Code No: 07A70311 **R07** **Set No. 2**

IV B.Tech I Semester Examinations,December 2011
MECHATRONICS
Mechanical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the principle of operation of inductive proximity sensor with a neat diagram. [16]
2. (a) Draw sketches of a buffer IC and explain its function.
   (b) Explain the various isolation schemes used in interface subsystems. [8+8]
3. Calling a routine helps in making an assembly level program short as well as modular. Explain with the help of the example. [16]
4. (a) What is the role of control system in a mechatronics system? Explain.
   (b) Discuss the use of real time control system in robots. [8+8]
5. Discuss the applications of counters in programmable and logic controllers (PLC). [16]
6. Explain how the speed of the induction motor is controlled using the variable frequency operation. [16]
7. (a) Draw the block diagram of hydraulic power supply and explain the operation.
   (b) Draw the schematic diagram of Cascade control used to give A+, B+, B-, A- and explain briefly. [8+8]
8. (a) Sketch an inverting operational amplifier and explain its working and applications.
   (b) Explain the terms 'conversion time', 'resolution', 'linearity error' used in ADC. [8+8]

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Code No: 07A70311 **R07** **Set No. 4**

IV B.Tech I Semester Examinations,December 2011
MECHATRONICS
Mechanical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the one-shot operation of an internal relay. Draw its ladder diagram also. [16]

2. (a) What is the function of amplifier?
   (b) Name the different types of filters. Describe them with neat sketches. [4+12]

3. (a) Draw the simple sketch and explain the characteristics of the following d.c. motors:
      i. Compound wound motor
      ii. Separately excited motor
   (b) Explain the various protection schemes used in mechatronics systems. [8+8]

4. (a) Explain the functions of PC based graphical user interface system in Robots used in the manufacturing system.
   (b) Discuss the advantages and limitations of PC based control systems over stand alone control systems. [8+8]

5. Compare and contrast between direct vector control and indirect vector control. [16]

6. (a) Sketch the control of a single acting cylinder and control of a double-acting cylinder.
   (b) Draw the sketches of the following ball bearings and explain its importance:
      i. Angular contact
      ii. Filling slot. [8+8]

7. Describe and compare the performance and properties of:
   (a) Proportional control
   (b) Proportional plus integral control
   (c) Proportional plus integral control plus derivative control. [5+5+6]

8. Investigate the analog-to-digital converters used in mechanical measuring systems. Find the sampling rate, the quantization bits, and the technique used for the conversion. [16]

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Code No: 07A70311 **R07** **Set No. 1**

IV B.Tech I Semester Examinations,December 2011
MECHATRONICS
Mechanical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the construction and principle of operation of the brushless DC permanent magnet motor. [16]

2. What is the need of addressing modes in microcontroller? Explain various addressing modes with examples available in 8051 microcontroller. [16]

3. (a) What is the principle of ADC?
   (b) Explain low pass filter and high pass filter. Also discuss its advantages.[4+12]

4. (a) Capacitive proximity sensors will sense metal objects as well a inductive proximity sensors. So why use inductive proximity sensors.
   (b) An inductive proximity sensor has a specified range of 5mm. What is it's range when sensing a brass target object? [8+8]

5. (a) Explain with the help of a block diagram, functioning of a mechatronics system.
   (b) Discuss the application of graphical interface in flexible manufacturing system. [8+8]

6. (a) Explain with a suitable illustration, how a linear motion is used to produce rotary movement.
   (b) Explain the various components used in the hydraulic system. [8+8]

7. (a) Explain the following ac motors:
      i. Three phase induction motor
      ii. Three phase synchronous motor.
   (b) What is TTL? Draw and explain 7408 Logic circuits. [8+8]

8. A new printing station will add a logo to parts as they travel along an assembly line. When a part arrives a part sensor will detect it. After this the 'clamp' output is turned on for 10 seconds to hold the part during the operation. For the first 2 seconds the part is being held a 'spray' output will be turned on to apply the thermo set ink. For the last 8 seconds a heat output will be turned on to cure the ink. After this the part is released and allowed to continue along the line. Write the ladder logic for this process. [16]

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Code No: 07A70311 **R07** **Set No. 3**

IV B.Tech I Semester Examinations,December 2011
MECHATRONICS
Mechanical Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Discuss the applications of PC based Simulations.
   (b) Explain the necessity for introducing the mechatronics systems in the future factory. [8+8]

2. Describe the following systems:
   (a) Ball bearings
   (b) Pressure relief valve
   (c) Elements of Hydraulic system. [5+5+6]

3. What is a linear variable differential transformer? Explain how it is used as the displacement sensor. [16]

4. (a) Discuss the merits and demerits of electrical relays with solid state relays.
   (b) A pulse width modulation dc motor speed control is capable of 125 volts dc maximum output. What is the output voltage when the PWM is operating at 45% duty cycle? [8+8]

5. (a) What is CMOS? Explain its functions.
   (b) Discuss the following protection devices used in mechatronics system:
      i. Over current sensing
      ii. Thermal dissipation. [8+8]

6. (a) List four types of I/O modules and explain them briefly.
   (b) What is the purpose of the programming unit in PLC? [8+8]

7. Explain how a servomotor is interfaced with 8051 microcontroller for the control of angle in the servomotor. [16]

8. (a) Sketch and explain a non-inverting operational amplifier.
   (b) Discuss the important hardware used in the signal conditioning. [8+8]

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