Ajay Kumar Garg Engineering College, Ghaziabad

Department of Electrical & Electronics Engineering

Sessional Test - 2

Course: B.Tech
Session: 2017-18
Subject: Electric Drives
Max Marks: 50

Semester: VII
Branch: EN-1,2
Sub. Code: NEN-701
Time: 2 Hours.

Note: Attempt **all** the sections

SECTION-A

A. Attempt **all** the parts. **(5X2=10)**

1. What do you mean by Load equalization?
2. A motor of smaller rating can be selected for a short time duty. Why?
3. For a DC series motor which type of braking is not possible & why?
4. What are the methods of braking applicable to induction motor?
5. State different classes of Motor Duty in detail with examples.

SECTION-B

B. Attempt **all** the parts. **(5X5=25)**

6. A motor has a heating time constant of 90 mins and a cooling time constant of 120 mins and final steady state temperature rise on full-load of 60^0C. The motor has repeated load cycle of full load for 30 mins followed by stationary period of 30 mins. Determine the maximum and minimum temperatures. Also determine the overload on the motor that can be allowed on this cycle such that the maximum temperature rise does not exceed the permissible value of 60^oC.

7. A Constant speed motor has the following duty cycle:
   Load rising linearly from 200 to 500kW: 4min
   Uniform Load of 400kW: 2min
   Regenerative Power returned to supply linearly from 400kW to 0: 3 min
   Remains idle: 4min
   Determine power rating of the motor assuming loss to be proportional to $(\text{power})^2$.

8. A 220V, 970 rpm separately excited motor having an armature resistance of 0.05 Ω draws 100A from the source. The motor is braked by plugging from an initial speed of 1000rpm. Calculate: (i) The resistance to be connected in series with armature to limit the initial baking current to twice the rated current (ii) Initial Braking torque (iii) The braking torque when the speed has reduced to Zero.

9. A 3-ϕ, 440V, 50Hz, 6 pole, Y-connected induction motor has following parameters referred to the stator: R_s =0.5 Ω, R_r' =0.6 Ω, X_s =X_r'=1. Stator to rotor turns ratio is 2. If the motor is used for the regenerative braking, Determine: (i) Maximum overhauling torque it can hold and the range of speed in which it can safely operate. (ii) The speed at which it will hold a load with a load torque of 160 N-m.

10. A drive has following equations for motor and load torques:
$T = (1+2\omega_m)$ and $T_l = 3\sqrt{\omega}m$ Obtain the equilibrium points and determine their steady state stability.

SECTION-C

C. Attempt **all** the parts. **(2X7.5=15)**

11. Explain the thermal model of motor for heating and cooling and hence prove that both heating and cooling time constants depend on the velocity of air.

12. Explain energy losses during starting and braking of a DC motor.