I. COURSE OVERVIEW:

Production Technology is a combination of manufacturing technology with management science. The goal is to accomplish the production process in the smoothest, most-judicious and most-economic way. Production engineering encompasses the application of castings, machining processing, joining processes, metal cutting & tool design, metrology, machine tools, machining systems, automation, jigs and fixtures, and dies and mould design and material science and design of automobile parts and machine designing and manufacturing. Production engineering also overlaps substantially with manufacturing engineering and industrial engineering. In industry, once the design is realized, production engineering concepts regarding work-study, ergonomics, operation research, manufacturing management, materials management, production planning, etc., play important roles in efficient production processes. These deal with integrated design and efficient planning of the entire manufacturing system, which is becoming increasingly complex with the emergence of sophisticated production methods and control systems.
II. COURSE PRE-REQUISITES:

<table>
<thead>
<tr>
<th>Level</th>
<th>Course Code</th>
<th>Semester</th>
<th>Prerequisites</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>UG</td>
<td>AHS005</td>
<td>1</td>
<td>Engineering Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>UG</td>
<td>AHS007</td>
<td>1</td>
<td>Applied Physics</td>
<td>4</td>
</tr>
</tbody>
</table>

III. MARKSDISTRIBUTION:

<table>
<thead>
<tr>
<th>Subject</th>
<th>SEE Examination</th>
<th>CIA Examination</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft Production Technology</td>
<td>70 Marks</td>
<td>30 Marks</td>
<td>100</td>
</tr>
</tbody>
</table>

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

<table>
<thead>
<tr>
<th>Methodology</th>
<th>✔️</th>
<th>✗</th>
<th>✔️</th>
<th>✗</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chalk &amp; Talk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quiz</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Assignments</td>
<td></td>
<td></td>
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<tr>
<td>MOOCs</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>LCD / PPT</td>
<td>✔️</td>
<td></td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Seminars</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mini Project</td>
<td></td>
<td></td>
<td></td>
<td>✔️</td>
</tr>
<tr>
<td>Videos</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Ended Experiments</td>
<td></td>
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</tr>
</tbody>
</table>

V. EVALUATION METHODOLOGY:

The course will be evaluated for a total of 100 marks, with 30 marks for Continuous Internal Assessment (CIA) and 70 marks for Semester End Examination (SEE). Out of 30 marks allotted for CIA during the semester, marks are awarded by taking average of two CIA examinations or the marks scored in the make-up examination.

**Semester End Examination (SEE):** The SEE is conducted for 70 marks of 3 hours duration. The syllabus for the theory courses is divided into five modules and each module carries equal weightage in terms of marks distribution. The question paper pattern is as follows. Two full questions with “either” or “choice” will be drawn from each module. Each question carries 14 marks. There could be a maximum of two sub divisions in a question.

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

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 %</td>
<td>To test the objectiveness of the concept.</td>
</tr>
<tr>
<td>50 %</td>
<td>To test the analytical skill of the concept OR to test the application skill of the concept.</td>
</tr>
</tbody>
</table>

**Continuous Internal Assessment (CIA):**

CIA is conducted for a total of 30 marks (Table 1), with 20 marks for Continuous Internal Examination (CIE), 05 marks for Quiz and 05 marks for Alternative Assessment Tool (AAT).
Table 1: Assessment pattern for CIA

<table>
<thead>
<tr>
<th>Component</th>
<th>Theory</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Assessment</td>
<td>CIE Exam</td>
<td>Quiz</td>
</tr>
<tr>
<td>CIA Marks</td>
<td>20</td>
<td>05</td>
</tr>
</tbody>
</table>

**Continuous Internal Examination (CIE):**

Two CIE exams shall be conducted at the end of the 8th and 16th week of the semester respectively. The CIE exam is conducted for 20 marks of 2 hours duration consisting of five descriptive type questions out of which four questions have to be answered where, each question carries 5 marks. Marks are awarded by taking average of marks scored in two CIE exams.

**Quiz - Online Examination**

Two Quiz exams shall be online examination consisting of 25 multiple choice questions and are to be answered by choosing the correct answer from a given set of choices (commonly four). Such a question paper shall be useful in testing of knowledge, skills, application, analysis, evaluation and understanding of the students. Marks shall be awarded considering the average of two quiz examinations for every course.

**Alternative Assessment Tool (AAT)**

This AAT enables faculty to design own assessment patterns during the CIA. The AAT converts the classroom into an effective learning centre. The AAT may include tutorial hours/classes, seminars, assignments, term paper, open ended experiments, METE (Modeling and Experimental Tools in Engineering), five minutes video, MOOCs etc.

**VI. HOW PROGRAM OUTCOMES ARE ASSESSED:**

<table>
<thead>
<tr>
<th>Program Outcomes (POs)</th>
<th>Strength</th>
<th>Proficiency assessed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO 1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.</td>
<td>3</td>
<td>Assignments, term paper, Laboratory practices.</td>
</tr>
<tr>
<td>PO 2 Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences</td>
<td>2</td>
<td>Term paper, Seminars</td>
</tr>
<tr>
<td>PO3 Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.</td>
<td>2</td>
<td>Micro Projects</td>
</tr>
<tr>
<td>PO 4 Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data.</td>
<td>2</td>
<td>Projects</td>
</tr>
</tbody>
</table>
Program Outcomes (POs) | Strength | Proficiency assessed by
--- | --- | ---
PO5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. | 2 | Assignments, Practical’s

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

<table>
<thead>
<tr>
<th>Program Specific Outcomes (PSOs)</th>
<th>Strength</th>
<th>Proficiency assessed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td>2</td>
<td>Lecture, Assignments.</td>
</tr>
<tr>
<td>PSO 2 Problem solving 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</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>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</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>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</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES:

The course should enable the students to:

I Study the composition of microstructures of metals and alloys with their applications in aerospace industry.

II Discuss the various manufacturing processes and selection of process for suitable applications

III Understand the working principles and applications of conventional and unconventional machining alongwith their advantages and disadvantages.

IV Demonstrate the importance of composites with their applications in different areas of aerospace industry

IX. COURSE OUTCOMES (COs):

<table>
<thead>
<tr>
<th>COs</th>
<th>Course Outcome</th>
<th>CLOs</th>
<th>Course Learning Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO 1</td>
<td>Demonstrate different type of materials used in aircraft industry and study its properties</td>
<td>CLO 1</td>
<td>Choose a concept or idea of technical real time problems to form solutions for the same.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLO 2</td>
<td>Understand, Identify, Study and comprehend processes that lead to solutions to a particular production.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLO 3</td>
<td>Develop one- self to extend</td>
</tr>
<tr>
<td>CO 2</td>
<td>Understand the process of casting and inspection techniques used for production.</td>
<td></td>
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<tr>
<td>------</td>
<td>--------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLO 4</td>
<td>Outline performance of the output of research, development or design.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLO 5</td>
<td>Identify, solve new problems and gain new knowledge.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLO 6</td>
<td>Understand the turning, milling, grinding and drilling of a specimen.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO 3</td>
<td>Explain sheet metal operations and its tooling operations used for aircraft industry.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLO 7</td>
<td>Getting knowledge about the techniques to produce a safe, effective, economic final product.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLO 8</td>
<td>Understand the theoretical knowledge behind the design and development of aircraft components.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLO 9</td>
<td>Gain knowledge about the basic conventional, unconventional riveting and welding for knowledge based exams.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO 4</td>
<td>Gain knowledge about the basic conventional and unconventional Machining</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLO 10</td>
<td>Discuss the principle of advanced materials and what factors drive to develop the composite materials.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLO 11</td>
<td>Extend the outputs of earlier research and discover good ideas for new products or improving current products.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLO 12</td>
<td>Memorize procedure and steps to keep the products working effectively.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO 5</td>
<td>Understand the importance of composites and its manufacturing process.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLO 13</td>
<td>Gain knowledge about what materials used to manufacture for each component in an aircraft.</td>
<td></td>
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</tr>
<tr>
<td>CLO 14</td>
<td>Ability to summarize the efficiency of the product development in achieving the mission goal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLO 15</td>
<td>Ability to summarize the efficiency of the safety of flight</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**X. COURSE LEARNING OUTCOMES (CLOs):**

<table>
<thead>
<tr>
<th>CLO Code</th>
<th>CLO’s</th>
<th>At the end of the course, the student will have the ability to:</th>
<th>PO’s Mapped</th>
<th>Strength of Mapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAEB16.01</td>
<td>CLO 1</td>
<td>Choose a concept or idea of technical real time problems to form solutions for the same.</td>
<td>PO1</td>
<td>3</td>
</tr>
<tr>
<td>AAEB16.02</td>
<td>CLO 2</td>
<td>Understand, Identify, Study and comprehend processes that lead to solutions to a particular production.</td>
<td>PO1</td>
<td>2</td>
</tr>
<tr>
<td>AAEB16.03</td>
<td>CLO 3</td>
<td>Develop one- self to extend the outputs of research.</td>
<td>PO2</td>
<td>2</td>
</tr>
<tr>
<td>AAEB16.04</td>
<td>CLO 4</td>
<td>Outline performance of the output of research, development or design.</td>
<td>PO3</td>
<td>1</td>
</tr>
<tr>
<td>AAEB16.05</td>
<td>CLO 5</td>
<td>Identify, solve new problems and gain new knowledge.</td>
<td>PO4</td>
<td>2</td>
</tr>
<tr>
<td>AAEB16.06</td>
<td>CLO 6</td>
<td>Understand about the turning, milling, grinding and drilling of a specimen.</td>
<td>PO2</td>
<td>2</td>
</tr>
<tr>
<td>AAEB16.07</td>
<td>CLO 7</td>
<td>Getting knowledge about the techniques to produce a safe, effective, economic final product.</td>
<td>PO3</td>
<td>3</td>
</tr>
<tr>
<td>AAEB16.08</td>
<td>CLO 8</td>
<td>Understand the theoretical knowledge behind the design and development of aircraft components.</td>
<td>PO1</td>
<td>2</td>
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<tr>
<td>AAEB16.09</td>
<td>CLO 9</td>
<td>Gain knowledge about the basic conventional, unconventional riveting and welding for knowledge based exams.</td>
<td>PO2</td>
<td>2</td>
</tr>
<tr>
<td>AAEB16.10</td>
<td>CLO 10</td>
<td>Discuss the principle of advanced materials and what factors drive to develop the composite materials.</td>
<td>PO4</td>
<td>1</td>
</tr>
<tr>
<td>AAEB16.11</td>
<td>CLO 11</td>
<td>Extend the outputs of earlier research and discover good ideas for new products or improving current products.</td>
<td>PO5</td>
<td>2</td>
</tr>
<tr>
<td>Course Learning Outcomes (CLOs)</td>
<td>Program Outcomes (POs)</td>
<td>Program Specific Outcomes (PSOs)</td>
<td></td>
<td></td>
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<tr>
<td>-----------------------------</td>
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<td></td>
</tr>
<tr>
<td>CLO 1</td>
<td>PO1</td>
<td>3</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>CLO 2</td>
<td>PO2</td>
<td>2</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>CLO 3</td>
<td>PO3</td>
<td>2</td>
<td></td>
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</tr>
<tr>
<td>CLO 4</td>
<td>PO4</td>
<td>2</td>
<td></td>
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</tr>
<tr>
<td>CLO 5</td>
<td>PO5</td>
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<tr>
<td>CLO 6</td>
<td>PO6</td>
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<td>CLO 8</td>
<td>PO8</td>
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<tr>
<td>CLO 9</td>
<td>PO9</td>
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<td>CLO 10</td>
<td>PO10</td>
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<td>CLO 11</td>
<td>PO11</td>
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<td>CLO 12</td>
<td>PO12</td>
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</tbody>
</table>
XIII. ASSESSMENT METHODOLOGIES—DIRECT

<table>
<thead>
<tr>
<th>CIE Exams</th>
<th>PO1, PO2, PO3, PO4, PO5</th>
<th>SEE Exams</th>
<th>PO1, PO2, PO3, PO4, PO5</th>
<th>Assignments</th>
<th>PO1, PO2, PO4</th>
<th>Seminars</th>
<th>PO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory Practices</td>
<td>PO1</td>
<td>Student Viva</td>
<td>PO4</td>
<td>Mini Project</td>
<td>PO3</td>
<td>Certification</td>
<td>-</td>
</tr>
<tr>
<td>Term Paper</td>
<td>-</td>
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</tr>
</tbody>
</table>

XIV. ASSESSMENT METHODOLOGIES—INDIRECT

✔ Early Semester Feedback ✔ End Semester OBE Feedback

✗ Assessment of Mini Projects by Experts

XV. SYLLABUS

MODULE-I  AIRCRAFT ENGINEERING MATERIALS

MODULE-II  CASTING, WELDING AND INSPECTION TECHNIQUES
General principles of various casting processes Sand casting, die-casting, centrifugal casting, investment casting, Shell molding types; Principles and equipment used in arc welding, gas welding, resistance welding, solid, laser welding, and electron beam welding, soldering and brazing techniques. Need for NDT, ultrasonic testing, Radiographic testing, Flight testing.

MODULE-III  SHEET METAL PROCESSES IN AIRCRAFT INDUSTRY
Sheet metal operations: shearing, punching, super plastic forming; operations in bending like stretch forming spinning drawing.

Riveting, types and techniques, equipment, fasteners, integral tanks, final assembly of aircraft, Jigs and Fixtures, stages of assembly, aircraft tooling concepts.

MODULE-IV  CONVENTIONAL AND UNCONVENTIONAL MACHINING PROCESSES
General working principles, applications and operations of lathe, shaper, milling machines, grinding, drilling machine, computer numeric control machining. Working principles and applications of abrasive jet machining, ultrasonic machining, Electric discharge machining and electro chemical machining, laser beam, electron beam, plasma arc machining.

MODULE-V  AIRCRAFT COMPOSITES
Production of semi-fabricated forms, Aerospace applications, Plastics and rubber, Introduction to fiber reinforced plastics, glass and carbon composites; Fibers and resins; Characteristics and applications, Classification of aircraft materials; Materials used for aircraft components, Application of composite materials, Super alloys, indigenized alloys, emerging trends in aerospace materials.
### Text Books:


### REFERENCES:


### XVI. COURSE PLAN:

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

<table>
<thead>
<tr>
<th>Lecture No</th>
<th>Topics to be covered</th>
<th>Course Learning Outcomes (CLOs)</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>Engineering materials Steels, study of iron</td>
<td>CLO1</td>
<td>T2:5.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R1:1.12.1</td>
</tr>
<tr>
<td>3-5</td>
<td>Iron carbon phase diagram</td>
<td>CLO1</td>
<td>T2:5.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R1:1.12.3</td>
</tr>
<tr>
<td>6-7</td>
<td>Heat treatment-annealing, normalizing, hardening and tempering of Aluminum and steel, Non-Ferrous metals and Alloys</td>
<td>CLO1</td>
<td>T2:5.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R1:1.15</td>
</tr>
<tr>
<td>8-10</td>
<td>Structure and properties of copper and its alloys, Aluminum and its alloys, Titanium and its alloys,</td>
<td>CLO2</td>
<td>T2:5.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R1:1.16</td>
</tr>
<tr>
<td>11-12</td>
<td>Corrosion - Types of Corrosions - Prevention – Protective Treatments</td>
<td>CLO3</td>
<td>T2:5.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R1:1.13.1</td>
</tr>
<tr>
<td>13-14</td>
<td>General principles of various Casting Processes - Sand casting, die-casting, centrifugal casting, investment casting.</td>
<td>CLO4</td>
<td>T2:5.18</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R2:1.13.2</td>
</tr>
<tr>
<td>15-16</td>
<td>shell molding types</td>
<td>CLO4</td>
<td>T2:5.19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R1:1.13.3</td>
</tr>
<tr>
<td>17-21</td>
<td>Principles and equipment used in arc welding, gas welding</td>
<td>CLO4</td>
<td>T2:5.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R1:1.17.1</td>
</tr>
<tr>
<td>22-23</td>
<td>Laser welding, Electron beam welding</td>
<td>CLO5</td>
<td>T2:5.24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R1:1.17.3</td>
</tr>
<tr>
<td>24-25</td>
<td>Soldering and brazing techniques</td>
<td>CLO5</td>
<td>T2:6.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R1:2.3</td>
</tr>
<tr>
<td>26-27</td>
<td>Need for NDT, ultrasonic testing, Radiographic testing</td>
<td>CLO6</td>
<td>T2:6.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R1:2.6.1</td>
</tr>
<tr>
<td>28-30</td>
<td>Sheet metal operations-shearing</td>
<td>CLO7</td>
<td>T2:6.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R1:2.6.2</td>
</tr>
<tr>
<td>31-32</td>
<td>punching, super plastic forming and diffusion bonding</td>
<td>CLO7</td>
<td>T2:7.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>R1:2.8</td>
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<tr>
<td>33-34</td>
<td>Different operations in bending like stretch forming spinning drawing etc.</td>
<td>CLO8</td>
<td>T2:7.5,7.6</td>
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<td></td>
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<td>R1:2.9.2</td>
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<tr>
<td>35-36</td>
<td>types of equipment for riveted joints</td>
<td>CLO9</td>
<td>T2:7.7</td>
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<td>R1:2.10</td>
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<tr>
<td>37-39</td>
<td>Aircraft tooling concepts and Jigs and Fixtures</td>
<td>CLO9</td>
<td>T2:7.7</td>
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<td></td>
<td>R1:2.10</td>
</tr>
<tr>
<td>40-41</td>
<td>General principles of working and types of lathe</td>
<td>CLO10</td>
<td>T2:7.11</td>
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<td></td>
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<td>R2:2.10.2</td>
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<tr>
<td>42-44</td>
<td>Shaper, milling machines, grinding, drills m/c, CNC machining and general principles.</td>
<td>CLO10</td>
<td>T2:7.11</td>
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<td>R1:2.32</td>
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<tr>
<td>45-48</td>
<td>Plane turning, threading, tapering, grooving, knurling and chamfering</td>
<td>CLO11</td>
<td>T2:15.2</td>
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<td>R1:8.2</td>
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<tr>
<td>Lecture No</td>
<td>Topics to be covered</td>
<td>Course Learning Outcomes (CLOs)</td>
<td>Reference</td>
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<tr>
<td>49-50</td>
<td>Importance of CNC and Advantages</td>
<td>CLO11</td>
<td>T2:15.7, R2:8.3.3</td>
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<tr>
<td>51-52</td>
<td>Principles (with schematic diagram only) of working and applications of abrasive jet machining,</td>
<td>CLO11</td>
<td>T2:15.13, R1:8.7.2</td>
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<tr>
<td>53-54</td>
<td>USM, EDM, ECM and LBM operations</td>
<td>CLO12</td>
<td>T2:5.20, R1:1.17.1</td>
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<tr>
<td>55-57</td>
<td>Introduction, Physical metallurgy, Wrought aluminum alloys, Cast aluminum alloys, Production of semi-fabricated forms</td>
<td>CLO13</td>
<td>T3:6.1, R1:2.3</td>
</tr>
<tr>
<td>58-60</td>
<td>Introduction to fiber reinforced plastics, glass and carbon composites; Fibers and resins.</td>
<td>CLO13</td>
<td>T2:6.3, R3:2.6.1</td>
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<tr>
<td>61</td>
<td>Characteristics and applications, Classification of aircraft materials</td>
<td>CLO13</td>
<td>T2:6.5, R1:2.6.2</td>
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<tr>
<td>62-63</td>
<td>Materials used for aircraft components, Application of composite material</td>
<td>CLO13</td>
<td>T2:7.3, R1:2.8</td>
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<tr>
<td>64-65</td>
<td>Super alloys, indigenized alloys</td>
<td>CLO14</td>
<td>T3:7.5,7.6, R3:2.9.2</td>
</tr>
<tr>
<td>67-66</td>
<td>emerging trends in aerospace materials</td>
<td>CLO14</td>
<td>T3:7.7, R3:2.10</td>
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XVII. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

<table>
<thead>
<tr>
<th>S NO</th>
<th>Description</th>
<th>Proposed actions</th>
<th>Relevance with POs</th>
<th>Relevance with PSOs</th>
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<tbody>
<tr>
<td>1</td>
<td>Gain information about lift augmentation devices and control surfaces</td>
<td>Seminars / Guest Lectures/ NPTEL</td>
<td>PO 1, PO 2</td>
<td>PSO 4</td>
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<tr>
<td>2</td>
<td>Encourage students to make case studies on different air vehicles to get knowledge of practical applications of the control devices</td>
<td>Assignments</td>
<td>PO 1, PO 2, PO 3</td>
<td>PSO 4</td>
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</tbody>
</table>

Prepared by:
Mr. Suresh Kumar R, Assistant Professor.

HOD, AE