Code No: M0326/R07 **Set No. 1**

IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011
MECHATRONICS
(Common to Mechanical Engineering and Production Engineering)
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Compare and contrast the control system for the domestic central heating system involving a bimetallic thermostat and that involving a microprocessor.
   (b) Sketch the block diagram of mechatronics system and explain briefly. [8+8]
2. (a) Explain briefly the term digital signal processing.
   (b) Explain the different signal conditioning methods. [8+8]
3. (a) Describe the electro-hydraulic system with the neat sketch.
   (b) Explain the working principle of relief valve and direction control valve. [8+8]
4. (a) Draw the simple sketch and explain the characteristics of the following d.c. motors:
      i. Series wound motor
      ii. Compound wound motor
   (b) Sketch and explain 7 segment display interfacing. [8+8]
5. Compare and contrast between DC servomotor drive with AC servomotor drive. [16]
6. Explain the pins/signals, which have different meanings at different instances in 8051 microcontroller. [16]
7. 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]
8. With a neat block diagram explain the operation of optical incremental encoder for the measurement of angular position. [16]

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Code No: M0326/R07 **Set No. 2**

IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011
MECHATRONICS
(Common to Mechanical Engineering and Production Engineering)
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. What are the different control methods used in Mechatronics? Discuss them with suitable examples. [16]
2. (a) Explain the need for using the signal conditioning.
   (b) Sketch and explain differential amplifier. Also discuss its applications, limitations. [8+8]
3. (a) Draw the block diagram of pneumatic power supply and explain the operation.
   (b) Explain the function of poppet valve and shuttle valve. [8+8]
4. (a) What are the different types of d.c. motors? Explain its uses.
   (b) Explain the various protection schemes used in mechatronics systems. [8+8]
5. What are the basic components of a relay? Explain the basic function of each relay. [16]
6. Discuss the specifications of DAC (Digital to Analog Converter) and explain how it is interfaced with 8051 microcontroller. [16]
7. (a) Describe the procedure for solving a rung of logic.
   (b) What are the two steps the PLC must perform during operation? [8+8]
8. List out the important terms used in the robot arm operation and explain then briefly. [16]

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Code No: M0326/R07 **Set No. 3**

IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011
MECHATRONICS
(Common to Mechanical Engineering and Production Engineering)
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (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]
2. (a) What is the function of filtering? Explain its characteristics.
   (b) List the different types of amplifiers and sketch any two types of amplifiers. [8+8]
3. (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]
4. (a) What is TTL circuit? Draw and explain 7402 TTL circuits.
   (b) Explain the advantages and disadvantages of a.c. motors over d.c. motors. [8+8]
5. Explain the operation of induction motor drive with pulse width modulation technique. [16]
6. What are the different groups (classifications) for the instructions in 8051 microcontroller instruction set? Explain them briefly. [16]
7. Discuss how the data is moved and compared in a shift register with the help of ladder diagrams. [16]
8. Explain with a neat diagram how the angular position is measured with potentiometers. [16]

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Code No: M0326/R07 **Set No. 4**

IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011
MECHATRONICS
(Common to Mechanical Engineering and Production Engineering)
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Define 'graphical user interface' and 'real time control system'. Discuss its applications and limitations.
   (b) Compare and contrast between traditionally designed watch and that of micro-process based designed watch using mechatronics elements. [8+8]
2. (a) What is the function of amplifier?
   (b) Name the different types of filters. Describe them with neat sketches. [4+12]
3. (a) Explain the advantages of pneumatic actuators over hydraulic actuators.
   (b) What is timing belt? When the timing belts are used? [8+8]
4. (a) What is brushless permanent magnet d.c. motor? Explain its characteristics.
   (b) What is solenoid? Explain the working principle of solenoid. [8+8]
5. (a) Discuss in brief variable frequency control of AC motors.
   (b) An induction motor is rated at 30 hp 1175 rpm. If the motor is connected to a variable frequency ac drive and operate the motor at 900 rpm, what is the maximum horsepower the motor can safely deliver? [8+8]
6. Compare and contrast between Analog to Digital Converters (ADC) and Digital to Analog Converters (DAC). [16]
7. Explain in detail different memories of a programmable logic controller (PLC) and explain how the memory of PLC is specified. [16]
8. List out the important terms used in the robot arm operation and explain then briefly. [16]

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