(3 Hours) (Maximum Marks 80)

Note:-

1. Q.1 is compulsory

2. Solve ANY THREE questions out of remaining.

3. ASSUME SUITABLE DATA wherever necessary.

Q1. (20)

a) Explain the operating principle of an alternator.

b) Explain operating principle of BLDC.

c) Define and explain power angle characteristics of salient pole synchronous machine.

d) What is meant by short pitched coil and what is the effect of using short pitched coil.

Q.2 (20)

a) A 220V, 50 Hz, 6 pole star connected alternator with ohmic resistance of 0.06 ohm per phase, gave following test results,

Field current A (If)	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.8	2.2	2.6	3.0	3.4
OC voltage in V (Ef)	29	58	87	116	146	172	194	232	261.5	284	300	310
Zpf terminal voltage in V	----	----	----	----	----	0	29	88	140	177	208	230

Find the regulation at full load current of 40A at pf of 0.8 lag by ZPF method.

b) Explain MMF and New ASA method to find regulation of an alternator.

Q.3 (20)

a) Explain Blondel's two reaction theory in detail.

b) A 125MVA, 3 phase, star connected 11KV, 4 pole, 50Hzsynchronous motor has a reactance of 0.15pu and negligible armature resistance. Calculate the synchronizing power per mechanical degree when it supplies full load at 11KV and 0.8 pf lead.

Q.4 (20)

a) Explain microprocessor based control scheme of BLDC motor (Block diagram and flow chart).

b) A 3 phase, 50Hz, 2 pole, star connected turbo alternator has 54 slots with 4 conductors per slot. The pitch of the coil is 2 slots less than the pole pitch. If the machine gives 3300V between lines on open circuit with sinusoidal flux distribution, determine the useful flux per pole.

Q.5 (20)

a) Explain the effect of change in excitation and mechanical power on performance of synchronous motor.

b) Explain starting methods of synchronous motors.

Q. 6 (20)

a) Write a short note on excitation circles and power circles.

b) Explain hunting in synchronous motors.