



GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Vocation (B.Voc)
Semester: III
Branch: Production Technology
Subject Name: Fundamentals of Mechatronics
Subject Code: 21130303

Type of course: Under Graduate

Prerequisite: Zeal to learn the subject

Rationale: In the field of Electronics, it is essential to know the functional aspects of several instruments useful in the process of signal measurement. Prior to the measurement, the process of signal conversion to equivalent electrical quantity and conversion of electrical quantity in one or the other forms are important steps. The fundamentals of signal measurement in analog as well as digital domains both need to be emphasized for modern instruments. It also emphasize on mechanical and electrical actuation system.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE(E)	PA(M)	ESE(V)	PA(I)	
3	0	0	3	50	0	0	0	50

Sr. No.	Topic	Teaching Hrs.	Module Weightage
01	<p>Introduction: Introduction to Mechatronics, measurement systems, control systems, the Mechatronics approach.</p> <p>Introduction to Transducers: Sensors and transducers, operating characteristics of transducers, measurement of displacement, velocity, pressure, flow, and temperature.</p>	9	25%
02	<p>Signal conditioning: Signal conditioning – their features and various blocks, the operational amplifiers, Protection, Filtering, Wheatstone bridge, Digital signals, Multiplexers, Data acquisition, Digital signal processing.</p> <p>Data Presentation Systems: Displays, Digital recorders, Digital Storage Oscilloscope - Block Diagram, theory and applications, Characteristics of digital display, DVM and Digital multi meter.</p>	9	25%
03	<p>Introduction to process control systems: Programmable logic controller overview (Introduction of PLC, Architecture & Block diagram of PLC), NO & NC Switch. Continuous controller modes i.e.P,I, D, PI, PD, PID. (Introduction, block diagram & working)</p>	8	20%



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04	Introduction of Mechanical Actuation Systems: Mechanical Actuation Systems for motion, Kinematics chains, Cams, Gear trains, Belt and chain drives, Bearings. Pneumatic and Hydraulic Systems: Actuation systems, Pneumatic and hydraulic systems, Directional control valves, Pressure control valves, Cylinders, Process Control valves, rotary actuators.	8	20%
05	Introduction of Electrical Actuation Systems: Electrical systems, Mechanical Switches, Solid-state switches, Solenoids, DC motors, AC motors, Stepper motors.	6	10%

Distribution of marks weightage for cognitive level:

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	20	20	-	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

Sr.No.	CO statement	Marks% weightage
CO1	To study basics of transducers.	25
CO2	To learn the fundamentals of signal conditioning and data presentations.	25
CO3	To study automation components and systems application.	20
CO4	To learn mechanical actuation system.	20
CO5	To learn electrical actuation system.	10

Reference Books:

1. A Course In Electrical And Electronics Measurements And Instrumentation by A.K.Sawhney, Dhanpat Rai & Sons publication
2. Theory of Machines, Rattan S S, Tata McGraw-Hill
3. Industrial Instrumentation and Control By. S.K. Singh The McGraw Hill Companies

List of Open Source Software/learning website:

<https://nptel.ac.in>,