

B. Tech. Semester I/II

Subject Name: Workshop Practice (Mech)

Subject Code: BTGN12110

Type of course: Engineering Science

Prerequisite: No Prerequisite

Course Outline: Mechanical workshop practice will develop and enhance relevant technical hand skills required by the engineer working in the various industries and workshops. It will give exposure to carpentry, fitting and tin smithy practices, machine tools, plumbing, welding and valves.

Electrical and Electronics workshop practices will help to learn skills related to programming microcontrollers like Arduino, and interfacing peripherals at bird view level, practical skills like electric wiring, using instruments.

Teaching and Examination Scheme: Out of 0-0-4 teaching scheme, workshop practice (MECH) and workshop practice (EC-EL) will have 0-0-2 teaching scheme. Evaluation component will be only one combining both parts. *

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	50
-	-	2	1	-	-	-	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests) **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Lab Hrs.	Module Weightage
1.	Basic Workshop Introduction: Introduction, Workshop layout, General safety norms in workshop, hand tools, power tools, marking and measurements, introduction about various shops and machines.	4	10%
2.	Fitting Shop: Introduction to various marking, measuring, cutting and finishing tools used in fitting shop, Individual job work of male and female part, Drilling operation on job.	6	55%
3.	Carpentry Shop: Introduction to various marking, measuring, cutting and finishing tools used in carpentry shop, Various	6	

Sr. No.	Topics	Lab Hrs.	Module Weightage
	carpentry joints, Individual job work of male and female part.		
4.	Tin Smithy: Introduction to various marking, measuring and cutting tools used in tin smithy shop, Group job work of a component.	4	
5.	Welding Shop: Introduction to arc and gas welding processes, demonstration of V butt joint using arc welding equipment on fitted job.	2	10%
6.	Machining: Introduction to various machines and machining processes, Demonstration of job work on lathe machine.	2	
7.	Pipe fitting and Plumbing: Introduction to pipe fitting, pipe fitting tools, pipe fitting operations such as marking, cutting, bending and threading, domestic and industrial applications of plumbing, Plumbing circuit, job work related to the construction of plumbing circuit.	4	25%
8.	Valves and Valve bodies: Introduction of valves, demonstration of valve bodies such as Ball valve, Gate Valve, Butterfly valve, Needle valve etc.	2	

Percentage Distribution of Marks as per Bloom's Taxonomy (Theory/Practical):

Percentage Distribution of Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	20	40	0	0	20

Legends: R: Remembrance, U: Understanding; A: Application, N: Analyze, E: Evaluate C: Create and above Levels (**Revised Bloom's Taxonomy**)

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.

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Elements of Workshop Technology, Vol. I and II.	Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K.	Media promoters and publishers private limited, Mumbai	Vol. I 2008 and Vol. II 2010	15 th
2.	Manufacturing Technology	Rao P.N.	Tata McGraw Hill House	2017	4 th

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Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
3.	Workshop Technology Vol. 1 and 2	Raghuvanshi B.S.	Dhanpat Rai & Sons	2015	1 st
4.	Workshop Technology 1	W A J Chapman	CBS	2001	5 th

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Use various hand tools, power tools and measuring instruments. (R, U, A – Cognitive level)	20
CO-2	Understand various manufacturing processes in machine shop and perform basic operations of carpentry, fitting and tin smithy work. (U, A,C – Cognitive level)	30
CO-3	Understand working principle of lathe machine, shaper machine and welding machine. (U – Cognitive level)	10
CO-4	Perform operations such as plumbing fittings, drilling in metal, wood and masonry for various engineering application. (U, A, C – Cognitive level)	20
CO-5	Performing mechanical assembly and disassembly and hands on practice for miscellaneous machines and equipment. (U, A – Cognitive level)	20

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	3	-	-	3	1	-	-	-	1	-	-	2			
CO-2	3	2	3	2	2	-	-	-	2	2	3	-			
CO-3	3	-	-	1	3	-	-	-	1	-	-	-			
CO-4	3	2	2	3	2	-	-	-	-	-	-	3			
CO-5	2	1	1	1	2	-	-	-	-	-	-	1			
Rationale*	14	5	6	10	10	-	-	-	4	2	3	6			

Rationale: This course will give basic understanding of various workshop practices and their importance in the various engineering fields. Also, it helps to understand use of basic tools in engineering activities and

develop problem solving skills.

LIST OF PRACTICALS:

(A) JOBS:

1. **Practice and demonstration of basic carpentry operations** – Marking, measuring, cutting, surface finishing, chiselling, use of hand portable drilling machine, etc.
2. **Practice and demonstration of basic fitting operations** – Marking, measuring, cutting, surface finishing, chiselling, filing, use of drilling machine, tapping, etc.
3. **Practice and demonstration of basic Tin Smithy operations** – Operations: Marking, measuring, cutting, folding, surface development etc.
4. **Practice drilling and fitting of nail-screws in masonry, wooden and metal objects using hand portable drilling machine (power tool).**
5. **Plumbing circuit model** –Prepare a model of water supply and drainage plumbing circuit.
6. **Demonstration of machine tools** - lathe machine, shaping machine, radial drilling machine and grinding machine.

(B) OPEN ENDED PROBLEM

Prepare a model using workshop practices.

(C) ACTIVITY

Assemble and disassemble of given mechanical components.

Major Equipment: Lathe machine, drilling machine, grinding machine, Resistance and Arc Welding machine, welding accessories, Hacksaw machine, Bending Machine, Shearing machine, Tools of Fitting, Carpentry, Tin Smithy and Plumbing and valves.

B. Tech. Semester I/II

Subject Name: Workshop Practice (EC-EL)

Subject Code: BTGN12110

Type of course: Engineering Science

Prerequisite: NIL

Rationale: Specifically workshop practices for Electrical, Electronics-IOT, and Computer is addressed here. This course will help to learn skills related to programming microcontrollers like Arduino, and interfacing peripherals at bird view level, practical skills like electric wiring, using instruments, and getting familiar with Operating system usage and networking. IOT will soon be pervasive so introductory concepts are also accommodated here.

Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops. Irrespective of branch, the use of workshop practices in day to day industrial as well domestic life helps to dissolve the problems. All these aspects will be covered by mechanical workshops also and listed in separately prepared documents.

Teaching and Examination Scheme:

Out of 0-0-4 teaching scheme, this workshop practice (EC-EL) will have 0-0-2 teaching scheme as follows. Similarly, for this workshop practice (MECH) will have a 0-0-2 teaching scheme. Evaluation component will be only one combining both parts. *

Teaching				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	50
0	0	2	1	-	-	-	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests) **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

List of Practical:

1. a) Electronic Components, identifications and measurements,
b) Introduction to basic electronics instruments CRO, Function generator, multimeters, trainers, power supply, and bread board.
c) Measurement of voltage, current, frequency, amplitude using simple example electric circuits (AC and DC), and compare with theoretical calculations.

2. a) Study of types of wires and cables; types of Connectors & Switches
b) To study wiring schemes.
1. Tube light Wiring 2. Staircase Wiring 3. Ceiling Fan Wiring. 4. Parallel Wiring 5. Godown wiring
c) Identify and understand various types of Ports and Connectors like, BNC, Crocodile, Banana, etc., RJ 45, Ethernet connector, USB, RS 232, VGA port, Printer port, etc.
3. Preparing the drawing for wiring a newly built room with safety features along with a bill of materials with specification. The room may be a classroom, an office, a shop, etc.
4. Study of various electricity bills and calculations for energy consumption.
Study of various tariff components for different consumer.
5. To Explain Different types of electrical fuses - construction, working and characteristics, MCB (miniature circuit breaker)- construction, working, types & uses.
6. Study types of lamps, fixtures & reflectors, illumination schemes for domestic, industrial & commercial premises.
7. a) To study and perform soldering and de-soldering.
b) Identify and rectify open circuit and short circuit faults in PCB/System.
c) To design, develop and test a regulated power supply using transformer, rectifier and voltage regulator ICs (7805, 7812, 7815, 7912, 7915).
8. To study basics of Arduino, pin outs, IDE required, programming method. Perform experiment for LED blinking using Arduino board on tinker cad as given in script description for
a) one second on-off blinking.
b) TWO LED blinking one by one.
c) Fading LED.
9. To program Arduino for following tasks:
a) Play buzzer tone for duration of 100* last two digits of your roll number.
b) When a push button switch is pressed, an LED should light up for 5 seconds.
c) To turn ON and OFF three different colours of RGB LED one by one.
d) To turn ON and OFF two different colours together to create the colours yellow, turquoise and purple.
10. Write and test program using ARDUINO for the following tasks:
a) As soon as a motion gets detected, a Piezo speaker should beep.
b) An LED should light up during dark or the Photoresistor is covered.
c) The speed of a blinking LED should be regulated with a potentiometer. Set value of resistor for potentiometer as per your roll number in K Ω .
11. Write and test program using ARDUINO for the following tasks:
a) Read out the temperature with the TMP36 sensor and display the temperature on the serial monitor. Keep temperature equal to your roll number and take screen shots.
b) Show a text on an LCD Display. Show YOUR NAME AND ROLL NUMBER on LCD

DISPLAY

12. Presentation on company and product
- a) Students will form a team of three students and register.
 - b) Group will study following and submit as a team.
 - (i) Presentation of the company
 - (ii) Presentation of the product e.g. electronics system including components , its design diagram (block diagram)

Suggested Specification table of Marks as per Bloom's Taxonomy (Theory/Practical):

% Distribution of Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	30	30	20	-	-

Legends: R: Remembrance, U: Understanding; A: Application, N: Analyze, E: Evaluate C: Create and above Levels.

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.

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Electrical Wiring, Estimating and Costing	S. L. Upal, G.C. Garg	Khanna Publisher	1996	
2.	Elements of Workshop Technology	Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K	Media promoters and Publishers private limited, Mumbai.	2008,2010	Vol. I,II
3.	Workshop Practices	H S Bawa	Tata McGraw-Hill	2009	

Course Outcome:

Sr. No.	CO Statement, After learning this subject, students will be able to,	Marks % weightage
CO-1	Develop basic circuits using breadboard, soldering iron, general purpose PCB and test the circuits using measuring instruments like CRO, millimeters, function generator, power supply. <i>(R,U,A,N - Cognitive level)</i>	30
CO-2	Program ARDUINO for implementing basic applications. <i>(R,U,A,N - Cognitive level)</i>	30
CO-3	Prepare electric wiring diagram by incorporating electrical safety features. <i>(R,U,A,N - Cognitive level)</i>	25
CO-4	Comprehend electricity bill, tariffs and its calculation for various consumers. <i>(R,U,A,N - Cognitive level)</i>	15

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	3	3	3	3	3	2	2	1	3	1	1	1			
CO-2	3	3	3	2	3	2	2	1	3	1	1	1			
CO-3	3	2	2	2	2	2	2	1	2	1	1	1			
CO-4	3	2	2	1	2	2	2	1	1	1	1	1			
Rationale*	12	10	10	8	10	8	8	4	9	4	4	4			

***Rationale:** Explaining why it is matching this particular program outcome

Major Equipment:

Oscilloscope (digital), Function generator, Power supply, ARDUINO kits, soldering infrastructure, general purpose PCBs and discrete components, voltage regulator ICs, electric wiring boards, wires, bulbs, switches one way and two ways, IOT demo, Computer and internet connectivity to use open source resources.

List of Open Source/learning website: Nil

List of Open Source Software:

- <https://www.tinkercad.com/>
Tinker cad
- <https://eleceng.dit.ie/dsp/elab/>
CRO and function generator simulation:
- <https://www.virtualbox.org/wiki/Downloads>
- <https://www.slax.org/>
Resources for installing virtual machines and Linux on it:
- <https://www.webminal.org/>
Resource to practice Linux commands online