Course Code: 2030205 Roll No: **MLRS- R20**

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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II B.Tech I Sem Supplementary Examination, July-2022

Electrical Machines – I

(EEE)

Max. Marks: 70

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A

(10*2 Marks = 20 Marks)

1.	a)	What are interpoles? Why are they used in DC machines?	2M	CO1	BL1
	b)	Mention the causes for failure to self-excite.	2M	CO1	BL1
	c)	Explain various losses in DC machine.	2M	CO2	BL2
	d)	Derive the condition for maximum efficiency of DC Machine.	2M	CO2	BL6
	e)	Give the applications of DC shunt and series motors.	2M	CO3	BL1
	f)	What are advantages and disadvantages of Brake test on DC machine.	2M	CO3	BL1
	g)	How can we refer the transformer winding resistance and leakage reactance from one side to the other?	2M	CO4	BL1
	h)	Why are transformers needed in a power system?	2M	CO4	BL1
	i)	Why is the SC test performed at reduced voltage on the HV side?	2M	CO5	BL1
	j)	Define voltage regulation of transformer.	2M	CO5	BL1

PART- B

(10*5 Marks = 50 Marks)

2	a)	Explain critical field resistance and critical speed. Give their significance.	5M	CO1	BL2
	b)	Explain the load characteristics of DC shunt, series and compound generators. Draw the graphs.	5M	CO1	BL2
		OR			
3		In a 110 V compound generator, the resistance of the armature, shunt and series windings are 0.06, 25 and 0.05 Ω respectively, The load consists of 200 lamps each rated at 55 W, 100 V. Find the emf and armature current, when the machine is connected for (a) long shunt (b) How will the ampere turns of the series windings be changed, if in (a) a diverter of resistance 0.1 Ω is connected across the series field? Ignore armature reaction and brush voltage drop.	10M	CO1	BL3

4	a)	What is armature reaction? Explain its adverse affects of it.	5M	CO2	BL2
	b)	Explain speed control of DC shunt motor using armature and field control methods.	5M	CO2	BL2
		OR			
5		A 10 kW, 250 V shunt motor has an armature resistance of 0.5 Ω and a field resistance of 200 Ω. At no load and rated voltage, the speed is 1200 rpm and the armature current is 3 A. At full load and rated voltage, the line current is 47 A and because of armature reaction, the flux is 4% less than its no-load value. (a) What is the full-load speed? (b) What is the developed torque at full load?	10M	CO2	BL3
6	a)	Explain Swinburne's test and give steps to determine the efficiency of the DC machine.	5M	CO3	BL2
	b)	Briefly discuss about separation of stray losses in the DC machine.	5M	CO3	BL2
		OR			
7		Explain Hopkinson's test with the help of neat circuit diagram. Give the steps to determine the efficiency of both the machines.	10M	CO3	BL2
8	a)	Explain the constructional details and principle of operation of single-phase transformer.	5M	CO4	BL2
	b)	State and prove the condition from maximum efficiency of a transformer.	5M	CO4	BL3
		OR			
9		A 400/200 V, 50 Hz transformer has a primary impedance of 1.2 + j 3.2 Ω and secondary impedance of 0.4 + j 1.0 Ω. A short-circuit occurs on the secondary side with 400 V applied to the primary. Calculate the primary current and its power factor.	10M	CO4	BL3
10	a)	Explain Sumpner's test on single-phase transformer. Give steps to determine efficiency.	5M	CO5	BL2
	b)	Explain various winding connection types in three-phase transformers, with the help of neat diagrams. Give the relationship between phase and line quantities of voltage and currents.	5M	CO5	BL2
		OR			
11		Each phase of a 3-phase transformer is rated 6.6 kV/230 V, 200 kVA with a series reactance of 8%. (a) The transformer is connected Y/Y. What is its 3-phase rating (voltage and kVA) and the per unit reactance. (b) Calculate the pf of load (rated) at which voltage regulation would be maximum. If this load is fed at rated voltage on LV side, what should be the HV side line voltage?	10M	CO5	BL3

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