**18MED23**

**Hall Ticket Number:**

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| **III/IV B.Tech (Regular) DEGREE EXAMINATION** | | | |
| **August, 2021** | **Mechanical Engineering** | | |
| **Sixth Semester** | **Mechatronics** | | |
| **Time:** Three Hours | | **Maximum: 5**0 Marks | |
| *Answer Question No. 1 Compulsorily.* | | | (10X1 = 10 Marks) |
| *Answer* ***ANY ONE*** *question from each Unit.* | | | (4X10=40 Marks) |

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| 1. | a) | Explain the classification of sensors. | | CO1 | |  |
|  | b) | Name the processes that occur in conditioning a signal. | | CO1 | |  |
|  | c) | Discuss about testing of measurement system installation. | | CO1 | |  |
|  | d) | Name the building blocks of mechanical system undergoing rotary motion. | | CO2 | |  |
|  | e) | Draw the symbolic representation of pushbutton operated spring reset normally closed 3/2 valve. | | CO2 | |  |
|  | f) | What are the specifications of stepper motor? | | CO2 | |  |
|  | g) | What is transfer function? | | CO3 | |  |
|  | h) | What is a first order system? | | CO3 | |  |
|  | i) | What will be the transfer function for a system consisting of three elements in series, the transfer functions of the elements being 10, 2/s and 4/(s+3)? | | CO3 | |  |
|  | j) | What is the role of magnetic bearings in Mechatronics? | | CO4 | |  |
| **Unit - I** | | | | | | |
| 2. | a) | Explain the terms that are used to define the static characteristics of transducers. | | CO1 | **5M** | |
|  | b) | Illustrate the construction and working of any one form of Analogue to Digital Converter. | | CO1 | **5M** | |
|  |  | **(OR)** | |  |  | |
| 3. | a) | Illustrate the construction and working of magnetic recording head. | | CO1 | **5M** | |
|  | b) | Explain data acquisition system with a neat sketch. | | CO1 | **5M** | |
| **Unit – II** | | | | | | |
| 4. | a) | Compare pneumatic and hydraulic power supply systems. | | CO2 | **5M** | |
|  | b) | Explain the construction and working of permanent magnet stepper motor. | | CO2 | **5M** | |
|  |  | **(OR)** | |  |  | |
| 5. | a) | Model the fluid system shown in figure to describe how the height of liquid in the container depends on the rate of input of liquid into the container. |  | CO2 | **5M** | |
|  | b) | Model the electrical system consisting of Resistor, inductor and capacitor. | | CO2 | **5M** | |
| **Unit – III** | | | | | | |
| 6. |  | Describe the response of a second order system subjected to unit step input. | | CO3 | **10M** | |
|  |  | **(OR)** | |  |  | |
| 7. |  | Compare the features of Proportional, Integral and PI controller. | | CO3 | **10M** | |
| **Unit – IV** | | | | | | |
| 8. | a) | Explain the basic structure of a PLC with a neat sketch. | | CO4 | **5M** | |
|  | b) | Discuss about timers and their application in PLC. | | CO4 | **5M** | |
|  |  | **(OR)** | |  |  | |
| 9. |  | Illustrate the working of pick and place robot using a microcontroller. | | CO4 | **10M** | |

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**Brief Scheme of Valuation**

1. a)Classification of sensors: 1Mark

b) Processes that occur in conditioning a signal: 1Mark

c) Testing of measurement system installation: 1Mark

d) Building blocks of mechanical system undergoing rotary motion: 1Mark

e) Symbolic representation of pushbutton operated spring reset normally closed 3/2 valve: 1Mark

f) Specifications of stepper motor: 1Mark

g) Transfer function: 1Mark

h) First order system: 1Mark

i) Transfer function for a system consisting of three elements in series: 1Mark

j) Definition of PLC: 1Mark

k) Ladder diagram: 1Mark

l) Role of magnetic bearings in Mechatronics: 1Mark

**Unit-I**

2. a) Terms that are used to define the static characteristics of transducers: 6 Marks

b)Construction and working of any one form of Analogue to Digital Converter:

Sketch:3 Marks + working: 3 Marks

**Or**

1. a) Construction and working of magnetic recording head: Sketch:3 Marks + working: 3 Marks

b) Data acquisition system with a neat sketch: Sketch:3 Marks + working: 3 Marks

**Unit-II**

1. a) Comparison of pneumatic and hydraulic power supply systems: 6 Marks

b) Construction and working of permanent magnet stepper motor: Sketch:3 Marks + working: 3 Marks

**Or**

1. a) Model the fluid system shown in figure: 6 Marks

b) Model the electrical system consisting of Resistor, inductor and capacitor: Sketch:3 Marks + working: 3 Marks

**Unit-III**

1. Response of a second order system subjected to unit step input: 12 Marks

**Or**

1. Compare the features of Proportional, Integral and PI controller: 12 Marks

**Unit-IV**

1. a) Basic structure of a PLC with a neat sketch: Sketch:3 Marks + working: 3 Marks

b) Types of timers and their application in PLC: Sketch:3 Marks + working: 3 Marks

**Or**

1. working of pick and place robot using a microcontroller: Sketches:6 Marks + working: 6 Marks