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10EE74

Seventh Semester B.E. Degree Examination, June/July 2018
Industrial Drives & Applications

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

1.
 - a. With a neat block diagram, explain the various components of an electrical drive. (06 Marks)
 - b. Explain how load equalization is done in an electrical drive with necessary diagrams. (06 Marks)
 - c. A motor drives two loads, one load has rotational motion and the other has translational motion. M.I. of the motor is 1.2 kg-m^2 . Motor runs at 1000 rpm. The first load is rotational at 200 rpm speed. Load inertia is 7 kg-m^2 at a torque of 10 N-m. The second load having translational motion has a speed of 10 m/sec driving a mass of 10 kg with a force of 20 N. Calculate equivalent inertia of system referred to motor shaft and power rating of motor. Assume negligible loss in the transmission system. (08 Marks)

2.
 - a. Explain different methods of determining the rating of a motor with fluctuating load. (08 Marks)
 - b. Derive an equation for the overloading factor under short time duty cycle. (06 Marks)
 - c. A 60 KW motor runs for 40 min. Heating time constant of motor is 80 minutes. The maximum efficiency occurs at 80% of full load. Determine continuous rating of motor. (06 Marks)

3.
 - a. Explain dynamic braking of separately excited d.c. motors and series with necessary diagrams. (08 Marks)
 - b. Explain the speed control of a separately excited d.c. motor using single phase half controlled rectifier. (06 Marks)
 - c. A 220 volts, 970 rpm, 100 Amp separately excited d.c. motor has armature resistance of 0.05 ohm. It is braked by plugging from a speed of 1000 rpm. Calculate (i) Resistance value in armature circuit to limit braking current to twice the full load current (ii) Braking torque (iii) Torque when speed is zero. (06 Marks)

4.
 - a. Explain the chopper control a separately excited d.c. motor. (08 Marks)
 - b. Describe separately excited dc motor control using 3 phase fully controlled rectifier. (06 Marks)
 - c. A 230 volts, 960 rpm, 200 amp, separately excited d.c. motor has an armature resistance of 0.02 ohm. The motor is connected to a chopper. The source voltage is 230 volts. Assuming continuous condition (i) Calculate duty ratio of chopper for motoring operation at rated torque and 350 rpm (ii) Calculate duty ratio for braking operation at rated torque and 350 rpm. (06 Marks)

PART – B

- 5 a. Explain the d.c. dynamic braking of 3 phase induction motor. (08 Marks)
- b. Explain the operation of 3 phase induction motor supplied from non-sinusoidal voltage supply. (06 Marks)
- c. A 400 volts, star connected 3 phase, 6 pole, 50 Hz induction motor has following parameters referred to stator. $R_s = R_r' = 1$ ohm, $X_s = X_r' = 2$ ohm. For regenerative braking operation calculate the overhauling torque and range of speed operation. (06 Marks)
- 6 a. With necessary diagrams, explain the variable frequency control of induction motor. (08 Marks)
- b. Explain the static rotor resistance control of induction motor. (06 Marks)
- c. Explain the static Scherbius drive. (06 Marks)
- 7 a. Explain the operation of synchronous motor from fixed frequency supply. (07 Marks)
- b. Explain the variable frequency control of synchronous motor. (06 Marks)
- c. Explain the self controlled synchronous motor drive using load commutated thyristor inverter. (07 Marks)
- 8 a. Name and explain the different drives used in cement mill. (10 Marks)
- b. Explain the various stages in paper mill and motors used in various stages. (10 Marks)

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