

B.E. (Electrical) (Semester - VII) Examination, December - 2015**ELECTRICAL DRIVES AND CONTROL****Sub. Code : 47935****Day and Date : Tuesday, 08 - 12 - 2015****Total Marks : 100****Time : 10.00 a.m. to 1.00 p.m.**

- Instructions :**
- 1) Attempt any three questions from each section.
 - 2) Use of non-programmable calculator is permissible.
 - 3) Figures to the right indicate full marks.
 - 4) Assume necessary data, if required.

SECTION - I

- Q1) a)** Explain four quadrant operation of a motor driving hoist with the help of a neat diagram. [8]
- b)** State various methods to obtain variable dc for motor control. Compare them in brief. [8]
- Q2) a)** A constant speed drive has following duty cycle [8]
- i) Load rising from 0 to 400 kW : 5 min
 - ii) Uniform load of 500 kW : 5 min
 - iii) Regenerative power of 400 kW returned to the supply : 4 min
 - iv) Remain idle for : 2 min
- Estimate power rating of the motor. Assume losses to be proportional to (power)².
- b)** Derive the equation to find out temperature rise of motor, when heat dissipation constant and temperature rise of motor is known. [8]
- Q3) a)** For a motor-load system how is equilibrium speed found out? Explain with neat diagram, the method of checking steady state stability of a motor-load system showing one stable equilibrium point and one unstable equilibrium point. [10]
- b)** Explain different classes of duty depending on loads. [8]

P.T.O.

- Q4) a) 250V shunt motor on no load runs at 1000 rpm and takes 5A. Armature and shunt field resistances are 0.2Ω and 250Ω respectively. Calculate the speed when loaded taking a current of 50A. The armature reaction weakens the field by 3%. [8]
- b) Explain the operation of a closed-loop torque control scheme with neat diagram. [8]

SECTION - II

- Q5) a) Explain control of dc separately excited motor by three phase fully controlled rectifier with neat diagram and rectifier output voltage waveform. Derive the expression for speed Vs torque for continuous conduction. [8]
- b) A 220V, 1500rpm, 50A, separately excited dc motor, with armature resistance of 0.5Ω , is fed from a three phase fully controlled rectifier. The available ac source has a line voltage of 440V, 50Hz. A star-delta connected transformer is used to feed the armature, so that the motor terminal voltage equals the rated voltage when the converter firing angle is zero. [10]
- Determine the firing when
- i) The motor is running at 1200rpm and rated torque.
 - ii) The motor is running at 800rpm and twice the rated torque.

- Q6) a) Explain dual converter scheme for multiquadrant operation of separately excited dc motor. [8]
- b) A 230V, 1200 rpm, 15A separately excited dc motor has an armature resistance of 1.2Ω motor and is operated under dynamic braking with chopper control braking resistance of 20Ω . [8]
- i) Calculate the duty ratio of the chopper for motor speed of 1000rpm and braking torque equal to 1.5 times rated motor torque.
 - ii) What will be the motor speed for duty ratio of 0.5 and motor torque equal to rated torque.

- Q7) a) Explain chopper control of separately excited dc motor during regenerative braking operation. Derive the function of armature voltage as a function of duty cycle and motor speed as a function of torque. Draw speed-torque curves of chopper controlled separately excited dc motor. [8]
- b) Explain the brushless dc motor with the help of neat diagram and wave forms. [8]
- Q8) a) With the help of drive circuit explain working of static scherbius control method of induction motor. Draw speed-torque curves for different fixing angles. [8]
- b) Explain vector or field oriented control of induction motor explaining its dc drive analogy. [8]

