ONE TIME EXIT SCHEME

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10EE74

Seventh Semester B.E. Degree Examination, April 2018
Industrial Drives and Applications

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Missing data, if any, may be suitably assumed.

PART – A

1 a. What are the advantages of an electric drive? **(04 Marks)**

b. Describe three types of power modulators used in electrical drives, with sketch. **(06 Marks)**

c. Describe the different components of load torque. **(04 Marks)**

d. A horizontal conveyor but moving at a uniform speed of 1.2m/s transports materials a the rate of 100 tonnes/hr. The belt is 200m long and driven by a motor at 1200rpm
   i) Sketch the system
   ii) Determine the load inertia referred to the motor shaft. **(06 Marks)**

2 a. With suitable sketches, and heating curves describe any four classes of motor duty. **(08 Marks)**

b. With usual notations, derive the expression for temperature rise of a machine. Sketch the temperature rise versus time curve. **(06 Marks)**

c. A constant speed motor has the following duty cycle :
   i) Load rising linearly from 0 to 200 KW in 4 minutes
   ii) Uniform load 200 KW for 2 minutes
   iii) Load rising linearly from 200 KW to 500 KW in 4 minutes
   iv) Constant load 300 KW for 3 minuets
   v) Regenerative braking for 300 KW to 0 KW in 4 minute
   vi) Remain idle 3 minute.
   Sketch the load curve. Determine suitable power rating of a motor. **(06 Marks)**

3 a. Draw necessary circuit diagram and wave forms and explain the operation of a drive using single phase half controlled converter control of separately excited DC motor. **(10 Marks)**

b. A 220V, 960 rpm, 12.8A separately excited DC motor has armature circuit resistance of 2 ohms and inductance of 150mH. It is fed from a single phase half controlled rectifier with an AC source voltage of 230V, 50Hz calculate the motor torque for $\alpha = 60°$ and speed = 600 rpm. **(10 Marks)**

4 a. Explain three phase fully controlled rectifier control of separately excited DC motor state the equations for Va; average output voltage, and w_m; speed. **(08 Marks)**

b. Explain multiquadrant operation of a separately excited DC motor using dual converters. **(06 Marks)**

c. A 230V, 960 rpm, 100A separately excited DC motor has an armature circuit resistance of 0.06 ohm and inductance of 150mH. The motor is fed from a chopper having source voltage of 230V, assuming continuous conduction calculate the duty ratio of the chopper for motoring operation at 1.25 times rated torque and 450 rpm. **(06 Marks)**

PART – B

5 a. Draw necessary circuit diagram and explain the operation of any two of the following starting methods as used for induction motors.
   i) Star - delta starting
   ii) Korndorfer starter (closed transition auto transformer)
   iii) Rotor resistance starting. **(08 Marks)**

   b. A 2200V, 2600Kw, 735 rpm, 50Hz 8 pole, 3ϕ induction motor has following parameters referred to stator, $R_S = 0.075\Omega$, $R_r = 0.1\Omega$, $X_S = 0.45\Omega$, $X'_r = 0.55\Omega$ stator winding is delta connected and consists of two sections connected in parallel. Calculate the maximum value of line current during starting and i) full load torque ii) starting torque. **(12 Marks)**

6 a. Draw the block diagram, and explain the operation of closed loop slip controlled PWM inverter drive. **(10 Marks)**

   b. Describe and compare static scherbius drive with static Kraner drive (Use sketches). **(10 Marks)**

7 a. Describe how a synchronous motor may be started using its damper windings. **(08 Marks)**

   b. Draw necessary block diagram and explain variable frequency control of multiple synchronous motors, state one application. **(08 Marks)**

   c. Compare dynamic braking with regenerative braking using a synchronous motor. **(04 Marks)**

8 a. With necessary diagrams explain the requirements of a rolling mill drive. **(07 Marks)**

   b. Sketch and describe a paper mill drive. **(06 Marks)**

   c. Explain any one type of cement mill drive with sketch. **(07 Marks)**

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