Seat No.: _____   Enrolment No.__ _____

GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. - SEMESTER – VI • EXAMINATION – WINTER 2012
Subject code: 162003   **Date: 04/01/2013**
Subject Name: Control of Electric Drives
Time: 02.30 pm - 05.00 pm   **Total Marks: 70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Explain the generalized block diagram of Electric Drive and state advantage of it.   **07**
       (b) Explain the Four quadrant operation of Electrical Drive.   **07**
Q.2 **(a)** Explain the output voltage, output current, source current and thyristor current   **07**
       waveforms for type-C chopper for its operation in second quadrant.
       (b) A motor drives two loads.One has rotational motion. It is coupled to the motor   **07**
       through a reduction gear with a=0.1 and efficiency of 90%.The load has a
       moment of inertia of 10 kg-m^2 and a torque of 10 N-m.Other load has
       translational motion and consists of 1000kg weight to be lifted up at an uniform
       speed of 1.5m/s.Coupling between this load and the motor has an efficiency of
       85%.Motor has an inertia of 0.2kg-m^2 and runs at a constant speed of 1420 rpm.
       Determine equivalent inertia referred to the motor shaft and power developed by
       the motor.
                                      OR
       (b) Explain the field control of DC shunt motor in details.   **07**
Q.3 **(a)** Describe the principle of step-up choppers. Derive an expression for the average   **07**
       output voltage in terms of input voltage and duty cycle. State the assumption
       made.
       (b) Explain the Four quadrant Operation of Chopper circuit   **07**
                                      OR
Q.3 **(a)** Derive the Steady state Time Domain analysis of Type-A chopper and derive the   **07**
       maximum and minimum value of load current
       (b) A step up chopper has input voltage of 220 V and output voltage of 660 V. If the   **07**
       conducting time of thyristor chopper is 100 μs, compute the pulse width of output
       voltage. In case output voltage pulse width is halved for constant frequency
       operation, find the average value of new output voltage.
Q.4 **(a)** Explain Single phase Half wave uncontrolled rectifier Circuit with RL load and   **07**
       draw necessary waveform with performance parameter.
       (b) Explain the single phase fully controlled bridge converter with R-L-E load draw   **07**
       the necessary waveform with conduction table.
                                      OR
Q.4 **(a)** Explain the operation and Analysis of Three phase uncontrolled rectifier with R-   **07**
       L load with necessary waveform and conduction table.
Q.4 **(b)** Explain Single phase half wave controlled rectifier circuit with purely resistive   **07**
       load and also derive the performance parameter.
Q.5 **(a)** Describe the operation of a single stack variable reluctance stepper motor.   **07**
       (b) Explain the methods for controlling the single phase ac induction motor with   **07**
       diagram.
                                      OR
Q.5 **(a)** Explain the methods for controlling the universal motor.   **07**
       (b) Derive the Equivalent values of Drive parameters with Rotational load.   **07**

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