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Question Paper Code : 25086

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Third Semester

Mechanical Engineering

EE 8353 – ELECTRICAL DRIVES AND CONTROLS

(Common to Manufacturing Engineering/ Mechanical and Automation Engineering)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the major elements of an electric drive?
2. Compare Group drive and individual drive.
3. Why a series motor is more suited to deal with torque overloads than other DC motors?
4. Draw the speed torque characteristic of (a) fan (b) constant power loads.
5. What are the protective devices used in DC Motor Starters?
6. Mention the merits and demerits of DOL starter.
7. Mention the different methods of speed control employed for DC Series Motor.
8. What is meant by time ratio control of DC choppers?
9. What are the main features of V/f control?
10. List the advantages and disadvantages of Static Scherbius scheme of speed control.

PART B — (5 × 13 = 65 marks)

11. (a) (i) A constant speed drive has the following duty cycle :

- (1) Load rising from 0 to 400 kW – 4 minutes.
- (2) Uniform load of 500 kW – 4 minutes.
- (3) Remaining idle for 2 minutes.

Estimate the Power rating of the motor. Assume Loss to be proportional to (power)². (5)

- (ii) List out the factors governing the selection of motors. (8)

Or

- (b) Draw the typical temperature rise-time curve and derive the equation for temperature rise in an electric drive. (13)

12. (a) Derive the speed-torque characteristics of a DC shunt motor with suitable graph and equations. (13)

Or

- (b) (i) Obtain the torque-slip characteristics of single phase induction motors. (8)

- (ii) Discuss any one method of electrical braking of Induction Machines. (5)

13. (a) How are DC motors started? Draw and explain the four point starter used for a DC shunt motor. (13)

Or

- (b) (i) Draw and explain the manual auto-transformer starter for three phase induction motor. (7)

- (ii) Explain with neat circuit diagram, the star-delta starter method of starting squirrel cage induction motor. (6)

14. (a) Demonstrate the operation of a semi converter fed DC shunt motor drive with relevant waveforms and draw the speed torque characteristics. (13)

Or

- (b) What are the factors controlling the motor speed? Discuss the various speed control methods used for DC series motors. (13)

15. (a) (i) Explain the working of variable frequency control of induction motor fed from voltage source inverter. (8)

- (ii) List various industrial applications of three phase induction motor. (5)

Or

- (b) Illustrate the static scherbius method of speed control of three phase induction motor. (13)

PART C — (1 × 15 = 15 marks)

16. (a) (i) Detail the rotor resistance method of speed control of a slip ring induction motor. (10)

- (ii) Brief the principle by which slip power can be recovered from slip ring induction motors. (5)

Or

- (b) Summarize Ward Leonard method of speed control of DC motor and list out its various features. (15)