



B.E. / B.Tech. (Full Time) DEGREE AND END SEMESTER EXAMINATION. NOV/ DEC 2012

ELECTRICAL AND ELECTRONICS ENGINEERING

FOURTH SEMESTER

EE 9253– ELECTRICAL MACHINES I

(REGULATION 2008)

Time : 3 hr

Max Mark: 100

Answer ALL Questions

PART – A (10 x 2 = 20 Mark)

1. Draw the electrical equivalent of a magnetic circuit.
2. What is the advantage of using a highly permeable medium in electrical machines? Explain.
3. What is the significance of conducting polarity test in transformers? Explain.
4. Distinguish the terms pulsating and rotating magnetic fields
5. Explain a three phase connection to obtain 30 degree lead and a reduction of voltage by  $1/\sqrt{3}$ .
6. Explain how the harmonic effects can be reduced in electrical machines.
7. Distinguish the number of brush contacts in Lap and Wave windings
8. Explain the use of series excited field windings in DC machines.
9. Why should the starting current be high in a DC motor? Explain.
10. Draw the torque speed characteristics of a separately excited DC motor.

PART – B (5 x 16 = 80 Mark)

11. Draw the single phase equivalent of a three phase transformer. Explain how the equivalent circuit parameters can be determined by conducting suitable tests.
12. a. (i) Derive an expression for regulation of transformers (8)  
(ii) Explain the Scott's connection to convert three phase into two phase (8)

(OR)

- 12(b) (i) Explain the construction and working principle of transformers (12)  
(ii) What is inrush current? Explain (4)

- 13(a) (i) Write short notes on three winding transformers (8)  
(ii) Explain how transformers can be operated in parallel (8)

(OR)

13. b. (i) Derive an expression for rotating MMF in two phase machines (8)  
(ii) Write short notes on all day efficiency of transformers (8)

14. a. (i) Illustrate with a neat sketch all the excitation schemes of a DC machine as motor and generator

(OR)

14. b (i) Explain the operating principle of a DC generator (8)  
(ii) A 100 kW, 200 V, shunt generator has  $r_a=0.03$  ohm, There are 1200 shunt field turns per pole. The magnetization curve at 1000 rpm is given as follows
- |         |    |    |     |     |     |     |     |
|---------|----|----|-----|-----|-----|-----|-----|
| I field | 0  | 1  | 2.2 | 3.3 | 4.2 | 5.3 | 7.1 |
| Eg      | 11 | 33 | 100 | 167 | 200 | 215 | 222 |
- Determine the terminal voltage at rated current for a shunt field current of 5A and a speed of 950 rpm. The armature reaction may be ignored. (8)

15. a. Explain any two methods of speed control and braking in DC motors

(OR)

- 15.b. (ii) Explain a method by which back to back test can be done on DC machines (8)  
(ii) Write the dynamic equation of a separately excited DC motor (8)