

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme		Master of Technology				Branch/Spec.		Electronics and Communication Engineering – Embedded System	
Semester		I				Version		1.0.0.0	
Effective from Academic Year			2026-27			Effective for the Batch admitted in			July 2026
Course Code		3ES1104		Course Name		Sensors, Actuators & Interfacing Techniques			
Teaching Scheme						Examination Scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	-	4	Theory	50	50	100
Hours	3	0	2	-	5	Practical	25	25	50
Pre-requisites									
Basic Electronics, Analog & Digital Circuits, Microcontrollers, and Measurement & Instrumentation concepts.									
Course Outcomes									
On successful completion of the course, the students will be able to:									
CO1	Understand principles of sensors and actuators used in embedded systems.								
CO2	Learn interfacing techniques with microcontrollers and processors.								
CO3	Develop embedded applications using industrial sensors and actuators.								
CO4	Gain practical knowledge of signal conditioning and communication interfaces.								
Theory Syllabus									
Unit	Content								Hrs.
1	Fundamentals of Sensors and Actuators: Introduction to Sensors and Transducers, Classification of Sensors, Analog and Digital Sensors, Active and Passive Sensors, Characteristics of Sensors, Introduction to Actuators.								9
2	Sensor Technologies: Temperature Sensors (LM35, RTD, Thermocouple), Pressure and Flow Sensors, Proximity and Ultrasonic Sensors, Light Sensors (LDR, Photodiode), MEMS Sensors and Gyroscopes, Gas and Humidity Sensors.								8
3	Actuators and Motor Control: Relay and Solenoid Actuators, DC Motors and Servo Motors, Stepper Motor Interfacing, PWM-Based Motor Control, Industrial Actuators, Smart Actuators in Automation.								8
4	Interfacing Techniques: ADC and DAC Interfacing, GPIO Programming, Sensor Signal Conditioning, Interrupt-Based Interfacing, Embedded Communication with Sensors.								10
5	Industrial and IoT Applications: Sensor Networks in Embedded Systems, IoT-Based Sensor Applications, Automotive Sensor Systems, Smart Home and Healthcare Applications, Industrial Automation Systems, Case Studies on Embedded Interfacing.								10
Practical Content									
Practical, assignments and tutorials are based on above syllabus.									
Text Books									
1	Sensors and Transducers – D. Patranabis.								
Reference Books									
1	Mechatronics and Sensor Technology – Bolton								
2	Embedded Systems – Raj Kamal.								
3	Industrial Instrumentation – S.K. Singh.								
ICT/MOOCs Reference									
1	https://www.youtube.com/watch?v=r_Pqc9boyIU&list=PLgMDNELGJ1CbuzZjqWa8uoSlQWKqVwPN7&index=2								
2	https://www.youtube.com/watch?v=t0mCp-RzxVU&list=PLgMDNELGJ1CbuzZjqWa8uoSlQWKqVwPN7&index=3								

Mapping of CO with PO and PSO :															
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	3	3	2	3	2	2	2	3	1	1	1	2
CO2	2	2	2	2	2	3	2	3	3	3	2	2	2	2	1
CO3	3	3	3	3	3	2	2	3	3	2	2	1	1	1	2
CO4	3	1	3	3	2	2	3	1	3	2	2	3	3	3	2