Q.P. Code: 16EE220 **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

BTECH III Year I Semester Supplementary Examinations November-2020

ELECTRICAL MACHINES III

(Electrical & Electronics Engineering)

Time: 3 hours Max. Marks: 60

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

UNIT-I

1	**a**	Explain the constructional details of salient pole and round rotor synchronous machines.	**7M**
	b	Define Armature reaction and discuss the armature reaction at UPF, lagging PF and leading PF with necessary wave forms.	**5M**

OR

2	**a**	Derive the EMF equation of an alternator.	**7M**
	b	The stator of a 3-phase, 16 pole alternator has 144 slots and there are 6 conductors per slot connected in two layers and the each phase are connected in series. If the speed of the alternator is 600 rpm, calculate the emf induced per phase. Resultant flux in the air-gap is 8×10^{-2} Webers per pole sinusoidally distributed. Assume the coil span as 150° electrical.	**5M**

UNIT-II

3	**a**	What is voltage regulation? Explain the synchronous impedance method for the determination of voltage regulation of an alternator.	**7M**
	b	A 1500 KVA, 6600V 3 phase star connected alternator with a resistance of 0.4 ohm and reactance of 6 ohm per phase, delivers full load current at power factor 0.8 lagging, and normal rated voltage. Estimate the terminal voltage for the same excitation and load current at 0.8 power factor leading.	**5M**

OR

4	**a**	Describe a method to determine direct axis and quadrature axis reactance of a salient pole alternator.	**7M**
	b	A 3-phase generator rated at 25 MVA, 0.8 power factor lag, 13.8 kV is operating at normal voltage and rated load. The direct axis synchronous reactance is 7.62 Ω, quadrature axis synchronous reactance is 4.57 Ω and armature resistance is 0.15 Ω per phase. Determine the direct axis and quadrature axis components of armature current and internal induced voltage.	**5M**

UNIT-III

5	**a**	What are the conditions required for parallel operation of alternators? Discuss any one method of synchronizing of alternators? Also explain the advantages of parallel operation of alternators.	**7M**
	b	Two similar 400V, 3-phase alternators share equal kW power delivered to a balanced 3-phase 50 kW, 0.8 p.f. lag load. If the power factor of one is 0.95 lag, find the power factor and the current supplied by the other machine.	**5M**

OR

6	**a**	What are the effects of change of excitation and mechanical power input on alternators operated in parallel.	**7M**
	b	A 2 MVA, 3-phase, star connected, 4 pole, 750 rpm alternator is operating on 6000 V bus bars. The synchronous reactance is 6 ohms per phase. Find synchronizing power and torque for full load 0.8 power factor lagging.	**5M**

UNIT-IV

7	**a**	Describe the effect of varying excitation upon armature current and power synchronous motor when the input power to motor is maintained constant.	**7M**
	b	A 2 kV, 3-phase star-connected synchronous motor has an effective resistance and synchronous reactance per phase of 0.3 ohms and 2.4 ohms respectively. The input is 800 kW at normal voltage and induced line e.m.f is 2500 V. Calculate line current and power factor.	**5M**

OR

8	**a**	Show that locus of power of a synchronous machine is circle. Give the co-ordinates of power circle.	**7M**
	b	What is meant by hunting? Explain the methods to suppress hunting.	**5M**

UNIT-V

9	**a**	Derive equation for forward slip and backward slip of a single phase induction motor.	**7M**
	b	Discuss the principle of operation of universal motors.	**5M**

OR

10	**a**	Explain the construction and working principle of a shaded pole induction motor.	**7M**
	b	Discuss about various type of stepper motor.	**5M**

*** END ***