

**FACULTY OF ENGINEERING**  
**B.E. 4/4 (EEE) I – Semester (New) (Main) Examination, November 2013**

**Subject: Electric Drives and Static Control**

Time: 3Hours

Max.Marks: 75

**Note: Answer all questions from Part A. Answer any five questions from Part B.**

**PART – A (25 Marks)**

1. Write the conditions for acceleration and deceleration of an electric drive from the basic equation of motor-load system. (3)
2. Draw the speed torque characteristics of series motor for shunted armature connection. (2)
3. Derive the formula for acceleration time of an electric motor from the fundamentals. (3)
4. Write the formula for energy lost during rheostatic braking of an induction motor. (2)
5. Draw the speed torque characteristics of a single phase fully controlled rectifier fed separately excited dc motor. (3)
6. Write the formula for effective value of braking resistance in case of separately excited dc motor. (2)
7. Draw the speed torque characteristics of induction motor for variable rotor resistance method. (2)
8. Compare VSI and CSI. (3)
9. Draw the ckt diagram of unipolar brush less dc motor (BLDC motor) and name various parts. (3)
10. Write the applications of electric drives. (2)

**PART – B (50 Marks)**

- 11.(a) Explain the four quadrant operation of a motor drive used for hoisting application briefly. (5)
- (b) Write about the v/f control of 3 - $\phi$  induction motor. Also draw the speed torque graphs. (5)
12. A dc shunt motor has the armature resistance of 0.04 ohms and the field winding resistance of 10 ohms. Motor is coupled to an over hauling load with a torque of 400 N-M. Following magnetization curve was measured at 600 rpm.
 

Field current (A)	2.5	5	7.5	10	12.5	15	17.5	20	22.5	25
Back emf(V)	25	50	73.5	90	102.5	110	116	121	125	129

Motor is braked by self excited dynamic braking with a braking resistance of 1 ohms. (a) At what speed motor will hold the load? (b) Calculate the value of RB when motor is required to hold overhauling load at 1200 rpm. (10)
- 13.(a) Explain the operation of chopper controlled d.c separately excited motor for (a) motoring (b) regenerative braking with neat diagrams. (6)
- (b) Draw the block diagram of closed loop speed control of rectifier fed d.c drive for below base speed and explain briefly. (4)
- 14.(a) Explain about the static Kramer drive with neat diagram. (5)
- (b) A 2.8 kw, 400 V, 50 Hz, 4 pole 1370 rpm Delta connected squirrel-case induction motor has following parameters referred to the stator.  $R_s = 2\Omega$ ,  $R_r' = 5\Omega$ ,  $X_s = X_r' = 5\Omega$ ,  $X_m = 80\Omega$ . Motor speed is controlled by stator voltage control. When driving a fan load it runs at rated speed at rated voltage. Calculate motor terminal voltage, current and torque at 1200rpm. (5)
- 15.(a) Compare self and separately controlled synchronous motor drives. (5)
- (b) Explain the various methods used for braking of synchronous motors. (5)
- 16.(a) Explain about steady state stability of a motor drive with necessary diagrams and equations. (5)
- (b) Write about static rotor resistance method with neat diagrams. (5)
17. Write short notes on:
  - a) Switched reluctance motor (5)
  - b) Non-circulating current mode dual converters. (5)