

Total No. of Questions : 10]

SEAT No. :

P2439

[Total No. of Pages : 3

[5253]-162

T.E. (Electrical)

ELECTRICAL MACHINES - II

(2012 Pattern) (End Semester)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) *Solve Q.No.1 or 2, Q.No.3 or 4, Q.No.5 or 6, Q.No.7 or 8, Q.No.9 or 10.*
- 2) *Neat diagram must be drawn whenever 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) Explain pitch factor (Kc) with diagram. **[4]**

- b) Effective resistance of a 1MVA, 3300V, 50Hz three phase star connected alternator is 0.3Ω per phase. A field current of 35 A produces a current of 200A on short circuit and 1100V across lines on open circuit. Find the per unit change in terminal voltage when a load of 1000 kW at 0.8 power factor lagging is thrown off. **[6]**

OR

Q2) a) With a neat diagram explain construction of three phase alternator. **[4]**

- b) Explain the procedure to determine regulation of three phase alternator by e.m.f. method. **[6]**

Q3) a) Compare three phase synchronous motor with three phase induction motor on following points : **[4]**

- i) Starting
- ii) Speed
- iii) Power factor
- iv) Cost/KVA

P.T.O.

- b) A three phase 20 kW synchronous motor is connected to 1000V supply and has synchronous reactance of 10Ω per phase. Find the value of minimum current and the corresponding induced emf for full load condition. The efficiency of the motor is 0.8, Neglect armature resistance. [6]

OR

- Q4)** a) Define short circuit ratio of alternator elaborate its significance. [4]
b) An alternator has direct axis synchronous reactance of 0.9 per unit and quadrature axis reactance of 0.55 per unit. Find the per unit open circuit voltage for full load at lagging power factor of 0.8. [6]
- Q5)** a) Explain construction and working of brushless d.c. motor. [8]
b) Explain stator side speed control methods of three phase induction motor (Any two). [8]

OR

- Q6)** a) Explain construction and working of variable reluctance stepper motor. [8]
b) Draw complete slip-torque characteristics of three phase induction motor and explain working of induction generator. [8]
- Q7)** a) Compare uncompensated a.c. series motor with compensated a.c. series motor. [8]
b) Explain working of universal motor with its operating characteristics. [8]

OR

- Q8)** a) Explain procedure to plot circle diagram of a.c. series motor. [8]
b) An universal motor having resistance of 38Ω and inductance of 0.25H connected to 230V d.c. Supply draws 1A at 2000 rpm when loaded. Find the speed and torque when the motor is connected with 230V, 50Hz a.c. Supply and loaded to draw same value of current when connected with d.c. supply. [8]

Q9) a) With neat diagram explain construction and working of split phase induction motor. Draw its torque speed characteristics. [8]

b) With a suitable diagram explain no load and blocked rotor test on single phase induction motor. How equivalent parameters are obtained from these tests. Draw equivalent circuits of the motor under two test conditions. [10]

OR

Q10)a) With neat diagram explain double field revolving theory. Hence draw torque-speed characteristics of single phase induction motor. [8]

b) A 230V, 50 Hz, 4 pole single phase induction motor has the following equivalent circuit parameters : [10]

$$R_1 = 3\Omega, R_2 = 5\Omega, X_1 = 3\Omega, X_2 = 2.5\Omega \text{ and } X_m = 75\Omega$$

Friction, windage and core losses are 50W and slip is 0.025. Calculate :

- i) Input current
- ii) Power factor
- iii) Developed power
- iv) Output power
- v) Efficiency

