
IV.		The open circuit characteristics of a D.C. shunt generator driven at rated speed is as follows: Field Amperes: 0.5 1.0 1.5 2.0 2.5 3.0 3.5 A Induced Voltage: 60 120 138 145 149 151 152 V If the resistance of the field circuit is adjusted to 53 Ω, Calculate the open circuit voltage and load current when the terminal voltage is 100 V. Neglect the armature reaction and assume an armature resistance of 0.1 Ω.	15	L4	2	4.3.3
V.		Explain why a single-phase Induction motor is not self-starting. Explain any one starting method of Single phase induction motor.	15	L5	3	1.2.1
		OR				

(P.T.O.)

		Marks	BL	CO	PI
VI.	Draw the circle diagram for a 3.73 kW, 200-V, 50-Hz, 4-pole, 3-Ø star-connected induction motor from the following test data: No-load: Line voltage 200 V, line current 5 A, total input 350 W Blocked rotor: Line voltage 100 V, line current 26 A, total input 1700 W. Estimate from the circle diagram for full-load condition, the line current, and the power factor.	15	L4	3	4.3.3
VII.	Find the no-load phase and the line voltage of a star-connected 3- Ø, 6-pole, alternator which runs at 1200 rpm, having flux per pole of 0.1 Wb sinusoidally distributed. Its stator has 54 slots having double layer winding. Each coil has 8 turns and the coil is chorded by 1 slot.	15	L3	4	2.3.2
	OR				
VIII.	A 3- Ø, 16-pole alternator has a star-connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03 Wb, Sinusoidally distributed and the speed is 375 rpm. Find the frequency rpm and the phase and line e.m.f. Assume a full-pitched coil.	15	L5	4	2.3.2
IX.	A 400-V, 10 h.p., 3- Ø synchronous motor has negligible armature resistance and a synchronous reactance of 10 W/phase. Determine the minimum current and the corresponding induced e.m.f. for full-load conditions. Assume an efficiency of 85%.	15	L5	5	4.3.3
	OR				
X.	What is the Hunting of Synchronous motor? Explain the starting method of the Synchronous motor with a neat diagram. What are the Industrial applications of Synchronous motor?	15	L1	5	1.2.1

Bloom's Taxonomy Levels
L1-13.33%, L2-6.66%, L3-20%, L4-30%, L5-30%

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