

P.E. Select. VI (old)
Elect. Mlc. III

25/5/07

Con. 2427-07.

(OLD COURSE)

ND-9617

(3 Hours)

[Total Marks : 100

MASHER

- N.B. :** (1) Question No. 1 is compulsory.
 (2) Attempt any four out of remaining.
 (3) Assume data wherever necessary and justify the same.

1. (a) Derive expression for distribution factor and coil span factor for 3 phase ac winding. 10
 (b) Derive expression for power developed in salient pole synchronous machine. 10

2. A 220 V, 50 Hz, 6 pole star connected alternator with ohmic resistance of 0.06 Ω per phase 20
 gave following data :

Field current A	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.8	2.2	2.6	3.0	3.4
Open circuit Voltage E_z volts	29	58	87	116	146	172	194	232	261.5	284	300	310
Short circuit current in Amp.	6.6	13.2	20	26.5	32.4	40	46.3	59	-	-	-	-
Zpf terminal voltage in V	-	-	-	-	-	0	29	88	140	177	208	230

 Find % voltage regulation at F. L current of 40 amps of 0.8 lag by emf, mmf zpf and ASA method.

3. (a) Explain how synchronous motor can be used to improve the power factor with the help of phasor diagram. 10
 (b) Explain starting methods of synchronous motors. 10

4. (a) What is necessity of voltage control alongwith frequency control ? Hence, explain V/f control of an induction motor. 10
 (b) Explain working of 3 ph inverter circuit with neat diagram and relevant O/P waveforms. 10

5. (a) State the conditions for parallel operation of two alternators. Derive expressions for load shared by each alternator. 10
 (b) Two similar alternators operating in parallel have following data : 10
 Alternator 1 – Capacity 700 kW, frequency drops from 50 Hz at no load to 48.5 Hz at full load.
 Alternator 2 – Capacity 700 kW, frequency drops from 50.5 Hz at no load to 48 Hz at full load.
 Speed regulation if primovers is linear in both case.
 Calculate how a total load of 1200 kW is shared by each alternator and find operating frequency at this bus bar.

6. (a) A 10 pole 50 Hz, 3 phase synchronous machine has 4 slots/ph/pole. Each slot has 12 conductors. Winding is chorded by one slot. Find distribution factors and pitch factors for fundamental, third and fifth harmonics. 10
 (b) Explain hunting in synchronous motor. 10

7. Write short notes on (any two) : 20
 - (a) Different types of reluctance motors
 - (b) Locus of armature current as excitation voltage E_z and load angle δ is varied.
 - (c) Expressions for armature to field mutual inductances and armature self inductances for salient pole machines.