Question Paper Code : 27209

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Third Semester

Mechanical Engineering

EE 6351 — ELECTRICAL DRIVES AND CONTROLS

(Common to Mechanical and Automation Engineering, Production Engineering, Manufacturing Engineering, Petrochemical Engineering, Chemical Engineering and Petrochemical Technology)

(Regulations 2013)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   Draw the block diagram of an electric drive.

2.   Mention the factors affecting the selection of Electrical drives.

3.   A 220V, DC shunt motor having the armature current of 10 A, runs at 1500 rpm. Find the armature current if the source voltage drops to 150V. Assume the load torque as constant.

4.   What are the different methods of breaking of DC series motor?

5.   What is the need for a starter in Electrical motors?

6.   Mention the advantage of four point starter over three point starter.

7.   Write the disadvantages of armature resistance method of speed control in DC shunt motor.

8.   List the applications of chopper fed DC drives.

9.   What are the various speed control methods used in AC motors?

10.   What are the different types of slip power recovery scheme?

PART B — (5 × 16 = 80 marks)

11. (a) Explain the various classes of motor duty with necessary diagrams and examples. (16)

Or

(b) (i) Define an Electric drive and describe the classification of Electric Drives. (8)

(ii) Explain the selection of motor power rating for different loading conditions. (8)

12. (a) Explain the four quadrant operation in motor drives. (16)

Or

(b) (i) Discuss the dynamic breaking of DC shunt motor. (8)

(ii) Describe the speed-torque characteristics of DC shunt and series motor with neat sketch. (8)

13. (a) Explain the three point starter in detail. (16)

Or

(b) Briefly explain the various types of starters used in 3ϕ induction motor. (16)

14. (a) (i) Explain the Ward-Leonard method of speed control in DC shunt motor. (12)

(ii) A 220V, DC shunt motor having a field flux of 0.8 wb, runs at a speed of 900 rpm. Find the speed of the motor, if the field flux reduced to 0.6 wb by field resistance control method. (4)

Or

(b) (i) Explain the voltage control strategies employed in DC chopper drives. (8)

(ii) A 220V, 1200 rpm, 1ϕ full converter fed separately excited DC motor having a armature resistance and current of 0.25 Ω and 40 A respectively. For the delay angle of 30°, find the speed of the motor. Consider motor constant, $K_a\phi = 0.18 \, N/rpm$. (8)

15. (a) Explain the rotor resistance control employed in 3ϕ Induction motor. (16)

Or

(b) Explain the concept of slip power recovery scheme in static scherbius method of speed control of Induction motor. (16)

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