

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Diploma Engineering				Branch	Mechatronics Engineering			
Semester	VI				Version	1.0.0.0			
Effective from Academic Year		2018-19			Effective for the batch Admitted in			July 2018	
Subject code	1MC2606		Subject Name		AUTOTRONICS				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	5	Theory	40	60	100
Hours	3	0	2	0	7	Practical	30	20	50

Pre-requisites:
Students must have knowledge of basic electrical and electronics. Students must aware with fundamental mechanical engineering.

Course Learning Outcomes:
<p>The course content should be taught and implemented with an aim to develop different skills leading to the achievement of the following competencies and course learning outcomes:</p> <p>CO1. To understand the types of systems and their components.</p> <p>CO2. To apply use of signal processing for control system.</p> <p>CO3. To develop understanding of construction and working of different types of sensors.</p> <p>CO4. To implement use of actuators in mechatronics system.</p> <p>CO5. To design mechatronics system and working of it.</p> <p>The practical should be carried out in such a manner that students are able to acquire different learning outcomes in cognitive, psychomotor and affective domain to demonstrate course learning outcomes.</p>

Course Content				
Name of UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
Unit – I Basic Electronics	1.1. Semiconductors; Diode :- PN Junction, Zener Diode, ; Rectifier- Half, Full, Bridge type with filters; 1.2. TRIAC, DIAC, Silicon Control Rectifier (SCR), 1.3. Amplifier and Oscillators 1.4. Common Emitter Configuration only; Power Device: - Photodiode, LED, LDR, Phototransistor 1.5. Integrated Circuits	1a. Select electronics components as per the requirement 1b. Explain rectifier, TRIAC and DIAC. 1c. Describe amplifier and Oscillators.	06	03

<p>Unit-2 Digital Electronics</p>	<p>2.1. Analog/Digital Signal; Logic gates (NOT, OR, NOR, AND, NAND), Symbol and Truth Table; 2.2. Flip Flop, RSandD: Symbol and Truth Table; 2.3. shift resister and counter; Encoder/Decoder; 2.4. multiplexer/demultiplexer, 2.5. LED display</p>	<p>2a. Create logic gates. 2b. Explain working of flip flop circuit. 2c. Describe working of resistors, counters, encoders and decoders. 2d. Use Multiplexer and Demultiplexer</p>	<p>06</p>	<p>03</p>
<p>Unit-3. Program ma ble Logic Controll er (PLC)</p>	<p>3.1. PLC working principle 3.2. Difference Between Relay Panel and PLC, concept of skin/source, set/reset, latch/unlatch 3.3. Troubleshooting and Maintenance of PLC.</p>	<p>3a. Explain working of PLC 3b. Select wired sensor for sinking or sourcing operation. 3c. Select PLC for a given application</p>	<p>18</p>	<p>16</p>
<p>UNIT – 4 ACTUATORS</p>	<p>4.1. AC/DC Electronic timer block; 4.2. Pressure gauge, Thermocouple vacuum gauge and Pirani vacuum gauge 4.3. Measurement of Flow: Hot wire Anemometer, Ultrasonic flow meter; 4.4. Measurement of Temperature: Thermopiles and Thermistor; 4.5. Measurement of Speed : Contact less electrical tachometer, Inductive, Capacitive type tachometer, Stroboscope 4.6. Measurement of Force: Strain gauge load cell; Electrical method for moisture measurement 4.7. Electromechanical Type Transducer: Potentiometric resistance</p>	<p>4a. Identify different types of actuator. 4b. Make the connections with actuators. 4c. Describe different types of electrical motors used in Build</p>	<p>18</p>	<p>16</p>

	<p>type, Inductive, Capacitive, Piezometric</p> <p>4.8. Photoe Transducer: Photo emissive, Photovoltaic, Photoconductive</p> <p>4.9 Applications: Mass Air flow rate sensor, Exhaust gas Oxygen concentration, Throttle plate angular position, Crankshaft angular position, Coolant temperature, Intake air temperature, Manifold absolute pressure (MAP), Vehicle speed Sensor. Transmission gear selector position, Methanol sensor, Rain Sensor; Solenoid Actuators motorized Actuators, Stepper motors.</p>			
Unit- 5 Microprocessor and Microcontroller	<p>5.1 8085 Microprocessor Architecture, Pin configuration, microprocessor and application;</p> <p>5.2 8051 Microcontroller Architecture, Pin configuration</p> <p>5.3 Microcontroller and application;</p>	<p>5.1 8085 Microprocessor Architecture, Pin configuration, microprocessor and application;</p> <p>5.2 8051 Microcontroller Architecture, Pin configuration</p> <p>5.3 Microcontroller and application;</p>	12	04
	<p>functions and applications of following system.</p> <p>I. Hydraulic robot arm.</p> <p>II. DC motor based bottle filling.</p> <p>III. Temperature sensing system.</p> <p>IV. Plastic bag manufacturing</p> <p>V. Automobile Engine control system</p> <p>5.5. Mechatronics systems, which are in recent trend</p>			

List of Practical		
No.	Unit	Name of Practical
1	1	Test electrical and electronic components like diode, LED, SCR, diac, triac, Zener diode, indicator, capacitor using multimeter.
2	2	Measure shaft speed by using Stroboscope and tachometer . Verify truth tables for logic gates: - NOT, AND, OR, NAND, NOR.
3	3	Identify the parts of PLC and demonstrate the working of PLC.
4	4	Observe the characteristics of LVDT.
5	4	Demonstrate the working of strain gauge.
6	3	Identify and demonstrate working of different sensors and actuators.
7	4	Demonstrate the working of various digital to analog and

		analog to digital converters.
8	3	Develop a ladder diagram for:- a) Measurement of speed of a motor. b) Motor start and stop by using two different sensors. c) Simulation of a pedestrian traffic controller. d) Simulation of four road junction traffic controller. e) Lift/elevator control. f) Washing machine control. g) Tank level control. h) Soft drink vending machine control.
9	4	Identify and demonstrate working of various sensors and actuators for multi cylinder modern petrol engines.
10	4	Identify and demonstrate working of various sensors and actuators for multi cylinder diesel engines
11	5	Identify different parts and configuration of microprocessor and microcontroller and demonstrate the working.

List of Instruments/Equipment/TrainerBoard	
1	PLC Kit
2	Strain Gauge Kit
3	RTD or Thermistor Measurement Kit
4	Microprocessor Kit
5	Logic Gates Electronics Kit

List of Reference Books			
No	Title of Reference Books	Authors	Publication
1	Principle of Electronics	Mehta V.K., Mehta Rohit	S. Chand publication, New Delhi, 2005 edition.
2	Electronic Principles with simulation CD	Malvino A.P.	McGraw Hill Education New Delhi 7th Edition,
3	Text book of Mechatronics	Rajput R.K	S. Chand New Delhi 2012 edition.
4	Digital Design	Morris Mano M., Ciletti Michael D.	Pearson Education New Delhi 5thEdition
5	The 8051 Microcontroller and Embedded Systems : Using Assembly and C	Ali Mazidi Muhammad	Pearson Education , New Delhi 2nd Edition

Link of Learning Web Resource	
1	http://www.schneider-electric.us/sites/us/en/support/product-supportresources/software-and-calculators/software/zelio-soft.page 8085 simulator
2	http://www.nptel.ac.in/courses/Webcourse-contents/IIScBANG/Microprocessors%20and%20Microcontrollers/pdf/Lecture_Notes/LNm1.pdf
3	https://www.youtube.com/watch?v=20WdriMuNr8
4	https://www.youtube.com/watch?v=GmFVoendk_o