NEW SCHEME

ME63

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Sixth Semester B.E. Degree Examination, July/August 2005

Industrial Management

Mechatronics

Common to IP/ME/AU/ MA

Time: 3 hrs.]   [Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) What are the objectives of mechatronics?   (5 Marks)

    (b) Explain five areas of application of mechatronics. What are the advantages and disadvantages of mechatronic systems.   (10 Marks)

    (c) Explain different know how required for mechatronics in manufacturing.   (5 Marks)

2. (a) Explain the working principle of a Hall generator.   (5 Marks)

    (b) Explain the working of a eddy current proximity sensor.   (7 Marks)

    (c) List the different types of internal and external sensors used in mechatronic system and briefly explain.   (8 Marks)

3. (a) Write the truth tables for OR, NOR, AND, and NAND gates for three inputs.   (6 Marks)

    (b) Explain the working principle of digital and analog converter.   (8 Marks)

    (c) Explain the structure of a micro processor. Draw the pin configuration of 8085 processor.   (6 Marks)

4. (a) Write the architecture of 8085 micro processor.   (8 Marks)

    (b) What is a micro controller? Explain the use of a micro controller with an example.   (8 Marks)

    (c) Write notes on classification of micro controllers.   (4 Marks)

5. (a) Sketch and explain the working of a recirculating ball lead screw.   (8 Marks)

    (b) Explain different types of lubrication conditions in linear and circular bearings.   (7 Marks)

    (c) Sketch different guide ways used in machine tools.   (5 Marks)

6. (a) Explain the working principle of permanent magnet D.C motor. How is it used for positive control devices? (8 Marks)

(b) Sketch and explain the working of a stepper motor. (7 Marks)

(c) Differentiate between a diode, thyristor and transistor. (5 Marks)

7. (a) Sketch and explain the working of directional control valves used in hydraulic systems. (7 Marks)

(b) State and explain the working of a hydraulic motor. (7 Marks)

(c) Draw a will dependent and travel dependent sequence circuit. (6 Marks)

8. (a) Write the basic relationship of an operational amplifier. (8 Marks)

(b) Explain the Wheatstone bridge circuit used for strain measurement. (7 Marks)

(c) Differentiate between analog and digital signal. (5 Marks)

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NEW SCHEME

ME63

Reg. No.

Sixth Semester B.E. Degree Examination, January/February 2006
Common to IP/ME/AU/MA
Mechatronics

Time: 3 hrs.)

(Max.Marks : 100

Note: *Answer any FIVE full questions.*

1. (a) Justify the Inter disciplinary nature of mechatronics.　　　　(6 Marks)

   (b) Write a note on microprocessor based controllers.　　　　(5 Marks)

   (c) What are the important criteria in the design of mechatronic systems? Explain the mechatronic based engine management system with a block diagram.　　(2+7 Marks)

2. (a) State in general, the principle of operation of transducers and highlight their difference with sensors.　　　　(6 Marks)

   (b) Briefly explain any two types of transducers.　　　　(4+4 Marks)

   (c) Explain the principle of operation of Hall effect transducers.　　(6 Marks)

3. (a) List down any five application areas of microprocessors.　　(5 Marks)

   (b) Describe with an example a microprocessor based digital control system.(8 Marks)

   (c) Explain the following terms :

   i) Fetch cycle　　ii) State　　iii) Bus.　　　　(7 Marks)

4. (a) Discuss about the memory and address, related to microprocessors.　(6 Marks)

   (b) State in detail the difference between microprocessor and microcontroller.　　　　(10 Marks)

   (c) Briefly write about the classification of microcontrollers.　　(4 Marks)

5. (a) Explain the working of the recirculating ball screws in CNC machines, with a neat sketch.　　　　(6 Marks)

   (b) Write a note on the phenomenon of stick slip.　　　　(4 Marks)

   (c) Discuss about the following drive systems :

   i) DC drives　　ii) Stepper Motors.　　　　(10 Marks)

6. (a) Write a note on :

   i) Diodes　　ii) Thyristors. .　　　　(5+5 Marks)

   (b) What is bouncing in mechanical switches? Show a transistor-based circuit to prevent bouncing.　　　　(6 Marks)

   (c) What is the role of solenoids in mechatronic systems?　　(4 Marks)

7. (a) What are the 3 types of pressure control valves? Explain the working of any two of these valves. (10 Marks)

   (b) Explain the working principle of double acting cylinder. (5 Marks)

   (c) Write a note on rotary actuators. (5 Marks)

8. (a) What is the significance of operational amplifiers? How is it used in an inverting amplifier? (4+4 Marks)

   (b) What is a multiplexer? State the basic principle of a two-channel multiplexer. (8 Marks)

   (c) Write a note on data acquisition. (4 Marks)

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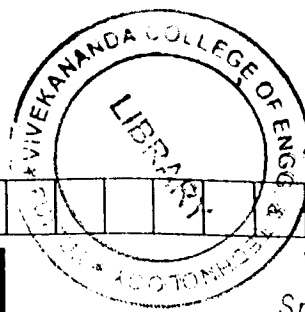
NEW SCHEME

Sixth Semester B.E. Degree Examination, July 2006
Mechanical Engineering
Mechatronics

Time: 3 hrs.]

[Max. Marks:100

Note: *1. Answer any FIVE questions.*

1 a. Define mechatronics and state the major differences between conventional and mechatronic product design approach. **(08 Marks)**
   b. Define sequential controller and explain with a block diagram the working of a domestic washing machine. **(12 Marks)**

2 a. Explain how sensing is achieved by an incremental optical encoder. **(06 Marks)**
   b. Explain the following terminology related to transducers.
      i)   Accuracy
      ii) Repeatability
      iii) Stability
      iv) Sensitivity. **(06 Marks)**
   c. What is the basic principle of a light sensor? Explain the different types. **(08 Marks)**

3 a. With the help of a block diagram explain briefly the general form of a microprocessor system. **(06 Marks)**
   b. Explain in brief the common types of registers used in microprocessor. **(08 Marks)**
   c. What are buses? Explain the functions of 3 forms of buses in a microprocessor system. **(06 Marks)**

4 a. Explain in detail with a block diagram the architecture of Intel 8085A microprocessor. **(12 Marks)**
   b. What are micro controllers? Explain the general form a micro controller with sketch. **(08 Marks)**

5 a. Explain stick-slip phenomenon and how it can be reduced. **(05 Marks)**
   b. Explain with sketch the working principle of hydrodynamic bearings. **(10 Marks)**
   c. What are the requirements of a CNC machine spindle tool assembly? **(05 Marks)**

6 a. What does MOSFET mean? Illustrate how it can be used to control the d.c motor. **(06 Marks)**
   b. How are d.c motors classified? Illustrate how field windings and armature windings are connected in each case. **(04 Marks)**
   c. Explain the principle of operation of a VR stepper motor. **(06 Marks)**
   d. Draw the characteristic of a stepper motor and explain in brief the following :
      i)   Slew range
      ii) Pull-out torque
      iii) Holding torque. **(04 Marks)**

7   a. Explain with example the application of solenoid operated 2/2 direction control valve with a neat sketch. (consider lift application).   **(08 Marks)**

       b. A hydraulic cylinder is used to move a work piece in a manufacturing operation through a distance of 250 mm in 15 sec. If a force of 50 kN is required to move the work piece, determine the working pressure and hydraulic liquid flow rate if a cylinder with a piston diameter of 150 mm is available.   **(04 Marks)**

       c. Design a pneumatic circuit to obtain a sequential operation of two cylinders A and B, the sequence being A+, B+, A- and B-.   **(08 Marks)**

8   a. Draw the circuit for the following amplifier and write the voltage gain of the circuit :
          i)   Inverting
          ii)   Non – inverting
          iii) Summing
          iv) Integrating.   **(06 Marks)**

       b. Explain with illustration Shannon's sampling theorem and term aliasing.   **(06 Marks)**

       c. Explain the salient features of the following :
          i)   Multiplexers
          ii)   Data acquisition system.   **(08 Marks)**

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NEW SCHEME

Sixth Semester B.E. Degree Examination, July 2007
Mechanical Engineering
Mechatronics
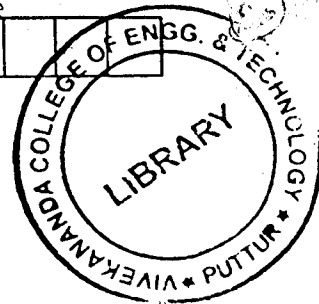
Time: 3 hrs.]   [Max. Marks:100

Note : Answer any FIVE full questions.

1   a. Briefly explain with regards to the design of mechatronic system.   **(05 Marks)**
    b. Explain the basic elements of a closed loop system. With a neat sketch explain any one of the best examples of the closed loop control system.   **(10 Marks)**
    c. Explain the sequential operation in case of automatic washing machines with the block diagram.   **(05 Marks)**

2   a. Distinguish between: i) Analog transducers and digital transducers ii) Active transducers and passive transducer iii) Primary transducers and secondary transducers iv) Input transducers and output transducers v) Mechanical transducers and electrical transducers.   **(10 Marks)**
    b. Explain the operating principal of linear variable differential transformer.   **(05 Marks)**
    c. With a neat sketch explain how resolution is determined in case of an incremental encoder.   **(05 Marks)**

3   a. List out the various general purpose registers used by the microprocessor and mention the function of each.   **(05 Marks)**
    b. How are microprocessors and microcontrollers specified? List some applications of microprocessors and microcontrollers.   **(05 Marks)**
    c. What do you understand by high level and low-level languages? Explain.   **(10 Marks)**

4   a. Define the following terms:
       i) Memory and address   ii) I/O and peripheral devices
       iii) Fetch cycle and write cycle   iv) Stack and stack pointer.   **(08 Marks)**
    b. Classify "Instruction set" for Intel 8085 and explain each of them.   **(06 Marks)**
    c. What do you understand by 8085 machine language and 8085 A assembly language?   **(06 Marks)**

5   a. Explain: i) Friction guide ways ii) Antifriction guide ways iii) Frictionless guide ways and mention their advantages and disadvantages.   **(10 Marks)**
    b. What are the differences between ball and roller screws?   **(05 Marks)**
    c. With a neat sketch explain hydrostatic bearing and hydrodynamic bearing.   **(05 Marks)**

6   a. Explain with a neat diagram the principal of working of a mechanical relay.   **(05 Marks)**
    b. Explain with a neat sketch the feedback control system for a DC motor using Pulse Width Modulator (PWM).   **(05 Marks)**
    c. What are stepper motors and how are stepper motors classified? Explain.   **(10 Marks)**

7   a. Explain the important elements of a hydraulic system with the help of a neat sketch.   **(05 Marks)**
    b. With the help of neat sketch explain the pressure-reducing valve and pressure-sequencing valve.   **(10 Marks)**
    c. How hydraulic motors are broadly classified?   **(05 Marks)**

8   a. Explain with a neat diagram the use of amplifier in an audio CD player.   **(05 Marks)**
    b. What is meant by temperature compensation? Explain it with respect to strain gauges and thermocouples.   **(10 Marks)**
    c. What is meant by digital signal processing? How they are carried out?   **(05 Marks)**

Sixth Semester B.E. Degree Examination, Dec. 07 / Jan. 08
Mechatronics

Time: 3 hrs.   Max. Marks:100

Note : 1. Answer any FIVE full questions.
2. Include figures, wherever required.

1 a. Explain the various stages through which mechatronics has evolved.   (08 Marks)
   b. Illustrate a measurement system and its constituent elements.   (08 Marks)
   c. Explain an open loop system with an example.   (04 Marks)

2 a. List and explain the different types of transducers used in mechatronics systems. (05 Marks)
   b. Illustrate the difference between transducer and sensor.   (08 Marks)
   c. Explain with a neat diagram the working of a photo emissive transducer with photo
      multiplier.   (07 Marks)

3 a. Convert the following decimal number into BCD number system: 36109   (03 Marks)
   b. With symbols and truth tables, explain any three types of logic gates.   (12 Marks)
   c. Illustrate the multiplexed mode of operation of $AD_0 - AD_7$ bus of 8085A. (05 Marks)

4 Illustrate the following terminology related to micro processors :
   a. Memory and address   (05 Marks)
   b. Program counter   (05 Marks)
   c. Bus   (05 Marks)
   d. Interrupts   (05 Marks)

5 a. List the various points that must be considered while designing guide ways. (04 Marks)
   b. Illustrate the relation of coefficient of friction and machine tool slide velocity for friction
      type guide ways. Also explain how to reduce the possibility of stick – slip between the
      slide and guides.   (06 Marks)
   c. Explain the following with figures:
      i) Types of nut preloading   ii) Types of shaft misalignment.   (10 Marks)

6 a. Explain the basic principles, construction and working of DC motors used in CNC
      machines.   (10 Marks)
   b. Illustrate the basic form of the permanent magnet stepper motor. Also illustrate the stepper
      motor characteristics.   (10 Marks)

7 a. Suggest a simple valve used to control the pressure in the hydraulic circuits and illustrate
      its construction and working.   (10 Marks)
   b. With a neat diagram, explain how a solenoid operated sliding spool valve functions.
                                                                              (10 Marks)

8 Write short notes on:
   a. Comparator   (05 Marks)
   b. Wheat stone bridge   (05 Marks)
   c. Two channel multiplexer.   (05 Marks)
   d. Operational amplifier.   (05 Marks)

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06ME64

Sixth Semester B.E. Degree Examination, June-July 2009
Mechatronics and Microprocessor

Time: 3 hrs.   Max. Marks:100

**Note: 1. *Answer any FIVE full questions, selecting
at least TWO questions from each part.*
2. *Draw neat sketches wherever necessary.***

PART – A

1   a.   Define mechatronics. State the major differences between conventional and mechatronic product design approach.   **(08 Marks)**
    b.   What is sequential controller and explain with a block diagram the working of an domestic washing machine.   **(12 Marks)**

2   a.   Explain how sensing is achieved by an incremental optical encoder.   **(08 Marks)**
    b.   Explain the following performance terminologies of transducers :
         i) Accuracy   ii) Repeatability   iii) Drift   iv) Speed of response   **(06 Marks)**
    c.   Explain the principle of operation of Hall effect sensor.   **(06 Marks)**

3   a.   Differentiate between a diode, thyristor and transistor.   **(06 Marks)**
    b.   Explain the working principle of a permanent magnet D.C. motor. How it is used for positive control drives.   **(08 Marks)**
    c.   Sketch and explain the working of an stepper motor.   **(06 Marks)**

4   a.   What is the significance of operational amplifier? How it is used in an inverting amplifier circuit?   **(10 Marks)**
    b.   What is multiplexer and de multiplexer? Where they are used?   **(06 Marks)**
    c.   Write a note on digital signal processing.   **(04 Marks)**

PART – B

5   a.   With the help of a block diagram, explain briefly the general form of a microprocessor system.   **(08 Marks)**
    b.   What are logic gates? Discuss AND and OR gates with their truth tables for two inputs.
                                                                                  (08 Marks)
    c.   Write a note on representation of real numbers.   **(04 Marks)**

6   a.   Explain in detail with a block diagram, the architecture of Intel 8085A microprocessor.
                                                                                  (10 Marks)
    b.   What are micro controllers? Explain the general form of a micro controller.   **(10 Marks)**

7   a.   Explain the classification of instructions for the Intel's 8085 microprocessor.   **(10 Marks)**
    b.   With a neat flow chart, discuss the programming process.   **(10 Marks)**

8   a.   Distinguish between instruction cycle, machine cycle and T-state.   **(10 Marks)**
    b.   Draw and explain the timing diagram for Opcode fetch operation.   **(10 Marks)**

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06ME64

Sixth Semester B.E. Degree Examination, May/June 2010
Mechatronics and Microprocessors

Time: 3 hrs.

Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO*
questions from each part.

PART – A

1   a. Explain with the block diagram, the basic elements of a measurement system.   **(08 Marks)**
    b. Explain with the block diagram, how a microprocessor control system is used to control the focusing and exposure in an automatic camera.   **(12 Marks)**

2   a. Define the following terms : i) Hysteresis error   ii) Repeatability.   **(04 Marks)**
    b. Explain with a sketch, an eddy current proximity sensor.   **(06 Marks)**
    c. Explain the working principle of Hall effect sensor. How can this sensor be used to determine the level of fuel in an automobile fuel tank?   **(10 Marks)**

3   a. Write short notes on relays.   **(05 Marks)**
    b. Explain the principle of brushless D.C. permanent magnet motor.   **(08 Marks)**
    c. Explain the principles of operation of the variable reluctance stepper motor.   **(07 Marks)**

4   a. With suitable examples, explain some of the processes that can occur in conditioning a signal.   **(10 Marks)**
    b. Explain how high voltages and wrong polarity may be protected against, by the use of a zener diode circuit.   **(06 Marks)**
    c. Define filtering. Mention the four different types of filters.   **(04 Marks)**

PART – B

5   a. Explain the evolution of microprocessors.   **(07 Marks)**
    b. With the truth table, for two inputs explain : i) AND – gate   ii) OR – gate.   **(08 Marks)**
    c. Discuss the XOR – gate and write down its truth table.   **(05 Marks)**

6   a. Explain for a microprocessor, the role of accumulator register and program counter register.   **(08 Marks)**
    b. State any four differences betweena microprocessor and a microcontroller.   **(04 Marks)**
    c. Write short notes on 'BUS' related to 8085 – microprocessor.   **(08 Marks)**

7   a. Explain the commonly used instructions that may be given to a microprocessor under
        i) Data transfer   ii) Arthmetic.   **(10 Marks)**
    b. With a flow chart, develop a program for the addition of two 8-bit numbers located in different memory addresses and storage of the result back into memory.   **(10 Marks)**

8   a. List the four operations commonly performed by a CPU.   **(04 Marks)**
    b. Explain the terms : synchronous and asynchronous data transmission.   **(06 Marks)**
    c. Explain the five different conditions, under which, microprocessor controlled data transfer can takes place.   **(10 Marks)**

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