M.E. Second Semester (Mechanical Engineering (Adv. Manu. & Mech. Sys. Desig.)) (New-CGS)
13471 : Mechatronics in System Design : 2 MMD 3

P. Pages : 2

Time : Three Hours

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Max. Marks : 80

Notes : 1. Answer **three** question from Section A and **three** question from Section B.
2. Illustrate your answer necessary with the help of neat sketches.
3. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION - A

1. a) How set speed is maintained irrespective of the load in servo motors with tacho generator?   7

   b) Explain with the help of a neat block diagram the various components and their working function of a CNC machine tool.   7

2. a) What are the requirements of the feed drives?   6

   b) What are various electric and electronic motors used in a mechatronic system? State their important features and applications.   7

3. a) Define: 6
   i) Quantization levels   ii) Nyquist criterion
   iii) Conversion time in ADC   iv) Resolution

   b) Explain the working principle of any two displacement sensors.   7

4. a) What is the purpose of using a proximity sensor in an automation circuit? Enlist various proximity sensors used in a mechatronics system. Explain the working of any one proximity sensor.   6

   b) What are various end effectors and grippers used in robotics? Draw simple sketches and name the effectors/grippers.   7

5. a) Explain with the help of diagram working of a GRAY Encoder.   6

   b) How synchronization motion is obtained in two pneumatic cylinders?   7

SECTION - B

6. a) Explain the general structure of a hydraulic circuit.   7

   b) Explain with the help of a neat sketch the hydraulic circuit for shaping machine.   7

7. a) Draw a neat sketch of a hydraulic circuit for continuous to and fro reciprocation of working table of a surface grinder. Explain.   6

   b) Explain the working of braking circuit of high speed hydraulic motor.   7

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

     b)   What are sequential logic devices? Write the applications and functions in detail.   **7**

9.   a)   Construct an appropriate ladder logic program for a car alarm. The alarm buzzer should   **6**
become ON if any one of the car doors is OPEN and if at the same time the engine ignition
switch is also made ON. For the open doors there should not be any alarm if the ignition
switch is OFF. Also the alarm should become ON when the vibration sensor fitted on the
car body sensor an impact, (like a ball hit), and the ignition switch is OFF. The vibration
sensor should not trigger the alarm while ignition switch is ON.

     b)   Construct a 3-bit comparator that outputs a 1, if the number is greater than or equal to 5,   **7**
and 0 otherwise.

10.   a)   Compare meter in & meter out type of speed control of hydraulic cylinders.   **7**

     b)   Explain with ladder diagram the use of   **6**
       i)   OR logic
       ii)   AND logic
       iii)   LATCH

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