

Con. 5567-08.

(REVISED COURSE)

(3 Hours)

RC- 7649

[Total Marks : 100

- N. B. : (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions out of remaining **six** questions.
 (3) Assume **suitable** data wherever **required**.

1. Answer any **four** of the following :—

- (a) Give different types of volume control valves and explain in brief. 5
 (b) Explain various controls involved in intelligent supervisory control sys. 5
 (c) What are the conditions for connecting mass in mechanical sys ? What is grounded - chair representation of mass ? 5
 (d) Why PI controller is called industrial controller ? 5
 (e) Draw ladder diagram of — 5
 (i) An XOR System
 (ii) Latch.

2. (a) Explain in detail Mechatronics design process diagram, operation and importance. 10
 (b) What are design steps of lead compensator design a lead controller using root locus 10
 technique to modify the behaviour of the plant.

$$G \times (s) = \frac{1}{(s^2 + 1)} \quad \text{such that following specification are met :}$$

- (i) $\xi \geq 0.707$
 (ii) $\tau \leq 0.1 \text{ sec}$
 (iii) Sys is stable.

3. (a) Draw the mechanical diagram of automobile suspension system, construct impedance 10
 diagram, block diagram. Determine the transfer function.
 (b) Explain the basic principle of piezoelectric transducer. Derive the expression for 10
 voltage. Draw mechanical diagram of Piezoelectric Accelerometer.
4. (a) What are energy modulation devices ? Give it's classification and explain the same. 10
 (b) Explain the following terms :— 10
 (i) Hydraulic resistance
 (ii) Hydraulic capacitance
 (iii) Pneumatic inertance
 (iv) Thermal capacitance
 (v) Damper model.

5. (a) What is adaptive control sys ? Compare the performance of different types of adaptive control sys. 10
- (b) Explain major components of Data acquisition and control sys. 10
6. (a) How will you configure Vis-Sim for real time operation ? Eight wire 1-2 amp 5 Ohm 1.8°/ step stepper motor to be run by using Vis-Sim. Explain real time interface for the application and write Vis-Sim program to control the position of stepper motor. 10
- (b) How PLC is selected for particular applⁿ. 5
- Devise a system using PLC which can be used to control the movement of the piston in a cylinder so that when a switch is momentarily pressed the piston moves in one direction and when second switch is momentarily pressed the piston moves in another direction. 5
7. Write short notes on :— 20
- (a) Microsensor (c) Brushless D. C. Motor
- (b) Neural Network (d) Digital PID Controller.
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