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Total Number of Pages: 02

**B.TECH**  
**PEEL5303**

**6<sup>th</sup> Semester Regular / Back Examination 2016-17**

**ELECTRIC DRIVES**

**BRANCH(S): EEE, ELECTRICAL**

**Time: 3 Hours**

**Max Marks: 70**

**Q.CODE: Z686**

**Answer Question No.1 which is compulsory and any five from the rest.  
The figures in the right hand margin indicate marks.**

- Q1      **Answer the following questions:**      (2 x 10)
- a) Why stator voltage control is more suitable for speed control of induction motor in fan type load than constant type load?
  - b) What is the condition of steady state stability?
  - c) Write the limitation of single phase fully controlled rectifier used for DC Motor drive.
  - d) Give two example of an electric drive operating at zero speed and rated torque.
  - e) Write the equation for speed in chopper control of separately excited dc motor drive.
  - f) Draw the speed torque characteristic of a three phase Induction motor showing regenerative braking region.
  - g) How the plugging is possible in wound rotor three phase Induction motor.
  - h) Compare static Kramer and Scherbius drive system
  - i) What are the advantages of CSI fed Induction motor drive?
  - j) Why flywheel cannot be mounted on the motor shaft in variable speed and reversible drive for load equalization?
- Q2      a) Formulate the expression for the tractive effort during acceleration period of a locomotive train.      (6)
- b) Explain dynamic braking used in DC Shunt Motor.      (4)
- Q3      Draw the circuit for achieving both motoring and regenerative braking in separately excited DC motor drive using chopper?      (10)
- Q4      Derive the current equation for a DC separately excited motor fed through a single phase half controlled rectifier. Assume ' $\alpha$ ' as firing angle and ' $\beta$ ' as extinction angle less than ' $\pi+\alpha$ '.      (10)
- Q5      a) What is the condition for steady state stability of an electric drive?      (5)
- b) A 200V, 875rpm, 150A separately excited DC motor has an armature resistance of  $0.06\Omega$ . It is fed from a single phase fully controlled rectifier with an AC source voltage of 220V, 50Hz. If the armature inductance is 0.85mH, Calculate the motor torque for  $\alpha=60^\circ$  and speed = 400rpm.      (5)

- Q6 (a) Derive the expression for speed as function of torque and torque as function of current for the DC Series Motor. Also draw the characteristic curve. (5)
- (b) A motor operated on a periodic duty cycle consisting of a load period of 20min and a no load period of 10min. The maximum temperature rise is 60°C. Heating and cooling time constant are 50min and 70min respectively. When operating continuously on no load the temperature rise is 10°C. Determine (5)
- (i) Minimum temperature rise during the duty cycle.
  - (ii) Temperature when the motor is loaded continuously.
- Q7 (a) Explain dynamic braking in a 3-phase Induction Motor using two lead connection. (5)
- (b) Explain Static Rotor resistance control scheme used in 3-phase Induction Motor Drive. (5)
- Q8 **Answer any two** (5 x 2)
- a) Static Ward-Leonard Drive System.
  - b) Drive mechanism in textile mill.
  - c) Slip power recovery scheme using any one method.
  - d) Expression for the rise and fall in temperature of an electrical machine assuming homogeneous body.