Code: EE6T4

III B.Tech-II Semester–Regular/Supplementary Examinations–March 2019

POWER SEMICONDUCTOR DRIVES
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

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

$11 \times 2 = 22$ M

1. a) What are the parts in an electric drive system?
   b) What is meant by regenerative braking of DC motor?
   c) What are the advantages of thyristor control on speed control of DC Motor?
   d) What are the functions of a dual converter? Where it is used?
   e) Rotor resistance control is not applicable for squirrel cage induction motors. Why?
   f) What are the main features of v/f control of Induction motor drives?
   g) What are the limitations of cycloconverter method of speed control for Induction motor?
   h) What is the necessity of three phase to two phase transformation? Explain.
   i) What is vector control of an induction motor?
   j) Mention the different methods of speed control employed for DC Series Motor.
   k) Draw the block diagram of an electric drive.

PART – B
Answer any *THREE* questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Explain the factors that influence the choice of electric drives. 8 M

   b) Explain the four quadrant operation of an electric drive for hoist application. 8 M

3. a) Explain with neat waveforms the operation of a single phase half controlled fed dc separately excited motor. 8 M

   b) A 30 kW, 230V, 860 rpm, 144 A dc motor has an armature resistance of 0.07 Ω. It is fed by a 3-phase fully-controlled rectifier from an ac source of 170.3 V (line), 60 Hz. Assuming continuous conduction, calculate motor speeds for the following cases: 8 M
   i) α= 60° , T_a = 300 Nm
   ii) α= 150°, T_a = 400 Nm
   iii) α= 120°, T_a= -400 Nm (obtained by the field current reversal)

4. a) Explain the operation of a chopper control of dc separately excited motor with speed torque curves. 8 M

   b) Draw the block diagram of closed loop speed control of a dc motor. 8 M

5. a) Explain with neat sketch the conventional static Kramer drive of variable speed drive system used for slip power recovery.   8 M

   b) A 440 V, 3-phase, 50 Hz, 6-pole, 945 rpm, delta connected induction motor has following parameters referred to the stator $R_s = 2.0\Omega$, $R_r' = 2.0\ \Omega$, $Xs = 3\ \Omega$, $Xr' = 4\Omega$. When driving a fan load at rated voltage it runs at rated speed. The motor speed is controlled by stator voltage control, Determine (i) Motor terminal voltage, current and torque at 800 rpm. (ii) Motor speed, current and torque for the terminal voltage of 280 V.   8 M

6. a) Explain the concept of Park's transformation.   8 M

   b) Write short notes on vector control of AC machines.   8 M