Code No: **R1641031** **R16** **Set No. 1**

IV B.Tech I Semester Regular Examinations, October/November - 2019
MECHATRONICS
(Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B
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PART–A *(14 Marks)*

1. a) Identify the various elements and levels of mechatronics system. [2]
   b) Why the signal conditioning is so important in electronic devices used in mechatronics? [3]
   c) What are the different types of fluid systems available for mechatronic system? [2]
   d) List the application of PLCs in computers. [3]
   e) What are the principal functions of Data Acquisition Systems? [2]
   f) Name some future mechatronics system. [2]

PART–B *(4x14 = 56 Marks)*

2. a) Define a mechatronic product and explain social and economical impacts of mechatronics products. [7]
   b) What are the various major fields of applications of mechatronics? Discuss them briefly. [7]

3. a) Enumerate the different signal conditioning methods? Explain them briefly. [7]
   b) Draw and explain the differential amplifier with a thermocouple. [7]

4. Explain the construction and principle of operation of permanent magnet stepper motor. What are the applications of it? [14]

5. Draw a block diagram of Programmable Logic Controller (PLC) showing in very general terms the main units of it. [14]

6. a) Describe the various interfaces available for analog and digital data acquisition systems. [7]
   b) What is DSP? Draw a block diagram for the data flow in DSP. [7]

7. a) Explain briefly the difference between microprocessor and microcontroller. What is a PLC? [7]
   b) What is a microcontroller? What are the advantages of PLC compared to a microcontroller? [7]

Code No: **R1641031** **R16** **Set No. 2**

IV B.Tech I Semester Regular Examinations, October/November - 2019
MECHATRONICS
(Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B
*****

PART–A ***(14 Marks)***

1. a) List the various measurement systems in mechatronics. [2]
   b) What is the purpose of filters in mechatronic systems? Name some filters. [3]
   c) List the different types of Hydraulic systems available for mechatronics. [2]
   d) State the role of micro-controllers in mechatronic system? [3]
   e) Distinguish the analog and digital DAQ's. [2]
   f) How do you abbreviate PLCs? What is its uniqueness? [2]

PART–B ***(4x14 = 56 Marks)***

2. a) What do you know about various design considerations in mechatronic product design? [7]
   b) Explain the various stand alone control systems used in Special Purpose Machines. [7]

3. a) Discuss the various passive components used in filtering noise signals. [7]
   b) Distinguish the BJT and FET diodes. [7]

4. a) What are the important applications of pneumatic actuator systems? [7]
   b) What is timing belt? When the timing belts are used? List and explain the components of hydraulic system. [7]

5. a) List out the various functional blocks of 8051 microcontroller and explain the function of each one briefly. [7]
   b) Explain the dissimilarities of timers and counters in programmable logic controls (PLCs). [7]

6. a) Describe briefly about any one of the analog to digital converter. [7]
   b) Explain the interfacing motor drives used in DSP. [7]

7. a) Classify the different types of Process Controllers? Distinguish them in detail. [7]
   b) Briefly explain the impotence and location of Counters and Registers in PLC with suitable examples. [7]

Code No: **R1641031** **R16** **Set No. 3**

IV B.Tech I Semester Regular Examinations, October/November - 2019
MECHATRONICS
(Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B
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PART–A *(14 Marks)*

1.	a)	Identify the sensors and transducers in mechatronics.	[2]
	b)	Compare the TRIAC and LEDs.	[2]
	c)	What are the different types of pneumatic systems available for mechatronics?	[3]
	d)	List the functions of micro-processors in mechatronics system.	[3]
	e)	Why digital signal processing employed in mechatronics?	[2]
	f)	What is a Digital Controller? State its role in mechatronics system?	[2]

PART–B *(4x14 = 56 Marks)*

2.	a)	Enlist the advantages and disadvantages of mechatronics systems.	[7]
	b)	Explain the control parameters and system objectives of mechatronic systems.	[7]
3.		Discuss the following type of amplifiers: (a) Logarithmic amplifier (b) Differential amplifier (c) Summing amplifier	[14]
4.	a)	State the basic principles involved in the action of a motor.	[7]
	b)	Mention the advantages of pneumatic actuators over hydraulic actuators.	[7]
5.	a)	Explain the immediate and indirect addressing modes available in 8051 microcontroller.	[7]
	b)	Explain the important features of a typical programmable logic controller (PLC).	[7]
6.	a)	Distinguish the features of analog and digital Data Acquisition Systems.	[7]
	b)	Discuss the importance of DAQ in the DSP with help of suitable example.	[7]
7.		What is a PLC? How it is different from microcontroller? What are the advantages of PLC compared to a microcontroller?	[14]

Code No: **R1641031** **R16** **Set No. 4**

IV B.Tech I Semester Regular Examinations, October/November - 2019
MECHATRONICS
(Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B
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PART–A *(14 Marks)*

1. a) Name the different light sensors in mechatronics. [2]
   b) What is a diode? Classify them. [2]
   c) State the major functions of control valves. [2]
   d) How digital logic controls improve the utility of the mechatronic system? [3]
   e) Draw the data flow block diagram in DSP. [2]
   f) Enlist the principal components in the process controllers. [3]

PART–B *(4x14 = 56 Marks)*

2. a) State the reasons why sensors and transducers are used in mechatronics. [7]
   b) Explain the working of any one pneumatic actuator and state its advantages. [7]

3. a) Distinguish the DIAC and TRIAC. [7]
   b) Discuss the various applications of amplifiers in mechatronic system. [7]

4. a) What is meant by “Electrical actuation system”? Explain the devices used in such systems. [7]
   b) Draw the neat sketch of pneumatic diaphragm actuator and explain its working. [7]

5. Describe how to select a specific microcontroller for a given application. Briefly give different applications of 8051 microcontroller. [14]

6. a) Explain the signal sampling, Time and space domain and Frequency domain in DSP. [7]
   b) Write a short note on string and segmented DAQ. [7]

7. Explain with the help of ladder rungs the jump control mechanism in a programmable and logic controller (PLC). [14]