INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

AERONAUTICAL ENGINEERING

COURSE DESCRIPTOR

Course Title	WORKSHOP/MANUFACTURING PRACTICES LABORATORY				
Course Code	AMEB01				
Programme	B.Tech				
Semester	I	AE | CSE | IT | ME			
Course Type	Foundation				
Regulation	IARE - R18				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	-	-	-	3	1.5
Chief Coordinator	Mr. G Musalaiah, Assistant Professor				
Course Faculty	Mr. G Musalaiah, Assistant Professor				

I. COURSE OVERVIEW:

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. This course intends to impart basic know-how of various hand tools and their use in different sections of manufacturing. Irrespective of branch, the use of workshop practices in day to day industrial as well domestic life helps to dissolve the problems.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
-	-	-	-	-

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Workshop/Manufacturing Practices Laboratory	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✘	Chalk & Talk	✘	Quiz	✘	Assignments	✘	MOOCs
✔	LCD / PPT	✘	Seminars	✘	Mini Project	✔	Videos
✔	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment.

Semester End Examination (SEE): The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

The emphasis on the experiments is broadly based on the following criteria:

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculations and graphs related to the concern experiment.
20 %	To test the results and the error analysis of the experiment.
20 %	To test the subject knowledge through viva – voce.

Continuous Internal Assessment (CIA):

CIA is conducted for a total of 30 marks (Table 1), with 20 marks for continuous lab assessment during day to day performance, 10 marks for final internal lab assessment.

Table 1: Assessment pattern for CIA

Component	**Laboratory**		**Total Marks**
Type of Assessment	Day to day performance	Final internal lab assessment	
CIA Marks	20	10	30

Continuous Internal Examination (CIE):

One CIE exams shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	**Performance**	**Calculations and Graph**	**Results and Error Analysis**	**Viva**	**Total**
2	2	2	2	2	10

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	**Engineering knowledge:** Capability to apply the knowledge of Mathematics, science and Engineering in the field of Mechanical Engineering.	2	Calculations of the observations
PO 3	**Design/development of solutions:** Competence to design a system, component or process to meet societal needs within realistic constraints.	2	Seminar
PO 6	**The engineer and society:** To utilize the engineering practices, techniques, skills to meet needs of the health, safety, legal, cultural and societal issues.	1	Calculations of the observations

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	**Professional skills:** Able to utilize the knowledge of aeronautical/aerospace engineering in innovative, dynamic and challenging environment for design and development of new products	2	Calculations of the observations
PSO 2	**Professional skills:** Imparted through simulation language skills and general purpose CAE packages to solve practical, design and analysis problems of components to complete the challenge of airworthiness for flight vehicles.	2	Calculations of the observations
PSO 3	**Practical implementation and testing skills:** Providing different types of in house and training and industry practice to fabricate and test and develop the products with more innovative technologies.	1	Seminar -
PSO 4	**Successful career and entrepreneurship:** To prepare the students with broad aerospace knowledge to design and develop systems and subsystems of aerospace and allied systems and become technocrats.	-	-

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES:

The course should enable the students to:	
I	Identify and use of tools, types of joints in carpentry, fitting, tin smithy and plumbing operations.
II	Understand of electrical wiring and components.
III	Observation of the function of lathe, shaper, drilling, boring, milling, grinding machines.

IX. COURSE OUTCOMES (COs):

The course should enable the students to:	
CO 1	Explain different basic operations performed on lathe, drilling, grinding, milling, shaper machines.
CO 2	Understand the different parts of the CNC turning, drilling, milling machines etc.
CO 3	Identify the different joints used in carpentry, tin smithy, black smithy and fitting.
CO 4	Apply the basic drawing for circuit diagrams used in house wiring.
CO 5	Identify the different types of welding, moulding, glass cutting methods.

X. COURSE LEARNING OUTCOMES (CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
AMEB01.01	CLO 1	To identify different Tools required for Wood working.	PO1, PO3	3
AMEB01.02	CLO 2	Familiarize the students to different cutting fluids.	PO1, PO6	3
AMEB01.03	CLO 3	Use of Cutting tools required for Metal working in the Fitting work.	PO3	3
AMEB01.04	CLO 4	Prepare Students for development of surfaces using the theory of Engineering Drawing and application of the same to the Tin Smithy.	PO1, PO3	2
AMEB01.05	CLO 5	Need for heating of the Mild Steel and to understand the Hot Working of the metals in Black Smithy.	PO6	2
AMEB01.06	CLO 6	To prepare circuit diagrams for house working for Series And Parallel Connection.	PO1	2
AMEB01.07	CLO 7	Understand the circuit connections for One Bulb connected with two way switches i.e., Stair Case connections.	PO1	1
AMEB01.08	CLO 8	To prepare Mould preparation and demonstration Casting Process.	PO1, PO3, PO6	1
AMEB01.09	CLO 9	Exposure for different types of solid state welding and other welding practices viz Arc welding, Gas welding, Brazing, Soldering etc.	PO3, PO6	2
AMEB01.10	CLO 10	Introduce Students with new technology manufacturing practices like 3D Printing.	PO3, PO6	2
AMEB01.11	CLO 11	Familiarize the students with the introduction of conventional machine tools like Lathe, Mailing, Drills etc.	PO1, PO3	1
AMEB01.12	CLO 12	Demonstrate Manufacturing practices on CNC Machine tools.	PO1	1

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XI. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO 1	2		2										2			
CLO 2	2					1							2			
CLO 3			2										2			
CLO 4	2		2										2		1	
CLO 5						1									1	
CLO 6	2												2		1	

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO 7	2												2			
CLO 8	2		2			1									1	
CLO 9			2			1									1	
CLO 10			2			1							2			
CLO 11	2		2												1	
CLO 12	2														1	

3 = High; 2 = Medium; 1 = Low

XII. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PO 3 PO 6,PSO1	SEE Exams	PO 1, PO 3 PO 6,PSO1	Assignments	-	Seminars	-
Laboratory Practices	PO 1, PO 3 PO 6,PSO1	Student Viva	PO 1, PO 3 PO 6,PSO1	Mini Project	-	Certification	-

XIII. ASSESSMENT METHODOLOGIES - INDIRECT

✔	Early Semester Feedback	✔	End Semester OBE Feedback
✘	Assessment of Mini Projects by Experts		

XIV. SYLLABUS

LIST OF EXPERIMENTS	
Week-1	**MACHINE SHOP-TURNING AND OTHER MACHINES**
Batch I: Working on central lathe and shaping machine. Batch II: Working on drilling, grinding machines.	
Week-2	**MACHINE SHOP-MILLING AND OTHER MACHINES**
Batch I: Working on milling machine. Batch II: Working on milling and shaping machine	
Week-3	**ADVANCED MACHINE SHOP**
Batch I: Working on CNC Turning machines. Batch II: Working on CNC Vertical Drill Tap Center.	
Week-4	**FITTING**
Batch I: Make a straight fit and straight fit for given dimensions.	

Batch II: Make a square fit for straight fit for given sizes.	
Week-5	**CARPENTRY-I**
Batch I: Preparation of lap joint as per given dimensions. Batch II: Preparation of dove tail joint as per given taper angle.	
Week-6	**CARPENTRY-II**
Batch I: Preparation of dove tail joint as per given taper angle. Batch II: Preparation of lap joint as per given dimensions.	
Week-7	**ELECTRICAL AND ELECTRONICS**
Batch I & II: Make an electrical connection to demonstrate domestic voltage , current sharing. and one bulb with two switches-stair case connection.	
Week-8	**WELDING**
Batch I: Arc welding & Gas Welding. Batch II: Gas welding & Arc Welding.	
Week-9	**MOULD PREPARATION**
Batch I: Prepare a wheel flange mould using a given wooden pattern. Batch II: Prepare a bearing housing using an aluminum pattern.	
Week-10	**MOULD PREPARATION**
Batch I: Prepare a bearing housing using an aluminum pattern. Batch II: Prepare a wheel flange mould using a given wooden pattern.	
WeeK-11	**BLACKSMITHY- I, TINSMITHY- I**
Batch I: Prepare S-bend & J-bend for given MS rod using open hearth furnace. Batch II: Prepare the development of a surface and make a rectangular tray and a round tin.	
Week-12	**TINSMITHY- I, BLACKSMITHY- I**
Batch I: Prepare the development of a surface and make a rectangular tray and a round tin. Batch II: Prepare S-bend & J-bend of given MS rod using open hearth furnace.	
Week-13	**PLASTIC MOULDING, INJECTION MOULDING, GLASS CUTTING**
Batch I: Plastic Moulding and Glass cutting. Batch II: Plastic Moulding and Glass cutting.	
Week-14	**BLOW MOULDING**
Batch I& II: Blow Moulding.	

Text Books:
1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai. 2. Kalpakjian S, Steven S. Schmid, "Manufacturing Engineering and Technology", Pearson Education India Edition, 4th Edition, 2002.
Reference Books:
1. Gowri P. Hariharan, A. Suresh Babu," Manufacturing Technology – I", Pearson Education, 2008. 2. Roy A. Lindberg, "Processes and Materials of Manufacture", Prentice Hall India, 4th Edition, 1998. 3. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw-Hill House, 2017.

XV. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Week No.	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1-3	Preparation of lap joint as per given dimensions	CLO1, CLO9	T1:1.4,R1:1.2
4-6	Preparation of dove tail joint as per given taper angle	CLO1	T1:1.5,R1:2.4
7-12	Make a straight fit and straight fit for given dimensions	CLO2, CLO3	T1:2.5,R1:2.5
13-15	Make a square fit for straight fit for given sizes.	CLO2, CLO3	T1:2.5,R1:2.6
16-18	Make an electrical connection to demonstrate domestic voltage and current sharing	CLO6, CLO7	T1:22.7
19-24	Make an electrical connection to control one bulb with two switches-stair case connection.	CLO6, CLO7	T1:6.3,R1:5.3
25-30	Prepare the development of a surface and make a rectangular tray and a round tin.	CLO1, CLO4	T1:7.5,R1:6.3
31-36	Prepare S-bend & J-bend of given MS rod using open hearth furnace	CLO1, CLO5	T1:8.5,R1:6.8
37-39	Arc welding & Gas Welding	CLO1, CLO9	T2:12.2,R2:13.1
40	Prepare a wheel flange mould using a given wooden pattern and bearing housing using an aluminum pattern	CLO8	T2:12.3,R2:13.2
41	Plastic Moulding ,Glass cutting and Blow Moulding.	CLO8	T2:12.4,R2:13.3
42	Working on central lathe, shaping machine	CLO1, CLO2, CLO11	T2:12.10,R1:13.7
43-44	Working on drilling, grinding machines and milling machine	CLO1, CLO2, CLO11	T2:12.5,R2:13.4
44-45	Working on CNC Turning machines and CNC Vertical Drill Tap Center.	CLO1, CLO2, CLO11	T1:11.2,R2:10.2

XVI. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S No	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	To improve standards and analyze the concepts.	Internships	PO1, PO3	PSO1
2	Conditional probability, Sampling distribution, correlation, regression analysis and testing of hypothesis.	NPTEL	PO 1	PSO 1
3	Encourage students to solve real time applications and prepare towards competitive examinations.	Case Studies	PO 6	PSO 3

Prepared by:

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HOD, AE