Course Code: 1930203 Roll No: MLRS- R19

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

II B.Tech I Sem Regular End Examination, March 2021

ELECTRICAL MACHINES-I

(EEE)

Time: 3 Hours. **Max. Marks: 70**

Note: 1. Answer any FIVE questions.
2. Each question carries 14 marks and may have a, b as sub questions.

1	a)	Explain the principle of operation and constructional details of DC Generator. Derive the EMF equation of it.	7M	CO	BL
	b)	Explain the process of building of back e.m.f. in self and separately excited DC Generators.	7M	CO	BL
2	a)	Explain the effects of armature reaction in a d. c. generator.	7M	CO	BL
	b)	The armature of a DC generator is wave wound with 6 poles. There are 56 slots on the armature surface and 6 turns per coil. The armature winding is double layer winding. The current carrying capacity of each conductor is 45 Amp, find the power developed by the armature, if flux per pole is 45mwb and generator is rotated at 350 rpm. Find the resistance of armature, if resistance of each conductor is 0.003Ω and hence find the output power and electrical efficiency of machine. Repeat the calculation for lap winding. Compare the output power and comment on result.	7M	CO	BL
3	a)	Derive the torque equation of a d.c. motor starting from the fundamentals.	7M	CO	BL
	b)	A 4 pole d.c. series motor has wave connected winding with 600 conductors. Total resistance of motor is 0.8Ω. When fed from 250V d.c. source, the motor supplies a load of 10kW and takes 50A with a flux per pole of 3mWb. For these operating conditions, calculate the developed torques and shaft torque.	7M	CO	BL
4	a)	Explain Swinburne's test of finding the performance of a DC machine working as a motor. What are the advantages and disadvantages?	7M	CO	BL
	b)	Explain Field's test on DC series machine.	7M	CO	BL
5	a)	Explain the necessity of Starter in dc motors. Explain the operation of 3-point starter with a neat sketch.	7M	CO	BL
	b)	Outline the steps to estimate the efficiency of given two d.c. machines by conducting Hopkinson's test. Draw schematic diagram to illustrate the method.	7M	CO	BL

6	a)	Explain the constructional details and principle of operation of single phase transformer.	7M	CO	BL
	b)	The efficiency at unity power factor of 6600/384 volts 100 KVA 50 Hz single phase transformer is 98% both at full load and at half full load. The power factor on no load is 0.2 and the full load regulation at a lagging power factor of 0.8 is 4 %. Draw the equivalent circuit referred to L.V. side and insert all the values.	7M	CO	BL
7	a)	Explain the effect of variation in frequency and supply voltage on the core losses of a transformer.	7M	CO	BL
	b)	The nameplate on a 50-MVA, 60-Hz single-phase transformer indicates that it has a voltage rating of 8.0-kV/78-kV. An open-circuit test is conducted from the low-voltage side, and the corresponding instrument readings are 8.0 kV, 62.1 A, and 206 kW. Similarly, a short-circuit test from the low-voltage side gives readings of 674 V, 6.25 kA, and 187kW. i) Calculate the equivalent series impedance, resistance, and reactance of the transformer as referred to the low-voltage terminals. ii) Determine the efficiency and voltage regulation if the transformer is operating at the rated voltage and load (unity power factor).	7M	CO	BL
8	a)	Explain the principle of operation of Auto-Transformer and draw its phasor diagram.	7M	CO	BL
	b)	Explain the Sumpner's test on single phase transformer and give the procedure to calculate the efficiency of the transformer.	7M	CO	BL

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