

Total No. of Questions : 10]

SEAT No. :

**P2586**

**[5153]-562**

[Total No. of Pages : 3

**T.E. (Electrical)**

**ELECTRICAL MACHINES - II**

**(2012 Pattern) (Semester-I)(EndSem.)**

*Time : 2½ Hours]*

*[Max. Marks :70*

*Instructions to the candidates:*

- 1) Answer Q1 or 2, Q3 or 4, Q5 or 6, Q7 or 8, Q9 or 10.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Use of Electronic pocket calculator is allowed.
- 5) Assume Suitable data, if necessary.

**Q1) a)** Draw and explain power - power angle curve of synchronous generator. **[4]**

- b) Slip test is conducted on 3 phase, 3kVA, 415V star connected alternator with following observations.

$V_{\max}$ (line) Volts	$V_{\min}$ (line) Volts	$I_{\max}$ (Amp)	$I_{\min}$ (Amp)
44.3	39.9	1.1	0.8

The armature resistance per phase is 5 ohms. Calculate regulation of alternator at 0.8 p.f lagging. **[6]**

OR

**Q2) a)** Compare emt method & mmt method of finding voltage regulation of alternator. **[4]**

- b) With neat diagram explain bright lamp method of synchronization of 3 phase alternators. **[6]**

**Q3) a)** A 10 MVA, 6.6 KV, 3 phase star connected alternator has provided OCC & SCC test data as under- **[8]**

$I_f$ (Amp)	25	50	75	100	125	150	175	200	225
$V_L$ (kv)	2.4	4.8	6.1	7.1	7.6	7.9	8.3	8.5	8.7
$I_{asc}$ (Amp)	288	582	875	-	-	-	-	-	-

**P.T.O.**

Calculate using ampere turns method the full load voltage regulation at 0.8 p.f lagging. The armature resistance  $R_a = 0.13 \Omega$ /phase

- b) Define Short Circuit Ratio (SCR) in case of synchronous generator. [2]

OR

**Q4)** a) A 3980V, 50Hz, 4 pole star connected synchronous motor generates back emf of 1790V per phase. The armature resistance & synchronous reactance per phase are  $2.2 \Omega$  and  $22 \Omega$  respectively. The torque angle is  $30^\circ$  electrical. Calculate (i) the resultant armature voltage/phase (ii) armature current / phase (iii) power factor of the motor. [8]

- b) State applications of 3 phase synchronous motor. [2]

**Q5)** a) With neat diagram, explain operation of 3 phase Induction generator state its applications. [8]

- b) With neat diagram, explain construction & working of permanent magnet stepper motor. [8]

OR

**Q6)** a) What are different methods of controlling speed of 3 phase induction motor. Explain V/f method. [8]

- b) Write a short note on single phase induction voltage regulator. [8]

**Q7)** a) Explain the operation of DC series motor on A.C supply. Explain the problems associated with AC operation. [8]

- b) A universal motor has resistance of  $30 \Omega$  and an inductance of  $0.5H$ . When connected to a 250V dc supply and loaded to take 0.8 Amp, it runs at 2000 rpm. Estimate its speed & power factor when connected to 250V 50Hz a.c supply & loaded to take the same current. [8]

OR

**Q8)** a) Explain the procedure to plot circle diagram of a.c series motor. How efficiency can be determined from it? [8]

- b) Compare the performance of universal motor on A.C & D.C supply. State applications of universal motor. Specify ratings of universal motor. [8]

**Q9) a)** With neat diagram, explain construction & working of capacitor start induction motor. Draw its phasor diagram & torque - speed characteristics. **[10]**

b) A 2 pole 240V 50Hz style phase induction motor has following constants referred to the stator. **[8]**

$R_1=2.2\ \Omega$ ,  $X_1=3.0\ \Omega$ ,  $R_2^1=3.8\ \Omega$ ,  $X_2^1=2.1\ \Omega$ ,  $X_m=86\ \Omega$ . Calculate the stator current & input power when the motor is operating at full load speed of 2820 rpm neglect case losses.

OR

**Q10)a)** Explain double field revolving theory for single phase induction motor. Hence draw its torque-speed curve. **[10]**

b) With suitable diagram explain no load & blocked rotor test on single phase split phase induction motor. Hence obtain the equivalent circuit for no load & blocked rotor test. **[8]**

