26 + 40

B.E. Electrical VIII CBSGS

Drives & Control

18.5.17

Q. P. Code: 13628

76

(3 Hours) [Total Marks: 80]

N.B.: (1) Question No. 1 is compulsory.
(2) Answer any THREE questions out of the remaining FIVE questions.
(3) Assume suitable data if necessary and justify them.
(4) Figure to the right indicates marks.

1. (a) What is electrical drive? State the main factors which decide the choice of electrical drives. 5
(b) Explain regenerative braking of three – phase Induction Motor with relevant speed torque characteristics. 5
(c) Justify two quadrant operation capability of single – phase fully controlled rectifier fed dc drive with Va – α curve and relevant diagram. 5
(d) Describe the operation of variable reluctance stepper motor. 5

2. (a) Explain four quadrant operation of a motor driving a hoist load with suitable diagram. 10
(b) A weight of 500 kg is being lifted up at a uniform speed of 1.5 m/s by a winch driven by a motor running at a speed of 1000 rpm. The moments of inertia of the motor and winch are 0.5 and 0.3 kg-m^2 respectively. Calculate the motor torque and the 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 rpm. 10

3. (a) Explain any two classes of motor duty. 6
(b) Derive the temperature expression for the thermal model of motor for heating and draw its characteristics with time. 7
(c) Explain the operation of closed – loop speed control using Phase – Locked – Loop (PLL). 7

4. (a) Explain plugging operation of dc motors (separately excited) with suitable diagram and draw its speed – torque curves. 4
(b) Explain the operation of chopper control of separately excited dc motor in motoring mode with suitable diagram, waveforms and characteristics. 6
(c) Give comparison between scalar control and vector control. 10

5. (a) Explain ac dynamic braking of a wound rotor motor with equivalent circuit and speed – torque curves. 12
(b) Draw and explain Static Scherbius drive with its four modes of operation. 8

6. (a) Draw the block diagram of direct vector control scheme and explain it. 10
(b) Explain brushless dc motor drive for servo applications. 10
