

MODEL QUESTION PAPER

MFE1

I Semester M.TECH Examination, August 2011 MACHINE DRIVES

Time: 3 Hours

Max. Marks: 75

GROUP A : Answer any three questions.

- Q.1 What are converters? List various types of converters and explain any two.
- Q.2 Explain different types of chopper circuits.
- Q.3 Explain signal flow graph representation of the system with one example.
- Q.4 Draw the block diagram of closed loop speed control?
- Q.5 Explain phase controlled line commutated converters.

GROUP B : Answer any three questions.

- Q.6 What are the characteristics of three phase induction motor?
- Q.7 A separately excited dc motor, operating from a single phase half controlled bridge at a speed of 1400rpm, has an input voltage of $330 \sin 314t$ and a back emf 80 V. The SCRs are fired symmetrically at $\alpha = 30^\circ$ in every half cycle and the armature has a resistance of 4ohm. Calculate the average armature current and the motor torque.?
- Q.8 Explain the transfer function of an armature controlled DC motor.
- Q.9 A 3-phase full converter bridge is connected to supply voltage of 230 V per phase and a frequency of 50Hz. The source inductance is 4mH. The load current on dc side is constant at 20 A. If the load consists of a dc voltage source of 400V having an internal resistance of 1 Ω , then calculate: firing angle delay and overlap angle in degrees.
- Q.10 Explain chopper resistance in the rotor circuit.

GROUP C: All Questions are Compulsory.

Q.11 Fill in the blanks

- (i) Compressor, pump and fan type loads require operation in ____ quadrant as their operation is ____.
- (ii) The stability occurs at _____ voltage.
- (iii) A typical active load is _____.
- (iv) The starting torque in star delta starting is _____ times of DOL starting
- (v) The speed of the motor is decided by the number of _____.

Q.12 Multiple choice question.

- (i) Speed control of dc shunt motors by means of field weakening is suitable for _____.

- (a) Constant power operation
 - (b) Constant torque operation
 - (c) Constant torque and constant power operation
 - (d) Variable torque and variable power operation
- (ii) The response of a system in s-domain to a unity impulse input gives____.
- (a) Gain of the system
 - (b) Transfer function of the system
 - (c) Time response of the system
 - (d) Error under steady state conditions
- (iii) A three phase ac voltage controller feeds an induction motor. The motor has _____.
- (a) Very good efficiency and power factor at all speeds
 - (b) Very good efficiency but poor power factor at all speeds
 - (c) Poor efficiency but good power factor at all speeds
 - (d) Poor efficiency and poor power factor at low speeds
- (iv) The derivation action of a PD controller_____.
- (a) Increase the rise time
 - (b) Decrease the steady state error
 - (c) Decrease the rise time
 - (d) Has no effect on the rise time.
- (v) Speed control of DC shunt motor by means of field weakening is suitable for _____.
- (a) Constant power operation
 - (b) Constant torque operation
 - (c) Constant power operation and Constant torque operation.
 - (d) Variable torque and variable power operation

Q.13 True or false

- (i) In drive system all mechanical quantities are referred to a single rotation shaft using principle of torque variance.
- (ii) The speed control using slip power recovery gives higher efficiency then other method of speed control.
- (iii) Speed control of DC shunt motors by means of field weakening is suitable for constant torque operation.
- (iv) The advantage of margin angle control improves power factor.
- (v) The response of a system in s-domain to a unit impulse input gives transfer function of the system.
