



[4658] – 542

Seat No.	
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T.E. (Electrical) (Semester – I) Examination, 2014
ELECTRICAL MACHINES – II
(2012 Course)

Time : 3 Hours

Max. Marks : 70

- Instructions :** 1) **Neat** diagrams must be drawn **wherever** necessary.
2) **Black** figures to the **right** indicate **full** marks.
3) **Use** of electronic pocket calculator is **allowed**.
4) Assume **suitable** data, **if necessary**.
5) Answer 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**.

1. a) A 3 phase 4160 V, 3.5 MVA, 50 Hz star connected alternator has open circuit characteristics given by following data :

I_f (A)	50	100	150	200	250	300	350	400
V_L (V)	1620	3150	4160	4750	5130	5370	5550	5650

A field current of 200A is found necessary to circulate full load current on short circuit of alternator. Using MMF method, calculate voltage regulation at 0.8 pf lag. Neglect armature resistance.

8

- b) What is meant by short circuit Ratio in case of alternator ?

2

OR

2. a) With neat diagram describe the slip test. How X_d and X_q can be determined ?

6

- b) Explain :

- 1) Coil span factor
2) Distribution factor

4

3. a) Define voltage regulation of alternator. If the alternator is loaded using resistive load, whether its terminal voltage will increase or decrease ? Why ?

6

- b) Write a short note on 'synchroscope'.

4

OR

4. a) A 400 V, 7.46 KW 3 phase synchronous motor has negligible armature resistance and has synchronous reactance of 10Ω /phase. Determine the minimum armature current and compounding induced emf for full load conditions. Assume efficiency at full load = 85%.

6

- b) Compare 3 phase synchronous motor with 3 phase induction motor (any 8 points).

4

P.T.O.



5. a) Explain following speed control methods of 3 phase induction motor
 1) Cascade control method
 2) V/f control method. 8
 b) Describe with neat diagram, construction and working of permanent magnet stepper motor. 8
 OR
6. a) Explain the operation of 3 phase induction motor as Induction Generator. State its advantages and applications. 8
 b) Explain the construction and working of Linear Induction Motor state its applications. 8
7. a) What are the types of compensated a.c. series motor ? Describe each with diagram. 8
 b) A universal motor has resistance of $30\ \Omega$ and inductance of $0.5\ \text{H}$. When connected to $250\ \text{V}$ d.c. supply and loaded to take $0.8\ \text{A}$, it runs at $2000\ \text{rpm}$. Determine the speed, torque and power factor when connected to $250\ \text{V}$, $50\ \text{Hz}$ ac supply and loaded to take same current. 8
 OR
8. a) Explain the procedure to plot circle diagram of a.c. series motor. How full load efficiency torque scale and speed scale can be determined ? 10
 b) Explain modifications necessary in the construction of d.c. series motor to operate it satisfactorily on a.c. supply. 6
9. a) With neat diagram explain the construction and working of 1 phase capacitor start induction motor. State its applications. 8
 b) A $230\ \text{V}$, $800\ \text{W}$ 2 pole $50\ \text{Hz}$ 1 ph I.M. have following parameters $\rightarrow R_1 = 2.2\ \Omega$, $X_1 = 3\ \Omega$, $R_2' = 3.8\ \Omega$, $X_2' = 2.1\ \Omega$, $X_m = 86\ \Omega$.
 Calculate current, power factor and efficiency when operating at slip of 6% draw equivalent circuit and show all the terms in it. 10
 OR
10. a) With neat diagram, explain double revolving field theory. Hence draw torque-speed characteristics of single phase induction motor. 8
 b) With neat diagram, explain construction and working of shaded pole induction motor. Draw its torque-speed characteristics. State applications of this motor. 10