Registration No. : | | | | | | | | | | |

Total number of printed pages – 3

B. Tech

PEEL 5303

Sixth Semester Back Examination – 2015

ELECTRIC DRIVES

BRANCH (S) : EEE, ELECTRICAL

QUESTION CODE : M 378

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

   (a) What is the basic difference between Short time duty and Intermittent periodic duty with one example ?

   (b) What do you mean by steady state stability of a drive system ?

   (c) Why flywheel cannot be mounted on the motor shaft in variable speed and reversible drive for load equalization ?

   (d) Regenerative breaking cannot be achieved in series motor. Justify.

   (e) Write the limitation of single phase fully controlled rectifier.

   (f) Derive the expression for average output voltage of a single phase fully controlled rectifier.

   (g) Write the equation for speed in chopper control of separately excited dc motor.

   (h) Draw the speed torque characteristic of a three phase Induction motor showing regenerative breaking region.

   (i) What are the advantages of CSI fed Induction motor drive ?

   (j) With a constant V/f ratio, motor develop a constant maximum torque, except at low speed. Justify.

P.T.O.

2. (a) Derive the expression for Overloading factor 'K' for short time Duty Loads. 5

(b) How to determine the Motor rating for Fluctuating Load ? 5

3. (a) What is the function of Power Modulator in Electrical Drive ? 5

(b) A moor has a continuous rating of 100 kW. The heating and cooling time constants are 50 and 70 min respectively. The motor has a maximum efficiency at 80% full load and is employed in an intermittent periodic load cycle consisting of a load period of 10 min followed by a no load period of 10 min. Calculate the value of the load in kW during the load period. 5

4. (a) Describe relative merits and demerits of four quadrant dc drive employing non-circulating and circulating current dual converters. 5

(b) Single-phase fully controlled rectifier can be utilized with active loads. Justify. 5

5. (a) Derive an equivalent circuit and torque expression for a delta connected squirrel-cage induction motor when one supply phase is disconnected. 5

(b) What is single-phasing in a 3-phase Induction Motor ? Why should it be avoided ? 5

6. (a) Write the difference between Current source and voltage source inverter. 5

(b) A 3-phase, 440 V, 6-pole, 50 Hz, delta-connected, slip-ring induction motor has rotor resistance of 0.2 ohm and leakage reactance of 1 ohm per phase referred to stator. When driving a fan load it runs at full load at 4% slip. What resistance must be inserted in the rotor circuit to obtain a speed of 850 rpm ? Neglect stator impedance and magnetizing branch. Stator to rotor turn ration is 2.4. 5

7. (a) Explain dynamic braking in DC Series Motor. 5

(b) A 200 V, 10.5 A, 2000 rpm shunt motor has the armature and field resistance of 0.5 and 400 ohm respectively. It drives a load whose torque is constant at rated motor torque. Calculate the motor speed if the source voltage drops to 150V. 5

8. Write short notes any **two** of the following : 5×2

(a) Dynamic braking of dc separately excited motor by chopper control

(b) Static Scherbius Drive

(c) V/f control of three phase induction Motor

(d) Moment of inertia of a fly wheel required for load equalization.