Code No: 07A7EC09 **R07** **Set No. 2**

IV B.Tech I Semester Examinations,MAY 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) Explain the basic rules involved in working with Laplace transforms.
   (b) Write the Laplace transforms of some commonly used input functions. [8+8]
2. List out the various functional blocks of 8051 microcontroller and explain the function of each one briefly. [16]
3. Explain the following:
   (a) Analog to Digital Converter
   (b) Filters
   (c) Digital signal processing. [5+5+6]
4. (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]
5. Explain the operation of on-off cycle timer with the help of ladder diagrams. [16]
6. Explain why variable frequency control yields high torque to current ratio during starting. [16]
7. (a) What is Darlington pair? Explain the Darlington pair used as switching circuit.
   (b) What is interfacing equipment? Why interfacing equipments are required? [8+8]
8. (a) Explain the steps involved in the sequential control of pick and place robot.
   (b) Discuss the differences between graphical user interface and real time control systems. [8+8]

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Code No: 07A7EC09 **R07** **Set No. 4**

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

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Describe the following pressure control valves:
   (a) Pressure limiting valve
   (b) Pressure regulating valve
   (c) Pressure sequence valve. [16]
2. (a) Draw the simple sketch and explain the characteristics of the following d.c. motors:
      i. Shunt wound motor
      ii. Series wound motor
   (b) Discuss the following protection devices used in mechatronics systems:
      i. Circuit breakers
      ii. Over current sensing. [8+8]
3. What is real time control system and graphical interface system? Discuss their applications in the field of robotics and FMS. [16]
4. Discuss the following type of amplifiers:
   (a) Logarithmic amplifier
   (b) Differential amplifier
   (c) Summing amplifier [5+5++6]
5. Explain how the speed of the induction motor is controlled using the variable frequency operation. [16]
6. What is the state of damping for the systems having the following transfer functions?
   (a) $G(s) = \frac{2}{(s^2-6s+16)}$
   (b) $G(s) = \frac{10}{(s^2+s+100)}$
   (c) $G(s) = \frac{2s+1}{(s^2+2s+1)}$
   (d) $G(s) = \frac{3s+20}{(s^2+2s+20)}$ [16]
7. Explain how digital interfacing is done with the 8051 microcontroller. [16]

8. Explain how a programmable and logic controller (PLC) will be selected for a particular task. [16]

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Code No: 07A7EC09 **R07** **Set No. 1**

IV B.Tech I Semester Examinations,MAY 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 different sources of interrupts in 8051 microcontroller. [16]
2. Explain the principle of operation of optical absolute encoder with a neat diagram. Compare it wiht incremental encoder. [16]
3. Describe the following systems:
   (a) Ball bearings
   (b) Pressure relief valve
   (c) Elements of Hydraulic system. [6+5+5]
4. (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]
5. Discuss the pulse width modulation technique in the speed control of induction motor drive. [16]
6. What is a shift register? Explain the operation of a shift register with the help of a ladder diagram. [16]
7. (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 microprocess based designed watch using mechatronics elements. [8+8]
8. Briefly discuss the following Converters:
   (a) Ramp ADC
   (b) Flash ADC
   (c) Duel ramp ADC
   (d) Successive approximation ADC. [4×4]

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Code No: 07A7EC09 **R07** **Set No. 3**

IV B.Tech I Semester Examinations,MAY 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) What are the different types of filters? Explain them with simple sketches.
   (b) What are the advantages of using digital to analog converter? [12+6]
2. (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]
3. Describe the construction and working principle of variable reluctance stepper motor. What are the applications of it? [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. Write a brief note on the following:
   (a) Electronic gearing
   (b) Velocity Profiles
   (c) Digital controllers. [5+5+6]
6. Explain the sequence of steps followed by programmable logic controller (PLC) in carrying out the program. Also explain the input/output processing methods in PLC. [16]
7. What is an assembly level language program? Explain the reasons why the coding is done in assembly language instead of being written in machine code directly by a programmer. [16]
8. Sketch and explain a Hydro-penumatic controlled double acting actuating system. Mention its advantages and applications. [16]

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