Code No: R05410303 **Set No. 1**

IV B.Tech I Semester Regular Examinations, November 2008
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 are the various applications of mechatronics? Discuss them briefly.
   (b) Explain the various stand alone control systems used in Special Purpose Machines. [8+8]
2. Discuss the following type of amplifiers:
   (a) Logarithmic amplifier
   (b) Differential amplifier
   (c) Summing amplifier [5+5++6]
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) Explain the basic principles involved in the action of a motor.
   (b) Draw the block diagram of three state buffer for LED display and explain briefly. [8+8]
5. Explain the construction and principle of operation of permanent magnet stepper motor. What are the applications of it? [16]
6. (a) Explain the immediate and indirect addressing modes available in 8051 microcontroller.
   (b) What are the purposes and functions of Address Latch Enable (ALE) pin connection with 8051 micro controller? [8+8]
7. Explain with the help of ladder rungs the jump control mechanism in a programmable and logic controller (PLC). [16]
8. (a) Define a transfer function. What are the properties of a transfer function?
   (b) What are the advantages and disadvantages of negative feedback? [8+8]

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Code No: R05410303 **Set No. 2**

IV B.Tech I Semester Regular Examinations, November 2008
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 is meant by real time control system? Discuss the role of Real Time Control Systems in the following:
   (a) Robotics
   (b) CNC Machines. [16]
2. (a) What is the principle of working of Ramp ADC? Explain with the help of neat sketch.
   (b) Draw and explain the differential amplifier with a thermocouple. [8+8]
3. (a) List and explain the components of hydraulic system.
   (b) Draw the neat sketch of pneumatic diaphragm actuator and explain its working. [8+8]
4. (a) What are the advantages of PC interfacing?
   (b) Explain n-channel and p-channel types of MOSFETs. [8+8]
5. What is an electrical relay? Explain the principle of operation of a relay with a neat diagram. [16]
6. Describe how to select a specific microcontroller for a given application. Briefly give different applications of 8051 microcontroller. [16]
7. Explain the important features of a typical programmable logic controller (PLC). [16]
8. Discuss the advantages and the disadvantages of P, PI, PD and PID controllers. [16]

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Code No: R05410303 **Set No. 3**

IV B.Tech I Semester Regular Examinations, November 2008
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 meant by graphical user interface? Discuss its use in Computerized Manufacturing system.
   (b) Enumerate the differences between Special Purpose Machines and CNC machines. [8+8]
2. (a) What are the different signal conditioning methods? Discuss them briefly.
   (b) Discuss the various applications of amplifiers. [8+8]
3. (a) What is the application of ball screw and nut?
   (b) Draw the neat sketch of diaphragm-operated process control valve. Explain its working principle, advantages and limitations. [4+12]
4. (a) Explain the applications of solenoids in mechatronics systems.
   (b) Discuss the working principle of variable speed a.c. motor. [8+8]
5. Explain, in detail, the specifications of a stepper motor. Draw its speed-torque characteristics and indicate few specifications on the characteristics. [16]
6. List out the various functional blocks of 8051 microcontroller and explain the function of each one briefly. [16]
7. Draw a block diagram of Programmable Logic Controller (PLC) showing in very general terms the main units of it. [16]
8. (a) Explain the basic rules involved in working with Laplace transforms.
   (b) Write the Laplace transforms of some commonly used input functions. [8+8]

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Code No: R05410303 **Set No. 4**

IV B.Tech I Semester Regular Examinations, November 2008
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 traditional design of a watch with that of the mechatronics-designed product involving a micro-processor.
   (b) Discuss the use of PC based simulations in robots. [8+8]
2. (a) Explain the applications of various types of amplifiers.
   (b) Discuss the various passive components used in filtering noise signals. [8+8]
3. (a) Discuss the important applications of pneumatic actuator systems.
   (b) Draw the neat sketches of valve bodies and show the path of fluid flow. [8+8]
4. (a) Draw sketches of a buffer IC and explain its function.
   (b) Explain the various isolation schemes used in interface subsystems. [8+8]
5. (a) Discuss the applications of variable frequency in the in AC motors.
   (b) A pulse width modulation DC motor speed control is capable of 125 volts DC maximum output. What duty cycle is required if the desired output voltage is 90 volts DC? [8+8]
6. Discuss the salient features of the 8051 microcontroller. What are its areas of applications? [16]
7. Discuss the applications of counters in programmable and logic controllers (PLC). [16]
8. What is a linear variable differential transformer? Explain how it is used as the displacement sensor. [16]

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