PVP 14

Code: EE6T4

III B.Tech - II Semester – Regular/Supplementary Examinations March 2020

POWER SEMICONDUCTOR DRIVES
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1.

a) What are the advantages of electrical drives?
b) What are the components of load torque?
c) Write the fundamental torque equation.
d) What are the advantages of three phase drives over single phase drives?
e) List method used for multiquadrant operation of separately excited DC motor fed from fully controlled rectifier.
f) Under what condition regenerative braking may employ to DC series motor?
g) List out the advantages offered by DC chopper drives over line commutated converter controlled DC drives.
h) Compare of VSI and CSI drives.
i) Draw the circuit diagram for speed control of induction motor by stator voltage control.
j) Write the equation to transform from three phases to two phases.
k) What is vector control of an induction motor?

PART – B

Answer any *THREE* questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Draw the block diagram of basic electrical drive system. Explain each component. 10 M

b) What are the main factors which decide the choice of electrical drive for a given application? 6 M

3. a) Explain the operation of a separately excited DC motor supplied from 3- Φ fully controlled rectifier with necessary diagrams. Assume Continuous conduction. 8 M

b) A 200 V, 875 rpm, 150 A separately excited DC motor has an armature resistance of 0.06 Ω. It is fed from a single phase full converter with an AC source voltage of 220 V, 50 Hz. Assume continuous load current,

(i) Calculate firing angle for rated motor torque and 750 rpm

(ii) Calculate firing angle for rated motor torque and –750 rpm

(iii) Calculate motor speed for firing angle 160^0 and rated motor torque. 8 M

4. a) Describe the first quadrant chopper control of separately excited DC motor. 8 M

b) Explain the operation of a separately excited DC motor supplied from 1-Φ Dual converter with necessary diagrams. 8 M

5. a) Draw the circuit diagram and explain the working of a slip power recovery system using static Scherbius system for a three phase induction motor. 10 M

b) Draw and explain principle of operation of cascaded H-bridge 5 level inverter fed induction motor. 6 M

6. a) Deduce Park's transformations for 3-Φ to d-q axes system. 8 M

b) Explain about DTC control of induction motor. 8 M