Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 80369

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

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 — ($10 \times 2 = 20$ marks)

1. What is an electrical drive?
2. Define the term 'short time rating'.
3. What are the various components of load torque?
4. What do you understand by electric braking?
5. Why dc motors should not be started without starters?
6. What type of protection is provided in the starters used for 3 phase induction motor?
7. List the various methods of conventional and solid state speed control of D.C. motors.
8. Compare armature control and field control.
9. Why the V/f is kept constant while controlling the speed of a 3 phase induction motor?
10. Mention the advantages of squirrel cage induction motor over a D.C. motor.

PART B — (5 × 13 = 65 marks)

11. (a) (i) What are the various factors which decide the choice of an electronic drive for industrial applications? (6)

(ii) Discuss different classes of duty cycles. (7)

Or

(b) Draw the pattern of temperature rise characteristic under steady state for

(i) Short time duty

(ii) Intermittent duty and explain the equivalent current method of estimating motor rating. (13)

12. (a) Describe various methods of braking used for shunt, series and compound motors. (13)

Or

(b) (i) For drives, classify the types of load torques available and sketch few speed torque curves of typical leads. (7)

(ii) Explain the four quadrant operation of a motor driving a hoist. (6)

13. (a) Discuss, with circuit diagrams, the star delta starter and auto transformer starter on the basis of starting torque and starting current.

Or

(b) Describe with suitable diagrams the function of (i) 2 point starter and (ii) 3 point starter.

14. (a) Describe with a help of a neat circuit diagram explain Ward-Leonard control of D.C. motors. (13)

Or

(b) Explain the speed control of D.C. shunt motors using D.C. choppers. (13)

15. (a) Describe the variable voltage variable frequency method of speed control of 3 phase induction motors for full range of speed control. (13)

Or

(b) Explain slip power recovery scheme with neat diagram. (13)

PART C — (1 × 15 = 15 marks)

16. (a) A 220 V dc shunt motor takes 22 A at rated voltage and runs at 1000 rpm. Its field resistance is 100 ohms and armature circuit resistance is 0.1 ohms. Compute the value of additional resistance required in the armature circuit to reduce the speed to 800 rpm when the load torque is proportional to speed. (15)

Or

(b) A motor has a thermal time constant of 45 minutes. When the motor runs continuously on full load, its final temperature rise is 80° C (i) what is the temperature rise after 1 hour if the motor runs continuously on full load? (ii) If the temperature on one hour rating is 80° C, find the maximum steady state temperature at this rating?

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