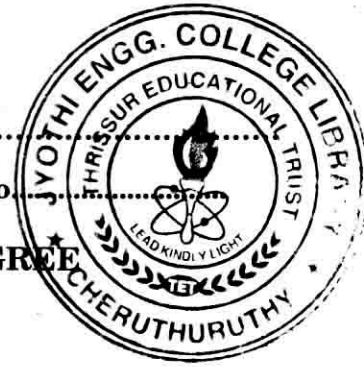


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Name.....

Reg. No.....



**SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE  
EXAMINATION, APRIL 2014**

EE/PTEE 09 604—ELECTRIC DRIVES

(2009 Scheme)

[Regular/Supplementary/Improvement]

Time : Three Hours

Maximum : 70 Marks

**Part A**

*Answer all questions.*

*Each question carries 2 marks.*

1. Name one suitable motor for cranes, stating the reason.
2. Draw the typical speed torque curve of a fan type load.
3. What are the possible quadrants of operation of a semiconductor fed d.c. drive system ?
4. In Scherbins scheme of induction motor control, if the d.c. link current is doubled, how much the total copper loss  $P_{cr}$  will increase/decreases ?
5. Give any *two* applications of synchronous drives.

(5 × 2 = 10 marks)

**Part B**

*Answer any four questions.*

*Each question carries 5 marks.*

6. A weight of 500 kg. is being lifted up to at a uniform speed of 1.5 m/s by a winch drive by a motor running at a speed of 1000 r.p.m. The moments of inertia of the motor and winch are  $0.5 \text{ kg.-m.}^2$  and  $0.3 \text{ kg.-m.}^2$  respectively. Calculate the motor torque and equivalent moment of inertia referred to the motor shaft. In the absence of weight, motor develops a torque of 100 N-m when running at 1000 r.p.m.
7. A drive has following parameters :

$$J = 10 \text{ kg.-m.}^2$$

$$T_M = 100 - 0.1 N, \text{ N-m}$$

$$T_L (\text{passive}) = 0.05 N, \text{ N-m.}$$

Where N is the speed in r.p.m. Then find the steady-state speed.

8. Explain principle of operation of chopper-feed d.c. drives.
9. What are the advantages of a.c. drives over d.c. drives ?

**Turn over**

10. Describe the conventional Scherbins scheme of slip energy recovery and enumerate its drawback.
11. Explain the self-control mode of a synchronous motor.

(4 × 5 = 20 marks)

### Part C

*Answer all questions.*

*Each question carries 10 marks.*

12. Explain the following control methods for an electric drive :

- (i) Closed loop torque control.
- (ii) Closed loop speed control.
- (iii) Closed loop position control.

*Or*

13. (a) Explain “steady-state stability” of an electric drive.  
(b) Explain multi-quadrant operation of an electric drive.
14. Explain three-phase fully controlled rectifier control of d.c. separately excited motor.

*Or*

15. Explain the closed-loop control scheme for d.c. motor drive below and above the base speed.
16. Explain closed-loop current source inverter (CSI) control of a three-phase induction motor. How multi-quadrant operation is achieved using this drive ?

*Or*

17. Explain the working of CSI controlled induction motor drive with neat sketch.
18. Explain the operation of 3 $\phi$  brushless d.c. motor drive, with necessary waveforms.

*Or*

19. Describe the principle of operation of switched reluctance motor. What are the advantages of SRM over other a.c. drives ?

(4 × 10 = 40 marks)