

Programme Name/s	: Automation and Robotics/ Digital Electronics/ Electronics & Tele-communication Engg./ Electronics & Communication Engg./ Electronics Engineering/ Instrumentation & Control/ Industrial Electronics/ Instrumentation/ Medical Electronics/ Electronics & Computer Engg.
Programme Code	: AO/ DE/ EJ/ ET/ EX/ IC/ IE/ IS/ MU/ TE
Semester	: First
Course Title	: ENGINEERING WORKSHOP PRACTICE (ELECTRONICS GROUP)
Course Code	: 311007

I. RATIONALE

Engineering diploma holders specializing in electronics and allied disciplines are expected to handle various mechanical, electrical and electronics tools in the workshop in any industry in which they are employed. This course provides simulated industrial environment and enable students to perform a variety of operations in various shops using relevant mechanical, electrical and electronic materials as well as use appropriate hand tools, equipment, tools and machinery. Through this course student will develop practical skills in sheet metal work, fitting, soldering, de-soldering, assembly, testing etc. of electronic components and circuits, that will also be very useful for projects and other courses that he or she will undertake during the diploma programme as well as in the world of work.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the student to attain the following industry /employer expected outcome through various teaching learning experiences: Build simple electronic circuits on PCB with metal enclosure.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Use firefighting equipment and other safety related accessories.
- CO2 - Use fitting and sheet metal tools in the workshop.
- CO3 - Test active and passive electronic components.
- CO4 - Perform soldering and de-soldering using soldering tools.
- CO5 - Build simple jobs in the electronic workshop.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Paper Duration	Assessment Scheme										Total Marks
				Actual Contact Hrs./Week			SLH	NLH			Theory				Based on LL & TL				Based on SL		
				CL	TL	LL					Practical										
											FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
													Max	Max	Max	Min	Max	Min	Max	Min	
311007	ENGINEERING WORKSHOP PRACTICE (ELECTRONICS GROUP)	EWP	SEC	-	-	4	-	4	2		-	-	-	-	50	20	50@	20	-	-	100

Total IKS Hrs for Sem. : 2 Hrs

Abbreviations: CL- ClassRoom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @\$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's) aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Follow safety practices. TLO 1.2 Explain the procedure for extinguishing fire. TLO 1.3 Use firefighting equipment. TLO 1.4 Locate various machines and equipment in workshop. TLO 1.5 Follow good housekeeping.	Unit - I General Workshop Practice 1.1 Safety practices, causes of accidents, general safety rules, safety signs and symbols 1.2 First aid 1.3 Fire, causes of fire, basic ways of extinguishing the fire, classification of fire, class A, B, C, D, firefighting equipment, fire extinguishers and their types 1.4 Workshop layout 1.5 Issue and return system of tools, equipment and consumables	Demonstrate operation of available extinguisher in workshop Show first aid box Practice by students for handling fire extinguisher
2	TLO 2.1 Identify fitting tools. TLO 2.2 Explain operation of fitting shop machines. TLO 2.3 Use fitting tools. TLO 2.4 Operate machineries related to workshop. TLO 2.5 Perform fitting operations. TLO 2.6 Maintain tools, equipment and machineries.	Unit - II Fitting 2.1 Fitting hand tools - bench vice, hammers, chisels, files, hacksaw, surface plate, punch, V - block, angle plate, try square, marking block, steel rule, twist drills, reamers, tap set, die set and their specifications 2.2 Operation of fitting shops machineries - Drilling machine, power saw, grinder their specifications and maintenance 2.3 Basic process - chipping, filling, scraping, grinding, marking, sawing, drilling, tapping, reaming etc.	Demonstrate various types of tools available in fitting shop with its utility

Sr.No	Theory Learning Outcomes (TLO's) aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	<p>TLO 3.1 Identify given type of active, passive and SMD electronic components.</p> <p>TLO 3.2 Locate various components such as LED , switch ,relay, 7-segment display , transformer on given circuit.</p> <p>TLO 3.3 Describe steps to use the given type of multimeter.</p> <p>TLO 3.4 Describe the steps to test the given electronics components using the multimeter.</p>	<p>Unit - III Identification of Electronic Components</p> <p>3.1 Electronic components - Passive components like resistor, capacitor and inductor, active components like diode, transistor, IC. Identify SMD components</p> <p>3.2 Switches, relays, LEDs, 7-segment display, step-down transformer, connectors and cables used in electronics circuits</p> <p>3.3 Data sheet and the catalog of electronics components, multimeter</p> <p>3.4 Tools required for electronic workshop - specifications, cost and other important characteristics (Catalogs of multimeter, power supply, to collect the latest information of tools)</p>	Hands on practice
4	<p>TLO 4.1 Select the soldering and de- soldering tools for the given job.</p> <p>TLO 4.2 Describe procedure for using the given soldering related component.</p> <p>TLO 4.3 Explain function of the given type of de-soldering device.</p> <p>TLO 4.4 Describe problems of given type of soldering.</p>	<p>Unit - IV Electronic Soldering Shop</p> <p>4.1 Soldering and de-soldering tools like normal soldering gun, temperature-controlled soldering gun, soldering metals, soldering flux, de-soldering gun, de-soldering pump, de-soldering mesh</p> <p>4.2 Soldering techniques like hand soldering, wave soldering and dip soldering</p> <p>4.3 Soldering of simple electronics components like resistors, capacitors, diode, switches, LEDs on general purpose PCB</p> <p>4.4 Dry soldering, problems of dry and loose soldering</p> <p>4.5 De-soldering of the components from the PCB</p>	Hands on practice demonstration video on use of soldering station
5	<p>TLO 5.1 Describe the procedure to build given type simple electronic circuit on bread board.</p> <p>TLO 5.2 Explain the procedure of assembling given simple electronic circuit on general purpose PCB.</p> <p>TLO 5.3 Explain the procedure to use the given type of meter for continuity testing.</p> <p>TLO 5.4 Explain the procedure to test the continuity of the given circuit using the given type of digital multimeter.</p> <p>TLO 5.5 Test a simple circuit using simulation software.</p>	<p>Unit - V Hands On Skills</p> <p>5.1 Continuity testing using multimeter</p> <p>5.2 Breadboard specifications and testing</p> <p>5.3 Measurement of series and parallel combination of resistors and capacitors</p> <p>5.4 Basic simulation software</p>	Hands - on skills

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Use standard safety symbols for a given situation.	1	Safety symbols	2	CO1

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 2.1 Perform mock drill session for firefighting using various classes of fire extinguishers and related accessories.	2	* Fire extinguishers and accessories	2	CO1
LLO 3.1 Select hand tools and equipment used in the fitting shop.	3	Fitting shop hand tools and equipment	2	CO2
LLO 4.1 Select machine tools and equipment used in the fitting shop.	4	Fitting shop machine tools and equipment	2	CO2
LLO 5.1 Identify various fitting tools based on given situation.	5	* Identification of fitting tools for given specifications	2	CO2
LLO 6.1 Identify various sheet metal tools based on given situation.	6	Identification of sheet metal tools for given specifications	2	CO2
LLO 7.1 Prepare the fitting job as per given drawings Part-I. LLO 7.2 Prepare the fitting job as per given drawings Part-II. LLO 7.3 Prepare the fitting job as per given drawings Part-III. LLO 7.4 Prepare the fitting job as per given drawings Part-IV LLO 7.5 Prepare the fitting job as per given drawings Part-V.	7	* Fitting job preparation	10	CO2
LLO 8.1 Identify the given hand tools, machine tools and equipment used in sheet metal shop along with its' sketch, applications and specifications Part-I. LLO 8.2 Identify the given hand tools, machine tools and equipment used in sheet metal shop along with its' sketch, applications and specifications Part-II.	8	* Identification of tools and equipment in sheet metal shop	4	CO2
LLO 9.1 Prepare two simple sheet metal jobs as per given drawings Part-I. LLO 9.2 Prepare two simple sheet metal jobs as per given drawings Part-II. LLO 9.3 Prepare two simple sheet metal jobs as per given drawings Part-III. LLO 9.4 Prepare two simple sheet metal jobs as per given drawings Part-IV.	9	* Preparation of sheet metal jobs	8	CO2
LLO 10.1 Perform sheet metal and fitting operation for the given utility job.	10	* Job preparation using sheet metal and fitting operation	2	CO2
LLO 11.1 Identify various: (a) Passive electronic components in the given circuit. LLO 11.2 Identify various: (b) Active electronic components in the given circuit. LLO 11.3 Identify various: (c) SMD electronic components in the given circuit.	11	* Passive, active and SMD components	4	CO3
LLO 12.1 Identify various controls available on the front panel of analog and digital multimeter.	12	* Multimeter	2	CO3
LLO 13.1 Determine the value of the given resistor using a digital multimeter to confirm with colour code.	13	* Determination of resistor value	2	CO3
LLO 14.1 Test the semiconductor diodes using a digital multimeter.	14	* Diode testing	2	CO3
LLO 15.1 Test the LEDs and 7-segment display using a multimeter.	15	* 7- Segment display	2	CO3

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 16.1 Connect resistors in series and parallel combination on breadboard and measure its value using a digital multimeter.	16	* Testing resistors on breadboard using multimeter	2	CO3
LLO 17.1 Connect capacitors in series and parallel combination on bread board and measure its value using a multimeter.	17	* Testing capacitors on breadboard using multimeter	2	CO3
LLO 18.1 Identify primary and secondary winding of step down transformer using a multimeter.	18	Identification of windings of transformer	2	CO3
LLO 19.1 Identify relay terminals (coil, common, normally open and close).	19	Relay terminals	2	CO3
LLO 20.1 Solder three components on Printed Circuit Board (PCB). LLO 20.2 Desolder one of the component on Printed Circuit Board (PCB).	20	* Soldering and desoldering components on PCB	2	CO4
LLO 21.1 Build simple circuits on a breadboard using resistors, diode, switch and LED.	21	* Building circuit on breadboard	2	CO5
LLO 22.1 Build simple circuits using relay and other electronics components.	22	Building circuit using relay and components	2	CO5
LLO 23.1 Test any one of the circuits developed in the LLO-16 / LLO-17 using testing equipment.	23	* Building and testing of circuits on PCB	2	CO5
LLO 24.1 Identify the components and the virtual instruments available in any basic simulation software.	24	* Identification of components and virtual instruments in simulation software	2	CO5
LLO 25.1 Build simple circuit using basic simulation software. LLO 25.2 Test the built circuit using basic simulation software.	25	Building and Testing of circuit using basic simulation software	2	CO5
LLO 26.1 Collect information about ancient tools for understanding Indian knowledge system.	26	* Draw sketches of various ancient tools	2	CO1 CO2

Note : out of above suggestive LLOs -

- Minimum 12 for 2 LL Hrs./Week or 24 for 4 LL hrs./Week are to be Performed.
- '*' Marked Practicals (LLOs) Are mandatory
- Judicial mix of LLOs are to be performed to complete minimum requirement of 12 / 24 as applicable

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING) : NOT APPLICABLE**VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED**

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Mechanical foam type Fire Extinguisher with ISI mark (9 litre, B and C type Fire Extinguisher)	1,2
2	A, B, C portable type Fire Extinguisher with ISI mark	1,2
3	Fitting tools: Hammers, Chisels, Files, Hacksaw, Surface Plate, Punch, V Block, Angle Plate, Try Square, Marking Block, Steel Rule, Twist Drills, Reamers, Tap Set, Die Set	3,4,5,7
4	Bench Drilling machine (up to 13 mm drill cap.) with ½ H.P. Motor 1000 mm. height	3,4,5
5	Power Saw machine: 350 mm mechanical with 1 HP Motor & all Accessories	3,4,5

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
6	Bench Grinder: 200 mm Grinding Disc diameter 200 mm. with 25 mm. bore	3,4,5
7	Work Benches: 1800mm*1900mm*750mm	3,4,5,6,7,8,9,10
8	Sheet Metal Hand Tools: Snip, Shears Sheet Gauge, Straight Edge, L Square, Scriber, Divider, Trammel, Punches, Pliers, Stakes, Groovers, Limit Set	6,8,9,10
9	Consumable Components: Resistors, Capacitors, Diodes, Transistors, ICs, IC Sockets, General Purpose PCBs, LEDs, Relays, Switches, Connectors, Connecting Wires, Soldering Metal, Soldering Flux, De-soldering Mesh	11,13,14,15,16,17,19,21,22,23
10	Magnifying Lens with Lamp	11
11	Multimeter: 3 and ½ digit with Component Tester	12,13,14,15,16,17,18,19,23
12	Wire Cutter	16,17,21,22,23
13	Anti-static Mat	16,17,18,19,20,21,22,23,24,25
14	Soldering Gun: 40 Watts, Holding Stand, Temperature Control, Power Cord	20,22
15	De-soldering Gun: 80 Watts	20,22
16	Clip-on Ammeter	22
17	PCB Drilling Machine	22
18	Open-source Simulation Software	24,25

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table) : NOT APPLICABLE

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Rubrics for continuous assessment based on process and product related performance indicators (50 marks)

Summative Assessment (Assessment of Learning)

- End of the term examination, Viva-voce, Workshop performance (50 marks)

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	1	2	-	3	-	1	2			
CO2	1	2	-	2	2	2	1			
CO3	2	2	2	2	2	-	1			
CO4	1	-	-	2	-	2	-			
CO5	2	1	3	2	3	-	1			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Raghuwanshi B.S.	A Course in Workshop Technology	Dhanpat Rai & Sons, New Delhi, 2017 or latest edition
2	Sarathe A.K.	Engineering Workshop Practice	Khanna Book Publishing Co.(P) Ltd. , New Delhi; 2021 or latest edition ISBN: 978-9391505516
3	Gupta J.K., Khurmi R.S.	A Textbook of Manufacturing Process (Workshop Technology)	S.Chand and Co., New Delhi, 2021 or latest edition, ISBN: 978-8121908689
4	Jones, Thomas H.	Electronic Components Handbook	Reston Publishing, Virginia, US, latest edition, ISBN: 978-0879092221
5	Mehta V.K., Mehta Rohit	Principles of Electronics	S. Chand and Co., New Delhi-110 055, 2014, ISBN: 978-8121924504
6	Glory Priyadarshini J. , Rani K.S.S., Maheswari M.P., Gomathy S.	Engineering Workshop practice on Electrical & Electronics Engineering	Notion Press, Mumbai, 2021 or latest edition, ISBN: 978-1639203819

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	http://fireextinguishertraining.com/	Fire extinguisher
2	www.youtube.com/watch?v=WE-SislzSMY	Fire extinguisher
3	https://www.youtube.com/watch?v=lUojO1HvC8c	Fire extinguisher
4	https://www.youtube.com/watch?v=0jbFC8dvTVY	Electrical tools
5	https://www.electroschematics.com/tools/	Electronic tools
6	https://www.youtube.com/watch?v=Fwj_d3uO5g8	Diodes
7	http://www.eleccircuit.com	Electronic circuit
8	https://mightyohm.com/files/soldercomic/FullSolderComic_EN.pdf	Soldering
9	https://www.tinkercad.com/	3D modeling software
10	multisim online	Simulation software