

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**DIPLOMA IN MECHANICAL ENGINEERING**  
**SEMESTER- VI**

Subject Name: **Mechatronics (Elective-II)**

Subject Code: **2361921**

<b>Sr. No.</b>	<b>Subject Content</b>	<b>Hrs.</b>
1	<p><b>INTRODUCTION.</b></p> <p>1.1 Know the objectives of learning this subject.            1.2 Need, scope &amp; importance of Mechatronics in industries.            1.3 Need of attitude, knowledge &amp; skill required for application of Mechatronics.            1.4 Systems, measurement systems and control systems.            1.5 Basic elements of close loop control systems.            1.6 Sequential and microprocessor based controllers, automatic camera-block diagram, working and applications.</p>	3
2	<p><b>BASIC ELECTRONICS.</b></p> <p>2.1 Fundamentals of electrical quantities-voltage, current , resistance, work , power, direct current (dc) and alternating current (ac).            2.2 Passive components used in electronics-resistor, capacitor, and inductor, combination of these.            2.3 Transformers-types, working and applications.            2.4 Semiconductors-intrinsic and extrinsic.            2.5 Diodes-types, working and applications.            2.6 Rectifiers- types, working and applications.            2.7 Transistors- types, working and applications.            2.8 Integrated circuits-concept and basic structure.            2.9 Number systems, logic gates, Boolean algebra and De Morgan laws.</p> <p><b>Note</b> : Question/s (application type-selection of components, designing logic gate circuit, etc.) of 4-6 marks out of 70.</p>	6
3	<p><b>SENSORS AND TRANSDUCERS.</b></p> <p>3.1 Performance terminology.            3.2 Static and dynamic characteristics.            3.3 Types , construction, working and applications of :                - Displacement , position and proximity sensors.                - Velocity and motion.                - Force.</p>	8

	<ul style="list-style-type: none"> <li>- Fluid pressure.</li> <li>- Liquid flow and liquid level.</li> <li>- Temperature.</li> <li>- Light.</li> </ul> <p>3.4 Selection criteria of sensors.</p> <p>3.5 Digital to Analog Conversion (DAC) and Analog to Digital Conversion (ADC)- circuit, working and applications.</p> <p><b>Note</b> : Question/s (application type-selection and justification of sensors, etc.) of 4-6 marks out of 70.</p>	
4	<p><b>MECHANICAL ACTUATION SYSTEMS.</b></p> <p>4.1 Basics of mechanical actuation systems: types of motion, kinematic chains, cams, gear trains, ratchet and pawl, belt and chain drives, bearings fundamentals, arrangements/ working, applications.</p> <p>4.2 Pneumatic and hydraulic actuation systems: fundamentals; sketch and working of directional control valves, pressure control valves, cylinders and process control valves , rotary actuators; working / arrangements and applications.</p> <p><b>Note</b> : Question/s (application type-selection and justification of ele. actuation systems) of 4-6 marks out of 70.</p>	6
5	<p><b>ELECTRICAL ACTUATION SYSTEMS.</b></p> <p>5.1 Electrical systems for actuators.</p> <p>5.2 Mechanical switches and relays –types, functions and applications.</p> <p>5.3 Solid state switches-types, working and applications.</p> <p>5.4 Solenoids – concept and applications.</p> <p>5.5 Basic principle, types, constructional features, operational (input/output) parameters, selection criteria and applications of :</p> <ul style="list-style-type: none"> <li>- DC motors.</li> <li>- AC motors.</li> <li>- Stepper motors.</li> <li>- Servo motors.</li> </ul> <p><b>Note</b> : Question/s (application type-selection and justification of ele. actuation systems) of 4-6 marks out of 70.</p>	8
6	<p><b>INTERFACINGS.</b></p> <p>6.1 Interfacings-concept and need.</p> <p>6.2 Interface requirements.</p> <p>6.3 Microprocessor-general block diagram , elements, working, selection and examples of</p>	6

	<p>applications.</p> <p>6.4 Microcontroller-general block diagram, elements, working, types/examples/versions/ families and their features,selection and examples of applications.</p> <p>6.5 Programmable Logic Controller (PLC)-basic structure, elements , working, input/output processing and programming, logic functions, selection and examples of applications.</p> <p>6.6 Serial and parallel interface.</p>	
7	<p><b>MECHATRONIC SYSTEMS.</b></p> <p>7.1 Traditional and mechatronic system design.</p> <p>7.2 Simple mechatronic design-timed switch , windscreen , bathroom scales.</p> <p>7.3 Develop at least two simple mechatronic system for given set of input and output conditions.</p> <p><b>Note :</b> Question/s (application type-design of simple mechatronic systems) of 8-10 marks out of 70.</p>	5
	Total	42

### Notes:

#### A. FOR STUDENTS.

- a. It is advised that student download this copy of syllabus and plan to achieve the objectives of learning this subject.

#### B. FOR PAPER SETTER/MODERATOR.

- a. Refer GTU syllabus and do not take reference of previous TEB question papers.
- b. Ask the questions from each topic having marks weightage proportionate to hours allotted to that topic.
- c. Optional questions must be asked from the same topic. That is weightage of compulsory attendance part of questions will be equal to proportionate to hours allotted to each topic.
- d. Marks ratio of knowledge: comprehension: application types questions must be 30:30:40 respectively.
- e. Submit solution / answer keys along with distribution of marks in each question for the paper being submitted.

### Reference Books:

- |    |              |                              |
|----|--------------|------------------------------|
| 1. | Mechatronics | HMT(TMGH).                   |
| 2. | Mechatronics | W.Bolton(Pearson Education). |