AQ—2861

Faculty of Engineering & Technology

M.E. Mechanical Engg. (Adv. Manu. & Mech. Sys. Desig.) Semester-II (New-CGS) Examination

MECHATRONICS IN SYSTEM DESIGN

Paper—2 MMD 3

Sections—A & B

Time—Three Hours]

[Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Answer **THREE** questions from Section A and **THREE** questions from Section B.

(3) Due credit will be given to neatness and adequate dimensions.

(4) Illustrate your answers wherever necessary with the help of neat sketches.

(5) Use pen of Blue/Black ink/refill only for writing the answer book.

SECTION—A

1. (a) Discuss the conventional system vs. mechatronics system with appropriate examples for :

 (i) Better design of products

 (ii) Intelligent process control. 7

 (b) Differentiate between process industry and discrete manufacturing industry. Compare level of automation in both. 7

2. (a) What is the difference between displacement, position and proximity sensors ? List various proxomity sensors and explain any one in detail. 6

(b) What are actuators ? List the various types of actuators and explain the construction and working of stepper motor. 7

3. (a) What is LVDT ? With suitable sketch, explain its working and use as displacement sensor. 6

(b) Define following specifications of the sensors :

range, accuracy, sensitivity, stability, drift, response time, dead band, dead time, resolution. 7

4. (a) Classify the various control valves in pneumatic system. Explain the construction and working of direction control valve in pneumatic system. 6

(b) Design and draw the circuit of the synchorization of pistons of two separate cylinders pneumatically. 7

5. (a) Sketch a typical pneumatic system. Draw its symbolic diagram. What are its typical applications ? Discuss its limitations. 6

(b) Design and draw a pneumatic circuit for two pressure power checking operations. 7

SECTION—B

6. (a) Sketch and explain travel dependent sequencing circuit for hydraulic cylinders. 7

(b) Design and draw a hydraulic circuit for synchronising of two cylinders. Explain in detail. 7

7. (a) Design an draw a hydro-pneumatic circuit. What are the advantages of this circuit ? 6

(b) Draw the structure of hydraulic system symbolically. Explain the working of each component. 7

8. (a) Explain a typical microcontroller with the help of its block diagram. Compare the microprocessor with micro-controller. 6

(b) Give an example and application of PLC for process control with a ladder diagram. 7

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9. (a) What are sequential logic devices ? Write the applications and functions in detail.

6

(b) What is PLC ? What are the main features of a PLC ? What are the advantages of using PLC for computer process control ? 7

10. (a) Describe with the help of a block diagram typical components of a microprocessor. What are the characteristics and features of a micro processor ? 6

(b) Explain with neat circuit diagram the working of braking and replenishing of high speed hydraulic motor. 7