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K 4280

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2009.

Third Semester

Mechanical Engineering

EE 1213 — ELECTRICAL DRIVES AND CONTROLS

(Common to B.Tech. Production Technology)

(Regulation 2004)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw the block diagram of electric drive.
2. What is meant by intermittent duty?
3. Draw the speed torque characteristics of a DC series motor for different values of armature resistances.
4. When plugging is employed for stopping an induction motor, why is it necessary to disconnect it from supply when the speed reaches close to zero?
5. What do you understand by soft start?
6. What are the advantages of squirrel cage induction motor over dc motors?
7. Field control is employed For getting speeds higher than rated and armature voltage control is employed for getting speeds less than rated. Why?
8. What is time ratio control?
9. Mention the advantages of solid state control of ac drives?
10. Mention the usage of different types of motors with applications in a textile mill.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the various factors influencing the choice of electrical drive. (10)
- (ii) State and explain the disadvantages of using a motor of wrong rating with an illustration. (6)

Or

- (b) (i) What are heating and cooling curves? Starting from the basic principles derive the expressions for heating and cooling curves for a electrical machine. Also mention the assumptions made. (10)
- (ii) The 10 minutes rating of a motor used in domestic mixer is 200 watts. The heating time constant is 40 minutes and the maximum efficiency occurs at full load (continuous). Determine the continuous rating. (6)
12. (a) (i) Explain the speed torque characteristics of three phase induction motor with neat diagram. (8)
- (ii) Explain why a dc series motor is more suited to deal with torque over load than other dc motors. (8)

Or

- (b) (i) State and explain the important features of various braking methods of DC motors. (12)
- (ii) Discuss how the dynamic braking can be made in a single phase induction motor. (4)
13. (a) (i) With a neat sketch, explain the operation of a three point starter used for starting a dc shunt motor. (10)
- (ii) Explain the operation of a rotor resistance starter used in slip ring induction motor. (6)

Or

- (b) Explain the different starting methods employed in a three phase squirrel cage induction motor. (16)
14. (a) (i) State and explain how armature current and speed of a dc separately excited motor will be affected when halving the armature voltage and field current with load torque remaining constant. (6)
- (ii) Explain the operation of a conventional ward Leonard speed control system for a dc separately excited motor. (10)

Or

- (b) (i) Draw and explain the operation of a speed control of a dc shunt motor by a single phase fully controlled converter for the continuous motor current. (10)
- (ii) Describe the operation of a two quadrant type A chopper fed separately excited dc motor drive. (6)
- 15. (a) (i) Explain how the speed of a three phase induction can be controlled by varying its stator voltage. (8)
- (ii) Write short notes on slip power recovery scheme. (8)

Or

- (b) (i) With a simple block diagram explain the operation of a variable voltage variable frequency (VVVF) inverter fed three phase induction motor drive. (10)
- (ii) Mention the advantages and disadvantages of ac voltage controller fed three phase induction motor drive when compared to inverter fed drives. (6)