

Register No:

M.E. DEGREE EXAMINATIONS: JUNE 2011

Second Semester

POWER ELECTRONICS AND DRIVES

PED506: Solid State DC Drives

Time: Three hours

Maximum Marks: 100

Answer ALL Questions

PART A (10x2 = 20 Marks)

1. Mention the speed control methods of DC motors.
2. Explain the term short time duty?
3. What are performance parameters of converter fed DC drives?
4. What are the quadrants of operation of dual converter fed DC drive?
5. Mention the control strategies used in chopper fed DC motors.
6. What are the braking schemes used for the DC drives?
7. What are the sensing and feedback elements of DC motor drives?
8. What are the control loops used for DC drives?
9. What are the advantages of micro computer control of DC drives?
10. What is the role of loop filter in PLL of DC drives?

PART B (5 x 16 = 80 Marks)

11. a) (i) Explain Ward- Leonard speed control of DC motor. (10)
(ii) A 220V, 800 rpm, 80A, separately excited DC motor has $R_a = 0.12\Omega$ and driving a constant torque load. Calculate the speed if the source voltage is dropped to 200V. (6)
(OR)
- b) (i) Explain the different types of loads. (8)
(ii) Explain the multi quadrant operation a drive. (8)
12. a) Explain the single phase two quadrant converter fed separately excited DC motor with circuit, wave forms, expression for speed and speed control characteristics.

(OR)

- b) (i) A separately excited DC motor is fed from single phase semi converter. The supply voltage is 240V. The thyristors are triggered at 110° . The armature current continues to flow for 50° beyond the voltage zero. The constant, $K_T=1$ N-m/A; $R_a = 6 \Omega$. Neglect the converter losses. Determine the motor speed at a torque of 1.8 N-m. (8)
- (ii) Draw and explain the circuit of single phase dual converter fed DC motor. (8)

13. a) Obtain the expression for ripple current in step down chopper fed separately excited DC motor with time ratio control.

(OR)

- b) Explain the modes of operation of class-E chopper fed separately excited DC motor.

14. a) Derive the transfer function of separately excited DC motor with field control.

(OR)

- b) Draw and explain the closed loop speed control of separately excited DC motor incorporating the inner current loop.

15. a) With neat diagram and flow chart, explain microcomputer control of a DC motor drive.

(OR)

- b) (i) Draw and explain PLL for DC drives. (8)
- (ii) Explain any one gate firing circuits for DC motor drive. (8)
