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Question Paper Code : 97067

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

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)

(Regulation 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Distinguish between group drive and individual drive.
2. Define continuous, short time and intermittent duty.
3. Define pulsating and impact loads with examples.
4. What are the advantages of electric braking over other type of braking?
5. Why we need starters for starting electric motors?
6. What are the advantages of relay based starters compared to conventional starters?
7. What are the various parameters that control the speed of dc motors?
8. What is the function of a chopper and give some of the applications.
9. What are the various conventional speed control methods used in induction motors?
10. What do you mean by VVVF control and mention some of its advantages.

PART B — (5 × 16 = 80 marks)

11. (a) Define heating and cooling of a motor. Derive the heating and cooling curve of a motor with necessary assumptions.

Or

- (b) (i) List out the factors that influence the choice of electric drives. (8)
(ii) An electric motor subjected to a load torque variation as given below : (8)
- 240 Nm for 20 min
 - 140 Nm for 10 min
 - 300 Nm for 10 min
 - 200 Nm for 20 min

If speed of motor is 720 rpm find the power rating of motor.

12. (a) Define various types of electric braking and discuss the various braking characteristics of dc shunt and dc series motors.

Or

- (b) Derive the torque equation of a 3-phase induction motor from the basics and obtain the speed Vs torque characteristics.

13. (a) With a neat diagram explain the working of a DC motor starter using time delay relays.

Or

- (b) Explain the working of a three-phase slip ring induction motor starter using frequency sensing relay.

14. (a) With a neat diagram explain the construction and working of a Ward Leonard system of speed control and write the advantages and disadvantages.

Or

- (b) Explain the speed control of a dc shunt motor using three-phase fully controlled rectifiers.

15. (a) (i) Explain the pole changing method of speed control for a squirrel cage IM. (10)
(ii) Explain the stator voltage variation method of a wound rotor IM. (6)

Or

- (b) Explain the speed control of a three-phase IM using three-phase bridge inverter -120° mode of conduction.