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Question Paper Code : 21848

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

Third Semester

Mechanical Engineering

ME 2205/ ME 36/EE 1205 A/080120013/ 10122 ME 306 — ELECTRICAL DRIVES
AND CONTROL

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

(Regulations 2008/2010)

(Also common to 10122 ME 306 — Electrical Drives and Control for B.E. (Part-Time)
Second Semester – Mechanical Engineering – Regulations 2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Mention two advantages of electrical drives.
2. Define cooling time constant.
3. State the advantages of electrical braking.
4. What is meant by plugging?
5. Name different types of dc motor starters.
6. List the methods of starting three phase squirrel cage and slip ring induction motors.
7. What is meant by a d.e to d.c converter drive?
8. List the applications of d.c choppers.
9. What is meant by slip power recovery scheme?
10. State all possible methods of speed control of 3 – phase induction motors.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the procedure for selection of power rating for drive motor with regard to thermal limits and load variation factors.

Or

- (b) Determine the half-an-hour rating of a 40 KW motor having the thermal time constant of 2HRS. Assume that the constant losses are 80% of variable losses at full load.

12. (a) (i) Draw and explain the speed torque characteristics for d.c. motors. (8)
(ii) Discuss how regenerative braking can be implemented in the case of d.c motors. (8)

Or

- (b) Discuss the various methods of electrical braking with particular reference to a 3-phase induction motor.

13. (a) Draw a neat sketch of three point starter and explain its working.

Or

- (b) Draw a neat sketch of rotor resistance starter for starting slip ring induction motor and explain its operation.

14. (a) (i) Discuss how the speed of a dc motor can be controlled using a dc chopper. (10)
(ii) Distinguish between single quadrant and two quadrant operation of the chopper. (6)

Or

- (b) Draw the power circuit diagram and explain the operation of three phase full converter fed dc drive.

15. (a) Explain how the speed of SRIM is controlled by feeding back its slip power to the mains. Derive the expression between the slip and delay angle.

Or

- (b) (i) Draw the circuit for the stator voltage control scheme for 3-phase induction motor, employing thyristors. (10)
(ii) Draw and explain the torque characteristics of induction motor for variable frequency operation at constant v/f ratio. (6)