ENGINEERING WORKSHOP PRACTICES (Mechanical, Electrical and allied branches)

Course Code : 311005

Programme Name/s	**: Automobile Engineering./ Chemical Engineering/ Electrical Engineering/ Electrical Power System/ Food Technology/ Mechanical Engineering/ Mechatronics/ Manufacturing Technology/ Metallurgical Engineering/ Production Engineering/ Printing Technology/ Polymer Technology/**
Programme Code	**: AE/ CH/ EE/ EP/ FC/ ME/ MK/ MRT/ MY/ PG/ PN/ PO**
Semester	**: First**
Course Title	**: ENGINEERING WORKSHOP PRACTICES (Mechanical, Electrical and allied branches)**
Course Code	**: 311005**

I. RATIONALE

Workshop Practice is a basic engineering course. The knowledge of basic shops like wood working, fitting, welding, plumbing and sheet metal shop is essential for technician to perform his/her duties in industries. Students are able to perform various operations using hand tool equipment and machineries in various shops. Working in workshop develops the attitude of group working and safety awareness. This course provides industrial environment in the educational institute.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

Use different engineering tools for performing shop floor activities.

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 tools and equipment.
- CO2 - Prepare job using different tools in fitting shop.
- CO3 - Perform various operations using plumbing and carpentry tools.
- CO4 - Prepare various welding joints.
- CO5 - Produce simple job using different sheet metal operations.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme											
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL		Total Marks
															Practical						
				CL	TL	LL					FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
311005	ENGINEERING WORKSHOP PRACTICES (Mechanical, Electrical and allied branches)	EWP	SEC	-	-	4	-	4	2	-	-	-	-	-	50	20	50@	20	-	-	100

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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 different types of fire extinguisher and their uses 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	Demonstration Collaborative learning Role Play
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. 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, dieing, reaming etc.	Model Demonstration

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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	TLO 3.1 Identify plumbing tools. TLO 3.2 Explain operation of fitting shop machines. TLO 3.3 Use plumbing tools TLO 3.4 Operate machineries. TLO 3.5 Perform plumbing operations TLO 3.6 Maintain tools, equipment and machineries.	**Unit - III Plumbing** 3.1 Plumbing hand tools pipe vice, pipe bending equipment, pipe wrenches, dies and their Specifications 3.2 Pipe fittings- bends, elbows, tees, cross, coupler, socket, reducer, cap, plug, nipple and their Specifications 3.3 Operation of Machineries in plumbing shops- pipe bending machine their specifications and maintenance. Basic process cutting, threading.	Model Demonstration
4	TLO 4.1 Identify metal joining tools. TLO 4.2 Explain gas and arc welding procedure TLO 4.3 Use metal joining tools. TLO 4.4 Perform welding, soldering, brazing operations TLO 4.5 Maintain tools, equipment and machineries.	**Unit - IV Metal Joining** 4.1 Gas welding hand tools- welding torch, welding tip, pressure regulator, oxygen and acetylene cylinders, spark lighter and their Specifications 4.2 Arc welding hand tools- electrode holder, cable connector, cable lugs, chipping hammer, earthing clamp, wire brush and their Specifications 4.3 Operation of machineries in welding shops- arc welding transformer their specifications and maintenance. 4.4 Welding Electrode, filler rod, fluxes, and solders. 4.5 Basic process welding, brazing and soldering.	Video Demonstrations Demonstration
5	TLO 5.1 Select wood working tools as per job/ requirement. TLO 5.2 Explain operation of wood working machines TLO 5.3 Use furniture making tools TLO 5.4 Operate machineries. TLO 5.5 Perform wood working operations TLO 5.6 Maintain tools, equipment and machineries.	**Unit - V Carpentry** 5.1 Types of artificial woods such as plywood, block board, hardboard, laminated boards, Veneer, fiber Boards and their applications. 5.2 Wood working hand tools carpentry vice, marking and measuring tools, saws, claw hammer, mallet, chisels, plans, squares, and their specifications 5.3 Operation of wood working machineries - Wood turning lathe, circular saw, their specifications and maintenance. 5.4 Basic process- marking, sawing, planning, chiseling, turning, grooving, boring.	Demonstration
6	TLO 6.1 Identify sheet metal tools. TLO 6.2 Explain operation of sheet metal machineries. TLO 6.3 Use sheet metal tools TLO 6.4 Operate sheet metal machineries. TLO 6.5 6.5 Perform bending operations Maintain tools, equipment and machineries.	**Unit - VI Sheet Metal** 6.1 Sheet metal hand tools snip, shears sheet gauge, straight edge, L square, scriber, divider, trammel, punches, pliers, stakes, groovers, limit set and their Specifications 6.2 Operation of machineries in sheet metal shops- sheet cutting and bending machine their specifications and maintenance. Basic process- marking, bending, folding, edging, seaming, staking, riveting.	Demonstration

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

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Use fire extinguisher	1	Identify fire extinguisher according to their specification.	2	CO1
LLO 2.1 Operate fire extinguisher	2	* Perform mock drill session in group of minimum 10 students for extinguishing fire.	2	CO1
LLO 3.1 Identify different tools used in workshop.	3	* Identify different tools used in workshop.	2	CO1 CO2 CO3 CO4 CO5
LLO 4.1 Select proper fitting tools LLO 4.2 Prepare fitting job using different tools.	4	* Prepare job using following operations:part1 a. Marking operation as per drawing b. punching operation as per drawing c. Filing operation as per drawing d. sawing operation as per drawing e. drilling operation as per drawing f. tapping operation as per drawing	6	CO2
LLO 5.1 Select proper plumbing tools LLO 5.2 Use plumbing operations for preparing plumbing joints	5	Prepare T joint pipe fitting job as per given drawing (individually)	4	CO3
LLO 6.1 Select proper plumbing tools LLO 6.2 Use plumbing operations for preparing plumbing joints	6	* Prepare elbow joint pipe fitting job as per given drawing(individually)	4	CO3
LLO 7.1 Develop list of different components as per the specification.	7	* Prepare bill of material for given pipeline layout (individually)	2	CO3
LLO 8.1 Obey safety rules employed in welding shop.	8	* Practice different safety rules in welding shop as per given instruction.	2	CO4
LLO 9.1 Prepare various welded joints using different welding processes.	9	Prepare lap joint using gas welding as per given drawing (individually)	4	CO4
LLO 10.1 Prepare various welded joints using different welding processes.	10	Prepare butt joint using gas welding as per given drawing (individually)	4	CO4
LLO 11.1 Assemble utility jobs using different manufacturing processes.	11	* Prepare utility job (like stool, benches, tables or similar jobs) involving arc welding and artificial wood as per given drawing (in group of 4 to 5 students) Fabrication operation involve measuring, marking, cutting, edge preparation, welding	8	CO3 CO4
LLO 12.1 Select proper sheet metal tools LLO 12.2 Prepare sheet metal component using different operations.	12	* Prepare sheet metal utility job using following operations a. Cutting And Bending b. Edging c. End curling d. Lancing e. Soldering f. Riveting	6	CO5

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Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 13.1 Collect information about ancient tools for understanding Indian Knowledge.	13	* Draw sketches of various ancient tools	2	CO1 CO2 CO3 CO4 CO5

Note : Out of above suggestive LLOs -

- '*' Marked Practicals (LLOs) Are mandatory.
- Minimum 80% of above list of lab experiment are to be performed.
- Judicial mix of LLOs are to be performed to achieve desired outcomes.

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	Fire buckets of standard size.	1,2
2	Fire extinguisher A,B and C types	1,2
3	Wood Turning Lathe Machine, Height of Centre: 200mm, Distance between Centers: 1200mm, Spindle Bore: 20mm with Taper, Range of Speeds: 425 to 2800 with suitable Motor Drive. with all accessories	11
4	Circular Saw Machine, Diameter of saw blade 200 mm, Maximum Depth of Cut 50 mm, Table Size -350 x 450 mm, Table Tilting - 450	11
5	Wood working tools- marking and measuring tools, saws, claw hammer, mallet, chisels, plans, squares	11
6	Carpentry Vice 200 mm	11
7	Sheet Bending Machine	12
8	Sheet Cutting Machine	12
9	Brazing Equipment	12
10	Sheet metal hand tools- snip, shears sheet gauge, straight edge, L square, scriber, divider, trammel, punches, pliers, stakes, groovers, limit set	12
11	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
12	Plumbing tools- pipe vice, pipe bending equipment, pipe wrenches, dies.	3,5,6
13	Work Benches- size:1800 x 900 x 750 mm	4
14	Bench Drilling machine (upto 13 mm drill cap.) with ½ H.P. Motor, 1000 mm height.	4
15	Power Saw machine 350 mm mechanical with 1 HP Motor & all Accessories.	4
16	Bench Grinder 200 mm Grinding Disc diameter 200 mm. with 25 mm. bore 32 mm. with ½ HP/1HP Motor.	4
17	Portable Hammer Drill Machine 0-13 mm A.C. 230 V, 2.5Amp, Pistol type, having different types of bits	4
18	Surface Plate 600 x 900 mm Grade I	4,5
19	Angle Plate 450 x 450 mm	4,5
20	Vernier height Gauge 450 mm	4,5,6,8
21	Pipe Bending Machine	5,6
22	Pipe Vice – 100 mm	5,6
23	Pipe Cutter- 50 mm	5,6
24	Bench Vice 100 mm	5,6

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Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
25	Welding machine 20 KVA 400A welding current 300A at 50, 100, 200, 250, 300 with std. Accessories and Welding Cable 400 amp. ISI with holder	8,9,10,11
26	Oxygen and acetylene gas welding and cutting kit with cylinders and regulators.	8,9,10,11
27	Gas welding hand tools- welding torch, welding tip, pressure regulator, oxygen and acetylene cylinders, spark lighter	8,9,10,11
28	Arc welding hand tools- electrode holder, cable connector, cable lugs, chipping hammer, earthing clamp, wire brush.	8,9,10,11

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

X. ASSESSMENT METHODOLOGIES/TOOLS

Formative assessment (Assessment for Learning)

- Assignment and Terms work

Summative Assessment (Assessment of Learning)

- Lab performance

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	3	-	-	2	3	3	1			
CO2	3	-	-	3	2	3	-			
CO3	3	-	-	3	2	3	1			
CO4	3	-	-	3	2	3	1			
CO5	3	-	-	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	Bawa, H.S.	Workshop Practice	McGraw Hill Education, Noida; ISBN-10: 0070671192 ISBN-13: 978-0070671195
2	Gupta, J.K.; Khurmi, R.S.	A Textbook of Manufacturing Process (Workshop Tech.)	S.Chand and Co. New Delhi ISBN:81-219-3092-8
3	Hegde, R.K.	Workshop Practice Manual For Engineering Diploma & ITI Students	Sapna Book House, 2012, ISBN:13: 9798128005830

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Sr.No	Author	Title	Publisher with ISBN Number
4	Singh, Rajender	Introduction to Basic Manufacturing Process & Workshop Technology	New Age International, New Delhi; 2014, ISBN: 978-81-224-3070-7
5	Hajra; Choudhary	Elements of Workshop Technology	Media Promoters and Publishers Mumbai, 2009, ISBN: 10-8185099146
6	Sarathe, A.K	Engineering Workshop Practice	Khanna Book Publishing CO(P) LTD, New Delhi, ISBN No. 978-93-91505-51-6

XIII . LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	http://www.asnu.com.au	Basic engineering tools.
2	http://www.abmtools.com/downloads/Woodworking%20Carpentry%20Tools.pdf	Wood working
3	http://www.weldingtechnology.org	Welding techniques
4	http://www.newagepublishers.com/samplechapter/001469.pdf	Basic engineering tools.
5	http://www.youtube.com/watch?v=TeBX6cKKHWY	Welding techniques
6	http://www.youtube.com/watch?v=QHF0sNHnttw&feature=related	Welding techniques
7	http://www.youtube.com/watch?v=Kv1zo9CAxt4&feature=relmfu	Wood working
8	http://www.piehtoolco.com	Basic engineering tools.
9	http://sourcing.indiamart.com/engineering/articles/materials-used-hand-tools/	Basic engineering tools.
10	https://www.youtube.com/watch?v=9_cnkaAbtCM	Basic engineering tools.

Note :

- Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students