PVP 20

Code: 20EE3303

II B.Tech - I Semester – Regular / Supplementary Examinations
DECEMBER 2022

ELECTRICAL MACHINES - I
(ELCTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Discuss terms i) Magneto Motive Force ii) Permeance iii) Reluctance	L2	CO2	7 M
	b)	A coil of 100 turns is wound uniformly over an insulator ring with a mean circumference of 2m and uniform sectional area of $0.025cm^2$. If the coil carrying a current of 2A Calculate i) MMF of the circuit ii) Magnetic Field Intensity iii) Flux density	L3	CO2	7 M
OR					
2	a)	Derive an expression for the energy stored in a magnetic field.	L2	CO2	7 M
	b)	State and briefly explain the various phenomena useful for electro-mechanical energy conversion in rotating machines.	L3	CO2	7 M

UNIT-II					
3	a)	Illustrate armature reaction in a DC machine and show how cross-magnetizing and demagnetizing MMF are produced.	L3	CO2	7 M
	b)	A 6-pole machine has an armature with 90 slots and 8 conductors per slot and runs at 1000 RPM, the flux per pole is 0.05 Wb. Determine the induced EMF if winding is (i) lap connected (ii) Wave connected.	L4	CO4	7 M
OR					
4	a)	Explain various methods of improving commutation in DC machines and its advantages.	L2	CO2	7 M
	b)	Elaborate the conditions to be fulfilled for DC Shunt generators operate in parallel. Explain power sharing between two dissimilar power rated machine.	L4	CO4	7 M
UNIT-III					
5	a)	Interpret why the starting current is high in a DC motor? Explain the working of a four-point starter for a DC machine.	L3	CO2	7 M
	b)	Two identical DC machines when tested by Hopkinsons method give the following test results. Field current are 2.5A and 2A. Line voltage is 220V. Line current including both the field current 10A. Motor armature current is 73A. The armature resistance of each machine is 0.05Ω. Calculate the efficiency of both machines.	L4	CO4	7 M

		OR			
6	a)	Explain the Swinburne's test to determine the losses of DC machine. Also write its limitations.	L2	CO2	7 M
	b)	A 200V DC shunt motor having armature resistance of 0.4Ω takes armature current of 20A on full load and runs at 600RPM. If resistance 0.5Ω is placed in the armature circuit, find the speed at half-full load torque. What is the ratio of stalling torque to full load torque.	L4	CO4	7 M
		UNIT-IV			
7	a)	Draw General schematic of a single phase transformer. Describe its working principle and diagram. Deduce the expression for EMF in secondary?	L3	CO3	7 M
	b)	A single phase 5:1 step down transformer takes no-load current of 0.8A at p.f of 0.25 lagging with LV winding as open. The secondary is connected to a load, taking a current of 100A at 0.8pf lagging. Find the primary current and power factor.	L4	CO5	7 M
		OR			
8	a)	Deduce the approximate equivalent circuit of a transformer referred to the primary side and derive relations for equivalent parameters.	L3	CO3	7 M
	b)	Explain the procedure to test two identical	L4	CO5	7 M

		transformers and how will estimate the losses from the test.			
		UNIT-V			
9	a)	Draw and explain the Scott connection of transformers and mark the terminals and turn-ratio.	L3	CO3	7 M
	b)	A 400/100V, 5kVA, two winding transformer is to be an auto transformer to supply power at 400V from 500V source. Draw the connection diagram and determine the kVA output of the auto transformer.	L4	CO5	7 M
		OR			
10	a)	Explain the significance of vector grouping of transformers. Also suggest the conditions to operate transformers in parallel.	L2	CO3	7 M
	b)	Distinguish the open Delta connection with Delta –Delta connection.	L4	CO5	7 M