[5460] - 562
T.E. (Electrical)
ELECTRICAL MACHINES - II
(2015 Pattern)

Time : 2½ Hours]   *[Max. Marks :70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 , Q.7 or Q.8.*
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) With neat diagram explain slip test to determine direct & quadrature axis reactance. **[6]**

b) What is hunting in synchronous motor. Explain how it can be reduced.**[6]**

c) A 1200 kVA 3300 V 50 Hz star connected alternator has effective armature resistance of 0.25 Ω per phase. A field current of 40 A produces a short circuit current of 200 A and an open circuit emf of 1100 V line to line. Calculate the voltage regulation at full load. **[8]**

   i) 0.8 pf lag

   ii) 0.8 pf lead

OR

Q2) a) A 3 phase 8 pole 750 rpm star connected alternator has 72 slots on the armature. Each slot has 12 conductors and winding is shorted by 2 slots. Calculate the induced emf between the lines if flux per pole is 0.06 weber. **[6]**

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

c) Justify - 'Three phase synchronous motor is not self starting'. Explain any one method of starting 3 phase synchronous motor. **[8]**

P.T.O.

Q3) a) Explain with neat diagram following speed control methods in 3 φ I.M. **[8]**

     i)   Rotor resistance control

     ii)   V/F method

    b) Explain with neat diagram construction & working of variable reluctance stepper motor. **[8]**

<div align="center">OR</div>

Q4) a) With suitable diagram explain construction & working of linear induction motor. **[8]**

    b) Write short note on - 3 phase Induction Generator. **[8]**

Q5) a) What are the problems experienced by dc series motor operated on a.c. supply. What are the modifications necessary to improve the performance of motor. **[8]**

    b) Draw the circle diagram of plain A.C. series motor. Describe how to find out motor Input, motor output and speed scale. **[8]**

<div align="center">OR</div>

Q6) a) Compare the performance of universal motor on A.C. and D.C supply. Draw torque vs. armature current and speed vs. torque characteristics on a.c. & d.c. operation. **[8]**

    b) With neat diagram explain working of **[8]**

     i)   Inductually compensated a.c series motor.

     ii)   Conductually compensated a.c series motor

Q7) a) With neat diagram, explain construction & working of permanent capacitor induction motor. Draw its phaser diagram. **[10]**

    b) With suitable diagram explain no load test and blocked rotor test on single phase induction motor. How equivalent circuit parameters are obtained from these tests. **[8]**

<div align="center">OR</div>

Q8) a) A 230 V, 1 HP, 2 pole single phase Induction motor has following parameters -

$$R_1 = 2.2 \ \Omega, X_1 = 3 \ \Omega, \ R_2' = 3.8\Omega, \ X_2' = 2.1\Omega, \ X_m = 86\Omega$$

Calculate current, Input power, power factor & efficiency when operating at slip, s = 6% **[10]**

b) With neat diagram, explain construction & working of split phase induction motor. **[8]**

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