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EE-701-CBGS

B.Tech., VII Semester

Examination, December 2020

Choice Based Grading System (CBGS)

Electrical Drives

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) What is an Electric Drive? Draw the block schematic diagram of an electric drive and briefly functions of its various parts.

   b) Define different types of loads and their characteristics.

2. a) Draw and explain the torque vs. speed characteristics of separately excited DC motor in constant field and filed weakening zone. Draw also 'the nature of variation of armature voltage, motor power and field weakening zone.

   b) Explain the four quadrant operation of separately excited motor DC motor with directions of speed and torque in each quadrant. Indicate the relative values of applied voltage and back emf.

3. a) Explain, with the help of diagram, the method of speed control of an induction using AC voltage controller. Under what condition, the method of speed control is more effective.

b) A 400 V, star connected, 3-phase, 50 Hz, 6 pole, induction motor has a following parameters referred to the stator:

$R_s = R'_r = 1\Omega$; $X_s = X'_r = 2\Omega$.

For regenerative braking operation of this motor determine:

i) Maximum overhauling torque it can hold and range of speed for safe operation.

ii) Speed at which it will hold an overhauling load with a torque of 100 N-m.

4. a) Explain any two types of PWM technique with detailed diagram.

b) Compare Voltage Source Inverter(VSI) and Current Source Inverter(CSI).

5. a) How do you start a synchronous motor? What are its application? How the operation of synchronous motor shifts from motoring to regenerative braking?

b) A 3-phase, 10 kW, 440, 0.8 rated power factor (lagging), 50 Hz, 4 pole, star-connected permanent magnet synchronous motor has negligible stator resistance and synchronous reactance of 10 Ω. Motor is braked by dynamic breaking. What will be the braking torque at 750 rpm when braking resistance $R_B = 5\Omega$?

6. a) Describe the operation of stepper motor. Mention their advantage and Disadvantage.

b) Explain the modes of switched reluctance motor along the neat diagram.

7. a) Discuss the cycloconverter control of Induction motor drive.

   b) Explain Static Kramer Drive. Why it has low range of speed control?

8. a) State and explain the important feature of various braking methods of DC motors.

   b) Draw and explain the operation of close loop control system of DC motor drive.

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