Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 53416

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Seventh Semester

Mechanical Engineering

MS 6701 — MECHATRONIC SYSTEM DESIGN

(Regulation 2013)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   Mention the requirements of automation.

2.   Where to use Automated Production Lines?

3.   Justify : "The velocity of forward stroke of a double acting cylinder is faster than the return stroke".

4.   Give the factors to be considered for selecting solenoids?

5.   List out the various programming languages of PLC.

6.   Draw the ladder diagram for NAND gate and NOR gate.

7.   Define preparatory function?

8.   What are the types of motion control system in CNC machining?

9.   Brief manual lead through programming.

10. How is force measured using a Piezo-electric sensor?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Write short notes on programmable automation.   (5)

         (ii) Classify various types of production systems? Discuss them with examples.   (8)

                                    Or

     (b) Discuss the important factors to be considered in material handling system design.   (13)

12. (a) How speed control is done with the help of meter-in and meter-out circuits. Explain briefly. (13)

Or

(b) (i) With a neat schematic diagram, describe the construction and the working principle of a sequence valve. (7)

(ii) Compare hydraulic and pneumatic systems. (6)

13. (a) (i) Apply the concept of latching to control the motor and also draw the ladder diagram. (5)

(ii) Write a ladder diagram program with explanation Starting the oil pump motor immediately when START is pressed. The main motor will be started after a 10 sec delay and then the auxiliary motor after a 5 sec delay. In addition, stopping all motors immediately when STOP is pressed. (8)

Or

(b) (i) Explain ON Delay Timer and OFF Delay Timer functions. (5)

(ii) Write a ladder diagram program double acting cylinder is used to perform to and fro operation. Cylinder has to move forward when limit switch is pressed maintained 6 sec time delay and continue to and fro motion till 6 cycles of operations is performed. (8)

14. (a) Draw the schematic diagram of a closed loop control system for the table movement of a CNC milling machine. (13)
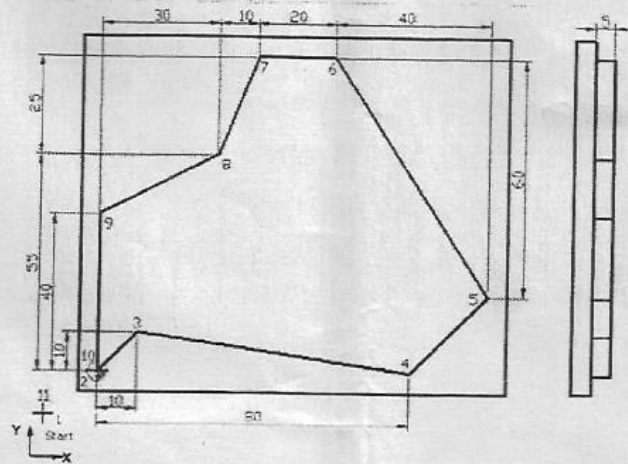
Or

(b) Discuss the Word Address Format used for CNC programming systems. (13)

15. (a) Describe various stages of Mechatronics design process. (13)

Or

(b) (i) With suitable diagrams explain Pitch, Yaw and Roll motions as concerned with a robotic manipulator. (8)

(ii) Write short notes on touch sensors. (5)

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PART C — (1 × 15 = 15 marks)

16. (a) Write important tool position for manual part programming of following component given in Figure in absolute mode based on the codes used in Fanuc controller. (15)

Or

(b) Develop a pressure sequencing circuit using a clamping and drilling cylinder for the following sequence : (15)

(i) Clamping

(ii) Feeding the drill

(iii) Withdrawing the drill

(iv) De-clamping.

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