



B.E. / B.Tech. (Full Time) DEGREE AND END SEMESTER EXAMINATION. APR/ MAY 2011

ELECTRICAL AND ELECTRONICS ENGINEERING

FOURTH SEMESTER

EE 284- ELECTRICAL MACHINES I

(REGULATION 2004)

Time : 3 hr

Max Mark: 100

Answer ALL Questions

PART - A (10 x 2 = 20 Mark)

1. What is the advantage of obtaining the electrical equivalent of magnetic circuit? Explain
2. Explain how voltage and frequency affect the iron loss in magnetic circuits?
3. Will the step-up transformer, step up both current and Voltage? Explain.
4. Where do we use auto-transformers? Explain.
5. Distinguish the terms power transformer and Instrument transformer.
6. Explain the role of inter-poles in DC machines. .
7. Name a motor for traction applications.
8. What is advantage of residual magnetism? Explain.
9. State the relationship rotor speed and excitation current in DC motors
10. Explain how load current influences the generated voltage of a DC generator.

PART - B (5 x 16 = 80 Mark)

11. (i) Explain how the equivalent circuit parameters are determined from the open circuit and short circuit test. (8)

(ii) A single phase 20 kVA, 2400/240 V, 50 Hz transformer gave the following test readings:

OC Test (LV side measurement) : 240 V, 1.066 A, and 126.6 W

SC Test (HV side measurement) : 57.5 V, 8.34 A, and 284 W

Compute the equivalent circuit parameters referred to both HV and LV side (8)

12. A(i) Derive an expression for maximum efficiency of a transformer. (8)  
(ii) Write about the parallel operation of transformers. (8)

(OR)

- 12 b (i) Derive an expression for electrical torque in terms of energy and co-energy relations. (10)  
(ii) Explain the use of three winding transformers. (6)

- 13(a) (i) Explain how rotating magnetic field is produced in ac machines (10)  
(ii) Write short notes on tap-changing transformers. (6)

(OR)

- 13(b) (i) Explain any two methods for speed control of DC motors (8)  
(ii) Explain any two methods of starting DC motors. (8)

14. a. (i) Draw the load characteristics of a DC generator with shunt, series and compound excitation schemes. (8)  
(ii) Distinguish the terms dynamic and regenerative braking. (8)

(OR)

14. b. Derive an expression for the torque in a separately excited DC motor. Draw the speed-torque characteristics of a DC motor for series and shunt field excitations (16)

15. a. Explain the effect of armature reaction and explain a method by which it can be reduced. (16)

(OR)

- 15.b. (i) Derive expressions for determination of voltage regulation and efficiency in transformers in terms of the equivalent circuit parameters (8)  
(ii) Explain how all-day efficiency of a transformer is determined? A 20kVA, 3000/300 V transformer has an iron loss of 300 W and full load copper loss of 400 W. It is loaded during the day as follows,  
0-8<sup>th</sup> hours 25% of full load at 0.8 PF  
9-17<sup>th</sup> HOURS 75% of full load at 0.6 PF  
18-23<sup>th</sup> HOURS 100% of full load at unity PF  
24 th hour no load  
Determine the all day efficiency (8)