

**Electrical Drives & Their Control**

P. Pages : 2

Time : Three Hours



**NKT/KS/17/7391**

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.
  10. Use of non programmable calculator is permitted.

1. a) Explain the block diagram of an electric drive. 6
- b) A 500 V, 45 kW, 600 rpm dc shunt motor has full load efficiency of 90%. The field resistance is  $200\Omega$  and the armature resistance of  $0.2\Omega$ . The field current is maintained constant. Armature reaction and brush drop is neglected. Calculate the rated armature current and hence the speed under each of the following conditions at which machine develops an electromagnetic torque equal to rated value :
- i) Regenerative braking - no external resistance.
  - ii) Plugging - external resistance of  $5.5\Omega$  inserted.
  - iii) Dynamic braking - external resistance of  $2.6\Omega$  inserted.

**OR**

2. a) Discuss speed - torque characteristics of i) dc shunt motor, ii) 3 - phase induction motor, iii) synchronous motor. 6
- b) A 25 Hp, 500 V, 4 - pole, 50 Hz induction motor with mesh connected stator takes a full load current of 30A and has slip of 4%. The impedance per phase is  $3.5\Omega$ . Calculate the starting torque and starting current taken from supply if the motor is started by i) DOL starter, ii) star delta starter, iii) auto-transformer with 70% tap. 8
3. a) What do you understand by load equilisation? Where do you find its applications? Derive the expression for moment of inertia of flywheel. 8
- b) Define the following ratings of motor : 5
- i) Continuous rating
  - ii) Short time rating

**OR**

4. a) Derive the expression for temperature rise of motor under heating medium. 7

