B.E. (Electrical Engineering (Electronics & Power)) Sixth Semester (C.B.S.)

Electrical Drives & Their Control

P. Pages : 2 **NJR/KS/18/4530**

Time : Three Hours *0661* Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) What are the basic requirements of electrical braking? Explain rheostatic braking of Induction motor. **6**

b) The rotor of 6 pole 50Hz slip ring induction motor has a resistance of 0.3ohm per phase and runs at 960r.p.m. at full load. Calculate external resistance per phase which must be in the rotor circuit to reduce the speed to 800rpm the torque remains constant. **7**

OR

2. a) A dc series drives a load with torque varying as square of the speed. The motor takes current of 20A when speed is 800rpm. Determine the speed and the current when field is shunted by a diverter whose resistance is three times that of the field winding. Neglect all losses. **6**

b) Explain Ward-Leonard method of speed control of D.C motor. Discuss advantages and disadvantages. **7**

3. a) What do you mean by load equalization and explain the effect of flywheel? **7**

b) A 6-Pole, 50Hz, induction motor has a flywheel of 1200kg-m^2 as moment of inertia. Load torque is 100kg-m for 10 secs. No load period is long enough for the flywheel to regain its full speed. Motor has a slip of 6% at a torque of 50kg-m **7**
Find.
1) Maximum torque exerted by the motor.
2) Speed at the end of deacceleration period.

OR

4. a) The temp. rise of a motor after continuous run on full load is 40ºC. The heating time constant is 100min. How long can the motor be run at twice the continuously rated output without overheating. The motor maximum efficiency at full load. **7**

b) A motor working in a coal mine has to exert power starting from zero and rising uniformly to 100 H.P. in 5min. After which it takes a constant power of 50 H.P, for 10min then at no load for 3min. The cycle is repeated indefinitely. Estimate suitable size of the motor. **7**

5. a) Explain how a PLC is different from microprocessor controlled device. **6**

b) What is ladder diagram with reference to PLC programming? Explain with suitable example. **7**

OR

6. a) Draw and explain the block diagram of PLC. **8**

b) What are the advantages of PLC in speed control of electric motors as compared to other methods. **5**

7. a) Draw and explain with the help of neat circuit diagram, how will you achieve, dynamic braking of 3-phase squirrel cage induction motor. **7**

b) Explain the fundamental difference between an ac and dc contactor. **6**

OR

8. a) Discuss blow out structure of contactor. Also compare AC and DC contactors. **6**

b) Describe in brief any one method for the control of acceleration of armature of d.c. shunt motor, give circuit diagram. **7**

9. a) Define the terms :- **7**

i) Crest speed. ii) Schedule speed.

iii) Average speed.

What are the factors affecting the schedule speed.

b) A train runs between two stations which are 2Km. apart at an average speed of 40Km/hour. The train accelerates at 2Km/hr/sec. and retards at 3kmphps. Assuming trapezoidal speed time curve, calculate the distance travelled by the train before the brakes are applied. Also calculate the maximum speed. **7**

OR

10. a) Explain starting in traction motor using series parallel starting. **7**

b) Sketch the typical speed time curves of different locomotives for. **7**

1) City service 2) Suburban service

3) Main line service.

Explain what is meant by coasting, notching.

11. a) Compare analog and digital control of electric drives. **6**

b) Which motors are required for the following drives? Explain in details with suitable characteristics. **7**

1) Rolling Mills. 2) Marine Drive.

3) Pump.

OR

12. a) Draw the block diagram of digital control and write flow chart of the program. **6**

b) State the requirement and mention the drives commonly used in following industrial application. **7**

1) Electric propulsion in ships.

2) Belt conveyors.

3) Cranes and Hoist.

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