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Reg. No: ☐☐☐☐☐☐☐☐☐☐

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech III Year I Semester Regular Examinations March-2023
ELECTRICAL MACHINES – III
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

1	a	Define harmonics and what are the various causes of producing harmonics in induced EMF?	CO1	L3	6M
	b	What are the effect of harmonics on induced EMF and winding factors and how they are suppressed?	CO1	L4	6M

OR

2		A 3-phase, 50 Hz, 16 pole star connected alternator has stator winding with 144 slots with 10 conductors per slot. The flux per pole is 0.04 wb and is distributed sinusoidally. The speed is 375 rpm. Find the frequency, phase EMF, and line EMF. The coil span is 120 degree electrical.	CO1	L2	12M

UNIT-II

3	a	Define i) Armature resistance ii) Leakage reactance iii) synchronous reactance iv) Synchronous impedance	CO2	L4	6M
	b	What is the armature reaction in alternators? Explain it for different power factors conditions.	CO2	L3	6M

OR

4		Explain the procedure for the construction of the Potier triangle by ZPF method and How do you calculate the no-load voltage and voltage regulation with a phasor diagram?	CO2	L2	12M

UNIT-III

5	a	Show that for alternators running in parallel, the division of load between them is governed mainly by the speed load characteristics of their prime movers?	CO3	L2	6M
	b	Two 3-phase synchronous mechanically coupled generators operate In parallel on the same load. Determine the kW output and pf of each machine under the following conditions. The synchronous impedance of each generator 0.2+j0.2 ohm/phase. Equivalent impedance of the load 3+4J ohm/phase. Induced emf per phase 2000+j0 volt for machine I and 22000+J100 for II.	CO3	L3	6M

OR

6	What is meant by synchronization of alternators? Discuss any two methods of synchronization of alternator.	CO3	L1	12M

UNIT-IV

7	Explain the operation of a synchronous motor at constant load variable excitation with neat phasor diagrams.	CO5	L2	12M

OR

8	a	What is a synchronous condenser? What is the use of a synchronous condenser with a neat phasor diagram?	CO5	L1	6M
	b	A 3-phase, 500V star-connected synchronous motor gives a net output of 17kW on full load operating at 0.9 lagging power factor. Its armature resistance is 0.8 Ω per phase. The mechanical losses are 1300W. Estimate the current drawn by the motor and full load efficiency.	CO5	L4	6M

UNIT-V

9	a	Discuss the disadvantages of low power factor and explain the use of synchronous condenser in power factor improvement.	CO6	L2	6M
	b	An industrial load of 800 kW is operating at 0.6 lagging power factor. It is desired to improve the factor to 0.92 lagging by connecting a synchronous motor driving load of 200 kW with an efficiency of 91%. Determine the KVA rating of the synchronous motor and the power factor at which it is operating.	CO6	L3	6M

OR

10	What is hunting? State its causes and how it can be minimized. Explain the use of damper winding in a synchronous motor.	CO6	L1	12M

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