R22 Regulation *Subject code: 4E3BD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech III Semester Supplementary Examinations, July 2024

ELECTRICAL MACHINES-I

(EEE)

Maximum Marks: 60 Date:25.07.2024 Duration: 3 hours

Note:
1. **This question paper contains two parts A and B.**
2. **Part A is compulsory which carries 10 marks. Answer all questions in Part A.**
3. **Part B consists of 5 Units. Answer any one full question from each unit.**
4. **Each question carries 10 marks and may have a, b, c, d as sub questions.**

	Part-A	CO	Bloom Tx
All the following questions carry equal marks	(10X1M=10 Marks)		
1.a)	How does field distortion affect commutation?	CO1	BL3
b)	What is the purpose of laminating the armature?	CO1	BL5
c)	Distinguish between armature resistance control and field resistance control while controlling the speed of dc shunt motors?	CO2	BL2
d)	Draw the torque-current characteristics of dc compound motors.	CO2	BL3
e)	Why is Hopkinson's test called regenerative test?	CO3	BL6
f)	Mention the factors on which hysteresis loss depends.	CO3	BL2
g)	The parameters of 2400/120V, 50Hz transformer are R1=0.1 ohms and R2 = 0.035 ohms. Find R_{01} and R_{02}?	CO4	BL4
h)	Why is transformer rating expressed in terms of kVA?	CO4	BL2
i)	Distinguish between autotransformer and ordinary 2-winding transformer in brief?	CO5	BL3
j)	What are the advantages of Sumpner's test over OC and SC tests?	CO5	BL1
	Part-B		
Answer All the following questions.	(5X10M=50Marks)		Bloom Tx level
2	a) Explain about demagnetizing AT/pole and cross magnetizing AT/pole. [5] b) Briefly explain the function of compensating winding in DC machine. [5]	CO1	BL2
	OR		
3	a) Distinguish between GNA and MNA. Describe the role of interpoles in a DC generator. [5] b) Draw the load characteristics of d.c compound motor and shunt motor. [5]	CO1	BL3
4	a) Derive the condition for maximum efficiency in DC machines. [5] b) The iron losses in a dc machine, when driven at normal speed and at normal excitation are 8KW. When driven at half speed and same excitation the losses are reduced to 3 KW. Determine the values of eddy current and hysteresis losses at (i) half speed and (ii) full speed [5]	CO2	BL4
	OR		

5	a) Explain principle of operation of DC motor with a neat sketch. [5] b) A DC series motor is running with a speed of 1000 RPM while taking a current of 30 A from the supply. If the load is changed such that the current drawn by the motor is increased to 70 A, calculate the speed of the motor on new load. The armature and series field winding resistances are 0.25 ohms and 0.35 ohms respectively. Assume the flux produced is proportional to the current. Take supply voltage as 260 V. [5]	CO2	BL5
6	a) Explain Field's test performed on dc machines. [5] b) What are the advantages of Swinburne's test over direct loading? Explain the test with relevant expressions. [5]	CO3	BL2
	OR		
7	a) Describe the brake test on DC motor to determine the performance characteristics of DC motor. [5] b) A 440V DC Shunt motor takes 4A at no load. Its armature and field resistances are 0.4Ω and 220Ω respectively. Estimate the kW output and efficiency when the motor takes 60A on full load. [5]	CO3	BL6
8	a) Define efficiency and regulation of a transformer. Show how the power factor affects both. [5] b) The voltage per turn of a single-phase transformer is 1.1V. When the primary winding is connected to a 220V, 50Hz A.C supply, the secondary voltage is found to be 550V. Find: i) Primary and Secondary number of turns ii) Core area if the maximum flux density is 1.1 wb/m^2. [5]	CO4	BL4
	OR		
9	Obtain the equivalent circuit parameters of 4 kVA, 200/400V, 50 Hz, 1-phase transformer from the following test data. OC test: 200V, 0.7A, 70W. SC test: 15V, 10A, 85W (with LV Short circuit). [10]	CO4	BL2
10	The OC and SC test data of 4 kVA, 200/400V, single phase transformer when supplying full load at 0.8 lagging p.f is given below. OC test: 200V, 0.8A, 70W (HV open circuit) SC test: 20V, 10A, 60W (LV short circuit) Calculate efficiency at a) full load, b) ½ Full load and c) Voltage regulation at Full load. [10]	CO5	BL4
	OR		
11	Mention the different tests that are conducted on Transformer? Explain the procedure for conducting Sumpner's test along with all precautions to be taken while conducting the test with neat diagrams. [10]	CO5	BL1