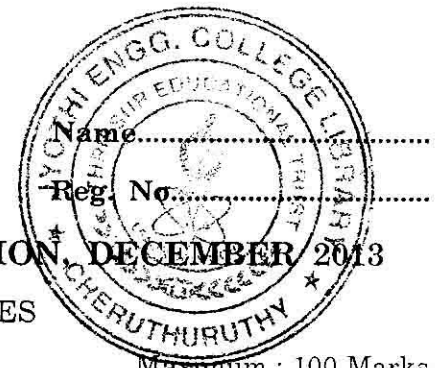


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(Pages 2)



FIRST SEMESTER M.TECH. DEGREE EXAMINATION, DECEMBER 2013

EPD/EPE 10 104—ELECTRIC DRIVES

Time : Three Hours

Maximum : 100 Marks

Answer any five questions choosing at least one question from each module.

MODULE 1

1. Mention the advantages of electric drive state the essential parts of electric drive with suitable block diagram and explain each block. (20 marks)
2. A d.c motor is fed from a dual converter. Explain the working for
 - (a) Starting and acceleration. (10 marks)
 - (b) Braking and reversing. (10 marks)

MODULE 2

3. (a) Draw the circuit diagram and explain the operation of a three-phase semi-converter drive. Also sketch and explain the waveforms for $\alpha = 60^\circ$ and $\alpha = 120^\circ$. (10 marks)
- (b) Discuss how the speed of a given DC motor is controlled by a class C chopper. Present all the relevant waveforms for both continuous and discontinuous current modes of operations. Also derive the relations for armature current ripple. (10 marks)
4. (a) A separately excited d.c. motor is supplied from d.c. step-up chopper. Enumerate a relationship between motor parameters, range of motor speed and range of chopper duty cycle. (10 marks)
- (b) Design and develop a digital control scheme for a full converter based d.c. drive. Also provide necessary program flow chart. (10 marks)

MODULE 3

5. Explain the stator frequency (speed) control of induction motor for its entire working range. Derive the torque equation in terms of supply voltage for the different ranges of frequency and also draw the speed-torque characteristics for both motoring and braking. (20 marks)

Turn over

6. A 2.8 KW 400 V, 50 Hz, 4 pole 1370 r.p.m. delta connected squirrel cage induction motor has the following parameters referred to the stator :—

$$R_s = 2 \Omega, R_r' = 5 \Omega, X_s = X_r' = 5 \Omega \text{ and } X_m = 80 \Omega.$$

Motor speed is controlled by stator voltage control method. When driving a fan load runs at rated speed at rated voltage. Calculate :

- (a) motor terminal voltage, current and torque at 1200 r.p.m..
- (b) motor speed, current and torque for the terminal voltage of 300V.

(20 marks)

MODULE IV

7. What is the basic difference between true synchronous mode and self control mode for variable frequency control of synchronous motor? Explain any one in detail.

(20 marks)

8. Discuss the commutatorless motor (CLM) mode of operation of a three-phase synchronous mot

(20 marks)