B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2004

Third Semester

Electronics and Communication Engineering

EE 1211 — ELECTRICAL MACHINES

(Common to Electronics and Inst. and Instrumentation and Control Engg.)

(Regulations 2004)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the purposes of magnetic yoke in a dc machine.

2. Why is brake test performed in dc motors?

3. How are HV and LV windings characterized?

4. Define voltage regulation.

5. Name the types of polyphase induction motors.

6. Are single phase induction motors self starting? Why?

7. What is the principle of reluctance motor?

8. List four applications of stepper motor.

9. Which of the following is advantageous and why? — a three phase star connected 3 wire system and 4 wire system.

10. Where is a substation located?

PART B — (5 × 16 = 80 marks)

11. (i)   Derive the expression for generated emf in a dc machine.   (8)

    (ii) Discuss the characteristics of DC motors.   (8)

12. (a) (i) Give the constructional details and characteristics ... (10)

   (ii) Mention the simplifying assumptions made to enable a transformer to be treated as an ideal transformer. (6)

Or

   (b) (i) Obtain the equivalent circuit of a single phase transformer. (8)

   (ii) The OC and SC tests on a 4 kVA, 200/400 V, 50 Hz, 1 ph transformer gave the results as :

   OC test on LV side — 200 V, 1 A, 100 W, SC test with LV side shorted — 15 V, 10 A, 85 W.

   Determine the parameters of the equivalent circuit referred to the LV side. (8)

13. (a) (i) Draw the power flow diagram of a 3 ph induction motor. (4)

   (ii) Derive the torque developed in this machine. (6)

   (iii) The power input to the rotor of a 415 V, 50 Hz, 6 pole, 3 ph. induction motor is 75 kW. The rotor electromotive force is observed to make 120 complete cycles per minute. Determine the rotor speed, air gap power per phase and mechanical power developed. (6)

Or

   (b) Write notes on the following :

   (i) Speed control schemes of 3 phase induction motor. (8)

   (ii) Types of single phase induction motor. (8)

14. (a) (i) Describe any method to determine voltage regulation of synchronous generator. (8)

   (ii) A 250 kVA, 3300 V star connected 3 phase synchronous generator has resistance and reactance per phase of 0.25 Ω and 3.5 Ω respectively. Calculate the voltage regulation at full load 0.8 pf lagging. (8)

Or

   (b) What are stepping motors? Give their types. Discuss about any one type of motor in detail. (16)

15. (a) Explain the structure of an electric power system with all its components. (16)

Or

(b) (i) Compare EHVAC with EHVDC systems. (8)

(ii) Give the constructional details of electric power cables. (8)