



# BHARATHIDASANUNIVERSITY, TIRUCHIRAPPALLI-620024.

## B.Sc. AVIATION CHOICE BASED CREDIT SYSTEM -

### LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS-LOCF)

(Applicable to the candidates admitted from the academic year 2026-2027 onwards)

| Sem | Part         | Courses                                      | Title                                             | Ins. Hrs. | Credits   | Exam. Hours | Maximum Marks |      |            |
|-----|--------------|----------------------------------------------|---------------------------------------------------|-----------|-----------|-------------|---------------|------|------------|
|     |              |                                              |                                                   |           |           |             | Int.          | Ext. | Total      |
| I   | I            | Ability Enhancement Course – I (AEC - I)     | (Tamil \$ / Other Languages +, #)                 | 6         | 3         | 3           | 30            | 70   | 100        |
|     | II           | Ability Enhancement Course – II (AEC - II)   | English Course - I                                | 6         | 3         | 3           | 30            | 70   | 100        |
|     | III          | Core Course - 1 (CC - 1)                     | Familiarization Aircraft                          | 4         | 4         | 3           | 30            | 70   | 100        |
|     |              | Core Practical - 1 (CP - 1)                  | Familiarization of Airport                        | 4         | 4         | 3           | 40            | 60   | 100        |
|     |              | Allied Course – 1 (AC - 1)                   | Introduction to Physics                           | 4         | 4         | 3           | 30            | 70   | 100        |
|     |              | Allied Course Practical – 1 (ACP-1)          | Physics Lab                                       | 2         | **        | **          | **            | **   | **         |
|     | IV           | Value Education                              | Value Education                                   | 2         | 2         | 3           | 30            | 70   | 100        |
|     |              | Interdisciplinary Course – 1 (IDC - 1) #     | One Course from Outside Department                | 2         | 2         | 3           | 30            | 70   | 100        |
|     | <b>Total</b> |                                              |                                                   | <b>30</b> | <b>22</b> | --          | --            | --   | <b>700</b> |
| II  | I            | Ability Enhancement Course – III (AEC - III) | (Tamil \$ / Other Languages +, #)                 | 6         | 3         | 3           | 30            | 70   | 100        |
|     | II           | Ability Enhancement Course – IV (AEC - IV)   | English Course - II                               | 6         | 3         | 3           | 30            | 70   | 100        |
|     | III          | Core Course - 2 (CC - 2)                     | Dangerous Goods and Regulations                   | 4         | 4         | 3           | 30            | 70   | 100        |
|     |              | Core Practical - 2 (CP - 2)                  | Radio Telephony and Communications                | 4         | 4         | 3           | 40            | 60   | 100        |
|     |              | Allied Course – 2 (AC - 2)                   | Basic Electricity and Aircraft Electrical Systems | 4         | 4         | 3           | 30            | 70   | 100        |
|     |              | Allied Course Practical - I (ACP-I)          | Physics Lab                                       | 2         | 4         | 3           | 40            | 60   | 100        |
|     | IV           | Skill Enhancement Course - 1 (SEC - 1) ##    | Human Performance                                 | 2         | 2         | 3           | 30            | 70   | 100        |
|     |              | Interdisciplinary Course – 2 (IDC - 2) #     | One Course from Outside Department                | 2         | 2         | 3           | 30            | 70   | 100        |
|     | <b>Total</b> |                                              |                                                   | <b>30</b> | <b>26</b> | --          | --            | --   | <b>800</b> |

|     |                                                                                         |                                                |                                         |           |           |    |    |    |            |
|-----|-----------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------|-----------|-----------|----|----|----|------------|
| III | I                                                                                       | Ability Enhancement Course – V(AEC - V)        | (Tamil \$ / Other Languages +, #)       | 6         | 3         | 3  | 30 | 70 | 100        |
|     | II                                                                                      | Ability Enhancement Course – VI (AEC - VI)     | English Course - III                    | 6         | 3         | 3  | 30 | 70 | 100        |
|     | III                                                                                     | Core Course - 3 (CC - 3)                       | Piston Engines and Propellers           | 4         | 4         | 3  | 30 | 70 | 100        |
|     |                                                                                         | Core Practical - 3 (CP - 3)                    | ATC Communication and Its Units         | 4         | 4         | 3  | 40 | 60 | 100        |
|     |                                                                                         | Allied Course – 3 (MC - 3)                     | Aviation Calculation and Numericals     | 4         | 4         | 3  | 30 | 70 | 100        |
|     |                                                                                         | Allied Course Practical - 2 (ACP-2)            | Flight Synthetic                        | 2         | **        | ** | ** | ** | **         |
|     | IV                                                                                      | Skill Enhancement Course - 2 (SEC - 2) ##      | Aviation Logistics and Cargo Management | 2         | 2         | 3  | 30 | 70 | 100        |
|     |                                                                                         | Interdisciplinary Course – 3 (IDC - 3) \$\$    | One Course from Outside Department      | 2         | 2         | 3  | 30 | 70 | 100        |
|     |                                                                                         | Health & Wellness @                            |                                         | --        | 1         | -- |    |    | 100        |
|     | <b>Total</b>                                                                            |                                                |                                         | <b>30</b> | <b>23</b> | -- | -- | -- | <b>800</b> |
|     | I                                                                                       | Ability Enhancement Course – VII (AEC - VII)   | (Tamil \$ / Other Languages +, #)       | 6         | 3         | 3  | 30 | 70 | 100        |
| IV  | II                                                                                      | Ability Enhancement Course – VIII (AEC - VIII) | English Course - IV                     | 6         | 3         | 3  | 30 | 70 | 100        |
|     | III                                                                                     | Core Course - 4 (CC - 4)                       | Air Navigation                          | 4         | 4         | 3  | 30 | 70 | 100        |
|     |                                                                                         | Core Practical - 4 (CP - 4)                    | Hangar Workshop                         | 4         | 4         | 3  | 40 | 60 | 100        |
|     |                                                                                         | Allied Course – 4 (AC - 4)                     | Meteorology                             | 4         | 4         | 3  | 30 | 70 | 100        |
|     |                                                                                         | Allied Course Practical – 2 (MCP-2)            | Flight Synthetic                        | 2         | 4         | 3  | 40 | 60 | 100        |
|     | IV                                                                                      | Skill Enhancement Course - 3 (SEC - 3) ##      | Basic Radio and Instrument Navigation   | 2         | 2         | 3  | 30 | 70 | 100        |
|     |                                                                                         | Interdisciplinary Course – 4 (IDC - 4) \$\$    | One Course from Outside Department      | 2         | 2         | 3  | 30 | 70 | 100        |
|     | <b>Total</b>                                                                            |                                                |                                         | <b>30</b> | <b>26</b> | -- | -- | -- | <b>800</b> |
|     | <b>Summer Internship / Industrial Activity during the Summer Vacation after II Year</b> |                                                |                                         |           |           |    |    |    |            |

|    |                    |                                            |                                                    |            |            |           |    |    |             |
|----|--------------------|--------------------------------------------|----------------------------------------------------|------------|------------|-----------|----|----|-------------|
| V  | III                | Core Course - 5 (CC - 5)                   | Aircraft Systems                                   | 4          | 4          | 3         | 30 | 70 | 100         |
|    |                    | Core Course - 6 (CC - 6)                   | Flight Performance and Planning                    | 5          | 4          | 3         | 30 | 70 | 100         |
|    |                    | Core Course - 7 (CC - 7)                   | Air Regulations                                    | 5          | 4          | 3         | 30 | 70 | 100         |
|    |                    | Core Course - 8 (CC - 8)                   | Aviation Security                                  | 5          | 4          | 3         | 30 | 70 | 100         |
|    |                    | Core Practical - 5 (CP - 5)                | Air Navigation                                     | 5          | 4          | 3         | 40 | 60 | 100         |
|    | IV                 | Skill Enhancement Course - 4 (SEC - 4)     | Ticketing and Visa                                 | 2          | 2          | 3         | 30 | 70 | 100         |
|    |                    | Skill Enhancement Course - 5 (SEC - 5) ##  | Aviation Safety Regulation                         | 2          | 2          | 3         | 30 | 70 | 100         |
|    |                    | Introduction to Disaster Management        |                                                    | 2          | 2          | 3         | 30 | 70 | 100         |
|    |                    | Summer Internship / Industrial Activity @@ | (with Viva-Voce)                                   | --         | 2          | --        | 20 | 80 | 100         |
|    | <b>Total</b>       |                                            |                                                    | <b>30</b>  | <b>28</b>  | --        | -- | -- | <b>900</b>  |
| VI | III                | Core Course - 9 (CC - 9)                   | Aircraft Instruments                               | 4          | 4          | 3         | 30 | 70 | 100         |
|    |                    | Core Course - 10 (CC - 10)                 | Airport Ground Handling                            | 5          | 4          | 3         | 30 | 70 | 100         |
|    |                    | Core Course - 11 (CC - 11)                 | Civil Aviation Requirements and Management Systems | 5          | 4          | 3         | 30 | 70 | 100         |
|    |                    | Core Project Work (CPW) @@                 | Project Work (with Viva-Voce)                      | 6          | 4          | 3         | 20 | 80 | 100         |
|    | IV                 | Value Added Course                         | General Studies for Competitive Examinations       | 2          | 1          | --        | 30 | 70 | 100         |
|    |                    | Skill Enhancement Course - 6 (SEC - 6)     | Radio Aids                                         | 2          | 2          | 3         | 30 | 70 | 100         |
|    |                    | Skill Enhancement Course - 7 (SEC - 7) ##  | Travel Agency Operation                            | 2          | 2          | 3         | 30 | 70 | 100         |
|    |                    | Environmental Studies                      |                                                    | 2          | 2          | 3         | 30 | 70 | 100         |
|    |                    | Gender Studies                             |                                                    | 2          | 1          | 3         | 30 | 70 | 100         |
|    |                    | Extension Activities *                     |                                                    | --         | 1          | --        | -- | -- | --          |
|    |                    | <b>Total</b>                               |                                                    |            | <b>30</b>  | <b>25</b> | -- | -- | <b>900</b>  |
|    | <b>Grand Total</b> |                                            |                                                    | <b>180</b> | <b>150</b> | --        | -- | -- | <b>4900</b> |

### ALLIED COURSE

| First Year                                                                                               | Second Year                                                                         |
|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1. Introduction to Physics<br>2. Physics Lab (P)<br>3. Basic Electricity and Aircraft Electrical Systems | 1. Aviation Calculation and Numericals<br>2. Flight Synthetic (P)<br>3. Meteorology |

| SKILL ENHANCEMENT COURSE (SEC) |                                         |         |                                    |
|--------------------------------|-----------------------------------------|---------|------------------------------------|
| Sl. No.                        | Title of paper                          | Sl. No. | MANDATORY Naan Mudhalvan Scheme ## |
| 1.                             | Human Performance                       | 1.      | <b>2<sup>nd</sup> Semester:</b>    |
| 2.                             | Aviation Logistics and Cargo Management |         |                                    |
| 3.                             | Basic Radio and Instrument Navigation   | 2.      | <b>3<sup>rd</sup> Semester:</b>    |
| 4.                             | Ticketing and Visa                      |         |                                    |
| 5.                             | Aviation Safety Regulation              | 3.      | <b>4<sup>th</sup> Semester:</b>    |
| 6.                             | Radio Aids                              |         |                                    |
| 7.                             | Travel Agency Operation                 | 4.      | <b>5<sup>th</sup> Semester:</b>    |
| 8.                             | -----                                   | 5.      | <b>6<sup>th</sup> Semester:</b>    |

| <b>INTERDISCIPLINARY COURSE (IDC)<br/>           FOR WHO HAVE OPT TAMIL AS PART - I<br/>           (for other Department Students only)</b> |                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| 1 <sup>st</sup> Semester                                                                                                                    | Introduction to Aviation        |
| 2 <sup>nd</sup> Semester                                                                                                                    | Theory of Flight (Aerodynamics) |
| 3 <sup>rd</sup> Semester                                                                                                                    | Introduction to Airlines        |
| 4 <sup>th</sup> Semester                                                                                                                    | Radio Telephony                 |

| <b>INTERDISCIPLINARY COURSE (IDC) #<br/>           FOR WHO HAVE NOT OPT TAMIL AS PART - I</b>                                                                                                       |                          |                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------|
| Those who have studied Tamil upto 10 <sup>th</sup> +2 but opt for other languages in degree                                                                                                         | 1 <sup>st</sup> Semester | Special Tamil - I  |
|                                                                                                                                                                                                     | 2 <sup>nd</sup> Semester | Special Tamil - II |
| Those who have not studied Tamil in school level                                                                                                                                                    | 1 <sup>st</sup> Semester | Basic Tamil - I    |
|                                                                                                                                                                                                     | 2 <sup>nd</sup> Semester | Basic Tamil - II   |
| Those students who opt for either special Tamil (or) Basic Tamil as IDCs, have to choose 2 more IDCs courses in their 3 <sup>rd</sup> and 4 <sup>th</sup> Semester from Outside his/her department. |                          |                    |

| <b>INTERDISCIPLINARY COURSE (IDC) \$\$<br/>FOR NCC CADETS ONLY</b>                                                                                                        |                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| <b>NCC Course is a Compulsory Course<br/>for the NCC Cadets in the<br/>3<sup>rd</sup> Semester:</b>                                                                       | <b>NCC Course is a Compulsory Course<br/>for the NCC Cadets in the<br/>4<sup>th</sup> Semester:</b>        |
| Introduction to NCC                                                                                                                                                       | 1. Special Subject Army <b>(or)</b><br>2. Special Subject Navy <b>(or)</b><br>3. Special Subject Air force |
| Those students who opt for NCC Courses as IDCs, have to choose 2 more IDCs courses in their 1 <sup>st</sup> and 2 <sup>nd</sup> Semester from Outside his/her department. |                                                                                                            |

### **SUMMARY OF CURRICULUM STRUCTURE OF UG PROGRAMMES – SCIENCE**

| Sl. No.      | Part | Types of the Courses                                                                          | No. of Courses | Credits for each Course | Total Credits | Marks       |
|--------------|------|-----------------------------------------------------------------------------------------------|----------------|-------------------------|---------------|-------------|
| 1.           | I    | Ability Enhancement Course                                                                    | 4              | 3                       | 12            | 400         |
| 2.           | II   | Ability Enhancement Course                                                                    | 4              | 3                       | 12            | 400         |
| 3.           | III  | Core Course                                                                                   | 11             | 4                       | 44            | 1100        |
| 4.           |      | Core Practical                                                                                | 5              | 4                       | 20            | 500         |
| 5.           |      | Allied Course (AC)                                                                            | 4              | 4                       | 16            | 400         |
| 6.           |      | Allied Course Practical (ACP)                                                                 | 2              | 4                       | 8             | 200         |
| 7.           |      | Core Project Work (CPW)                                                                       | 1              | 4                       | 4             | 100         |
| 8.           | IV   | Skill Enhancement Course (SEC)                                                                | 7              | 2                       | 14            | 700         |
| 9.           |      | Interdisciplinary Course (IDC)                                                                | 4              | 2                       | 8             | 400         |
| 10.          |      | Value Education                                                                               | 1              | 2                       | 2             | 100         |
| 11.          |      | Health and Wellness                                                                           | 1              | 1                       | 1             | 100         |
| 12.          |      | Introduction to Disaster Management                                                           | 1              | 2                       | 2             | 100         |
| 13.          |      | Summer Internship / Industrial Activity                                                       | 1              | 2                       | 2             | 100         |
| 14.          |      | Value Added Course                                                                            | 1              | 1                       | 1             | 100         |
| 15.          |      | Environmental Studies                                                                         | 1              | 2                       | 2             | 100         |
| 16.          |      | Gender Studies                                                                                | 1              | 1                       | 1             | 100         |
| 17.          |      | <b>EXTENSION ACTIVITIES</b> (NCC / NSS / SPORTS / ANTI DRUG CELL / YRC & Any Other Activities | --             | 1                       | 1             | --          |
| <b>Total</b> |      |                                                                                               | <b>49</b>      | <b>-</b>                | <b>150</b>    | <b>4900</b> |

|    |                                                                                                                                             |
|----|---------------------------------------------------------------------------------------------------------------------------------------------|
| \$ | For those who have studied Tamil upto 10 <sup>th</sup> +2 (Regular Stream)                                                                  |
| +  | Syllabus for other Languages should be on par with Tamil at degree level                                                                    |
| #  | Those who have studied Tamil upto 10 <sup>th</sup> +2 but opt for other languages in degree level under Part - I should study special Tamil |

|              | and those who have not studied Tamil in the school level should study Basic Tamil in Part – IV under the Interdisciplinary Course.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |             |        |    |           |    |              |            |    |   |                                          |    |              |  |            |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|--------|----|-----------|----|--------------|------------|----|---|------------------------------------------|----|--------------|--|------------|
| **           | Examination at the end of the next semester                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |             |             |        |    |           |    |              |            |    |   |                                          |    |              |  |            |
| ##           | Naan Mudhalvan Scheme: As per the Naan Mudhalvan Scheme instructions, 5 courses from 2 <sup>nd</sup> to 6 <sup>th</sup> semester should be studied under Skill Enhancement Course.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |             |        |    |           |    |              |            |    |   |                                          |    |              |  |            |
| \$\$         | NCC Course is one of the Choices in the Interdisciplinary Course. Only the NCC Cadets are eligible to choose this course. However, NCC Course is a Compulsory Course for the NCC Cadets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |             |        |    |           |    |              |            |    |   |                                          |    |              |  |            |
| @            | <p style="text-align: center;"><b>Health and Wellness: Assessments:</b></p> <ul style="list-style-type: none"><li>• Use self-reflective worksheets to assess their understanding</li><li>• submit the worksheets to internal audit / external audit</li><li>• Every student’s activity report should be documented and the same have to be assessed by the Physical Director with Mentor. The evaluation should be for 100 marks. No examination is required.</li></ul> <p style="text-align: center;"><b>Scheme of Evaluation:</b></p> <table><tr><th>Part</th><th>Description</th><th>Marks</th></tr><tr><td>A</td><td>Report</td><td>40</td></tr><tr><td>B</td><td>Attendance</td><td>20</td></tr><tr><td>C</td><td>Activities (Observation During Practice)</td><td>40</td></tr><tr><td colspan="2"><b>Total</b></td><td><b>100</b></td></tr></table> | Part        | Description | Marks  | A  | Report    | 40 | B            | Attendance | 20 | C | Activities (Observation During Practice) | 40 | <b>Total</b> |  | <b>100</b> |
| Part         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Marks       |             |        |    |           |    |              |            |    |   |                                          |    |              |  |            |
| A            | Report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 40          |             |        |    |           |    |              |            |    |   |                                          |    |              |  |            |
| B            | Attendance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 20          |             |        |    |           |    |              |            |    |   |                                          |    |              |  |            |
| C            | Activities (Observation During Practice)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 40          |             |        |    |           |    |              |            |    |   |                                          |    |              |  |            |
| <b>Total</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>100</b>  |             |        |    |           |    |              |            |    |   |                                          |    |              |  |            |
| @@           | <p style="text-align: center;"><b>Summer Internship / Industrial Activity</b></p> <p>Internship will be carried out during the summer vacation after the second year. Viva-Voce will be conducted by the college and Marks shall be send to the University and the same will be included in the 5<sup>th</sup> semester Mark Statement.</p> <p style="text-align: center;"><b>Summer Internship / Industrial Activity&amp; Project Work</b></p> <p style="text-align: center;"><b>Scheme of Evaluation:</b></p> <table><tr><th>Description</th><th>Marks</th></tr><tr><td>Report</td><td>80</td></tr><tr><td>Viva-Voce</td><td>20</td></tr><tr><td><b>Total</b></td><td><b>100</b></td></tr></table>                                                                                                                                                      | Description | Marks       | Report | 80 | Viva-Voce | 20 | <b>Total</b> | <b>100</b> |    |   |                                          |    |              |  |            |
| Description  | Marks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |             |        |    |           |    |              |            |    |   |                                          |    |              |  |            |
| Report       | 80                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |             |        |    |           |    |              |            |    |   |                                          |    |              |  |            |
| Viva-Voce    | 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |             |        |    |           |    |              |            |    |   |                                          |    |              |  |            |
| <b>Total</b> | <b>100</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |             |        |    |           |    |              |            |    |   |                                          |    |              |  |            |
| *            | Extension Activities shall be outside instruction hours.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |             |        |    |           |    |              |            |    |   |                                          |    |              |  |            |

**PROGRAM OUTCOMES–B.Sc.-AVIATION**

On Successful completion of the Program the undergraduate of aviation will be able to,

**KNOWLEDGE**

|            |                                                                                                                                                                                                  |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PO1</b> | Exhibit knowledge on difference element used together for safe conduct of flight.                                                                                                                |
| <b>PO2</b> | Comprehend knowledge on working principles of aviation tools, instruments and equipment's.                                                                                                       |
| <b>PO3</b> | Exhibit advanced knowledge of functions and importance of various aviation department such as meteorology department and air traffic service department in stream lined flow of airline business |

**SKILLS**

|            |                                                                                                       |
|------------|-------------------------------------------------------------------------------------------------------|
| <b>PO4</b> | Demonstrate skill in handling & operating various aviation tools, instruments & equipment's.          |
| <b>PO5</b> | Exhibit intra and inter personal skills including wide knowledge of Indian and International air law. |
| <b>PO6</b> | Demonstrates soft communication skills that uplift passenger handling.                                |

**ATTITUDES**

|            |                                                                             |
|------------|-----------------------------------------------------------------------------|
| <b>PO7</b> | Demonstrate importance of team work, decision making and crew coordination. |
|------------|-----------------------------------------------------------------------------|

**ETHICAL AND SOCIAL VALUES**

|            |                                                                                                                                                                                 |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>PO8</b> | Practice airmanship and work together for the safety and well-being of coworker, uphold ethical and social values in personal and in work environment                           |
| <b>PO9</b> | Practice and exhibit time management and quick decision making thereby reducing unwanted delays as a byproduct reducing carbon emission and helping to make a green environment |

## **PROGRAM SPECIFIC OUTCOMES Knowledge & Skills:**

**PSO1** Advanced knowledge about the various equipment's and instruments used in and around airport.

**PSO2** Inter pretaviation phraseology markings, difference lightings signage used in airport and decode meteorological reports and coded aviation information.

**PSO3** Evaluate plan and construct a flight plan, gather all necessary information and convey it to the concerned person for successful conduct of flight from departure to destination.

**PSO4** Get a clear knowledge to choose their field of interest in aviation sector.

## **LEARNING OUTCOMES (LO):**

LO1: Disciplinary Knowledge

LO2: Communication Skills

LO3: Critical thinking

LO4: Problem Solving

LO5: Analytical Reasoning

LO6: Research-related Skills

LO7: Cooperation/ Team Work

LO8: Scientific Reasoning

LO9: Reflective Thinking

LO10: Information/ digital literacy

LO11: Self-directed learning

LO12: Multicultural competence

LO13: Moral and ethical awareness/reasoning

LO14: Leadership readiness/qualities

LO15: Life-long learning

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**Code: FAMILIARIZATION OF AIRCRAFT  
(Theory)**

**Credits: 4**

**COURSE OBJECTIVES:**

To provide fundamental knowledge of aircraft structure, systems, types, and basic principles of operation to build a foundation in aviation.

**UNIT – I UNDERSTANDING OF BASIC MECHANICS, THERMO DYNAMICS AND FLUID MECHANICS:**

Speed, Velocity, Newton's laws of motion, Friction, Centre of Mass, Centre of Gravity, Torque, Work, Energy, Power, Pressure, Stress, Elasticity of Material, Principle of the Gyroscope; Laws of Thermodynamics, Heat Transfer, Specific Heat, Calorific values of fuels; Viscosity, Fluid Resistance, Specific Gravity, Absolute and relative humidity, Pascal's law & its application in Hydraulic press, Hydraulic and Pneumatic system, Bernoulli's Theorem, Venturi's tube theory, Streamline, Laminar and turbulent flow.

**UNIT – II AIR FRAME & SYSTEMS:**

Types of Fuselages, Load transfer technique, Various Wing Structures-Rectangular, Elliptical, sweptback, swept forward, Anhedral, Dihedral; Definition of Control Surfaces, Primary control surface, Secondary control Surface, Working Of Aileron, Elevator, Rudder, Flaperons; Airframe, fuel system, Cooling System

**UNIT-III LANDING GEAR, WHEEL BRAKES:**

Purpose of landing gear, Types of Landing Gear- Retractable and Non-Retractable landing gear, Tri cycle type, Tail Dragster Landing Gear, Main Landing Gears and different types of Shock Strut-Rigid struts, Spring Steel Struts, Bungee cords, Shock struts, oleo struts; Brake System.

**UNIT-IV AIR CRAFT ENGINE (PISTON):**

Basic understanding of Piston engine components: Crankcase, Crankshaft, Camshaft, Bearings, Connecting Rod, Piston, Piston Rings, Four-Stroke engine cycle, carburetor, Engine Handling, normally aspirated, Turbo charging, Supercharging.

**UNIT-V AIR CRAFT ENGINE (JET):**

Basic understanding of Jet engines, Propeller, Parts of Propeller, Difference between jet engine and piston engine, Types of Compressors: Axial, Centrifugal, Fuel injection, Types of Combustion Chambers, gas turbine engine.

**UNIT-VI CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):**

Draw a simple airfoil and explain how lift is produced. Study aircraft diagrams and identify parts: fuselage, wings, tail. Observe videos/simulators and note how each control affects movement (roll, pitch, yaw)

**TOPIC FOR SELF STUDY:**

| <b>Sl. No</b> | <b>Topics</b>                                       | <b>WebLinks</b>                                                                       |
|---------------|-----------------------------------------------------|---------------------------------------------------------------------------------------|
| 1             | Basic Mechanics, Thermodynamics and Fluid Mechanics | <a href="https://iubtgedu.org.com">https://iubtgedu.org.com</a>                       |
| 2             | Airframe & systems                                  | <a href="https://www.aircraftsystemstech.com">https://www.aircraftsystemstech.com</a> |
| 3             | Aircraft Engine                                     | <a href="https://www.sciencedirect.com">https://www.sciencedirect.com</a>             |

**REFERENCE BOOKS:**

1. Oxford–Aircraft General Knowledge 1 (Air frame and systems)
2. Oxford–Aircraft General Knowledge 3 (power plant)
3. Aero plane Technical by Trevor Thom

**COURSEOUTCOMES:**

On completion of this course, the students will be able to:

| <b>CO</b> | <b>Course Outcomes</b>                                                                                           | <b>LO</b> |
|-----------|------------------------------------------------------------------------------------------------------------------|-----------|
| CO1       | Understanding basic fluid mechanics and thermodynamics relevant to aviation applications                         | LO1       |
| CO2       | Understand the basic components of aircraft and airframe                                                         | LO6       |
| CO3       | Demonstrate knowledge of landing gear types, shock struts and braking systems used in aircraft.                  | LO1       |
| CO4       | To know the various purposes of landing gear                                                                     | LO4       |
| CO5       | Describe the structure and operation of piston engines including major components and types of induction systems | LO1       |
| CO6       | Analyze different types of compressors, combustion chambers and fuel systems of Jet engines                      | LO6       |

**SPECIFIC LEARNING OUTCOMES (SLO):**

| UNIT       | COURSE CONTENTS                                                             | LEARNING OUTCOMES                                                      | TAXONOMY LEVEL |
|------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------|----------------|
| <b>I</b>   | <b>Understanding of Basic Mechanics, Thermodynamics and Fluid Mechanics</b> |                                                                        |                |
| 1.1        | Speed, Velocity                                                             | What is Speed, Velocity                                                | K1             |
| 1.2        | Newton's laws of motion                                                     | Explain Newton's laws of motion                                        | K3             |
| 1.3        | Centre of Mass<br>Centre of Gravity                                         | Comparisons of Centre of Mass<br>Centre of Gravity                     | K2             |
| 1.4        | Torque, Work, Energy, Power, Pressure, Stress, Elasticity of Material       | Torque, Work, Energy, Power, Pressure, Stress, Elasticity of Material  | K2             |
| 1.5        | Principle of the Gyroscope                                                  | Explain the working of the Gyroscope                                   | K3             |
| 1.6        | Laws of Thermodynamics                                                      | Define Laws of Thermodynamics                                          | K3             |
| 1.7        | Heat Transfer, Specific Heat                                                | What is Heat Transfer, Specific Heat                                   | K1             |
| 1.8        | Values of fuels; Viscosity, Fluid Resistance, Specific gravity              | Explain values of fuels Viscosity, Fluid Resistance, Specific gravity  | K2             |
| 1.9        | Pascal's law & its application                                              | Hydraulic press, Hydraulic and Pneumatic system                        | K3             |
| 1.10       | Bernoulli's Theorem                                                         | Explain Bernoulli's Theorem                                            | K3             |
| 1.11       | Venturi's tube theory                                                       | Venturi's tube                                                         | K2             |
| 1.12       | Laminar and turbulent flow. Streamline                                      | Laminar and turbulent flow. Streamline                                 | K2             |
| <b>II</b>  | <b>Airframe &amp; systems</b>                                               |                                                                        |                |
| 2.1        | Types of Fuselages                                                          | Load transfer technique in Fuselages                                   | K1             |
| 2.2        | Various Wing Structures                                                     | Rectangular, Elliptical, swept back, Swept forward, Anhedral, Dihedral | K3             |
| 2.3        | Control Surfaces                                                            | Primary control surface, Secondary control Surface                     | K3             |
| 2.4        | Aileron, Elevator, Rudder                                                   | Working of Aileron, Elevator, Rudder                                   | K4             |
| 2.5        | Fuel system                                                                 | What is Fuel system                                                    | K1             |
| 2.6        | Cooling System                                                              | Define Cooling System                                                  | K2             |
| <b>III</b> | <b>Landing Gear, Wheel brakes</b>                                           |                                                                        |                |

|           |                                           |                                                                                 |    |
|-----------|-------------------------------------------|---------------------------------------------------------------------------------|----|
| 3.1.0     | Types of Landing Gear                     | Retractable and non-retractable Landing gear                                    | K2 |
| 3.1.1     | Landing gear                              | Purpose of landing gear                                                         | K2 |
| 3.1.2     | Types of Landing Gear                     | Tricycle type                                                                   | K2 |
| 3.1.3     | Types of Landing Gear                     | Tail Dragger Landing Gear, Main Landing Gears                                   | K4 |
| 3.1.4     | Shock Strut                               | Define Shock Strut                                                              | K3 |
| 3.1.5     | Types of Shock Strut                      | Rigid struts, Spring Steel Struts                                               | K2 |
| 3.1.6     | Brake System                              | Define Brake System                                                             | K3 |
| <b>IV</b> | <b>Air craft Engine (Piston)</b>          |                                                                                 |    |
| 4.1.0     | Basic Piston engine components:           | Crankcase, Crankshaft, Camshaft, Bearings, Connecting Rod, Piston, Piston Rings | K3 |
| 4.1.1     | Four-Stroke engine                        | Explain Four-Stroke engine                                                      | K4 |
| 4.1.2     | Engine components                         | Define engine Handling                                                          | K4 |
|           | charging                                  | Compare Turbocharging, Supercharging                                            | K3 |
| <b>V</b>  | <b>Air craft Engine (Jet)</b>             |                                                                                 |    |
| 5.1.0     | Basic Jet engines                         | Propeller, Parts of Propeller                                                   | K3 |
| 5.1.1     | Comparisons of Jet engines, piston engine | Difference between Jet engines, piston engine                                   | K2 |
| 5.1.2     | Types of Compressors                      | Compare Axial, Centrifugal                                                      | K3 |
| 5.1.3     | Fuel injection                            | Define Fuel injection                                                           | K3 |
| 5.1.4     | Types of Combustion Chambers              | Types of Combustion Chambers                                                    | K4 |
| 5.1.5     | Gas turbine engine                        | What is gas turbine engine                                                      | K4 |

### **COURSE ARTICULATION MATRIX (CAM) for defined COs**

| <b>CO</b> | <b>Program Outcomes</b> |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|-----------|-------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|           | 1                       | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| CO1       | H                       | M | L |   | L | H | L |   | L |    | M  |    |    | L  | L  |
| CO2       | H                       |   |   | M |   |   |   |   | M | M  |    |    | L  | M  |    |
| CO3       | H                       | M | L | L |   | L | L | H |   | H  | L  | L  | M  |    | L  |
| CO4       | H                       | L | L |   |   | L |   |   |   |    |    |    |    | L  | M  |
| CO5       | H                       | M |   | M | L |   | L | L | L | M  |    | L  | M  | M  |    |
| CO6       | H                       | L | M | L | M |   |   | M |   |    | L  |    | L  |    | M  |

L – Low

M- Medium

H-High

**COURSE OBJECTIVE:**

To acquire basic understanding of the layout at airport its building facilities, installation and their functioning.

**BUILDINGS&INSTALLATIONS:**

- Basic definitions and understanding of Terminals, Security, Apron, Hangar, Taxiway, Runway, Fire Station, Airport Vehicles, Fuel depot. Regulations related to each of airport services.
- Purpose hanger, apron, aircraft stand, taxi way and runway.

**MARKINGS&LIGHTINGS:**

- Difference between markings, Lightings and Signboards
- Apron markings-aero bridge movement are a markings, stand lead in line, Apron edge marking
- Aircraft stand identification marking, Taxiway centerline and edge marking & lighting, Runway centerline and edge line marking & lighting
- Threshold, aiming point, touch down zone marking & lighting Declared distances, PCN, Lighting system, Aerodrome Beacon, Obstacle Lighting & Marking. Location, Direction & Destination signboard.

**FACILITIES&EQUIPMENT'S:**

- Basic understanding of Navigational facilities.
- Basic radio principle, frequency used and introduction about various navigational equipment's VOR, NDB/ADF, DME;
- Basic radar principle, Primary and secondary radar, Surveillance equipment's: Primary Radar, SSR, Surface Movement Radar, ADS; GPS, VHF antennae, ILS

**AIRTRAFFICCONTROL:**

- Different Air Traffic Control Units, Concept of Flight Information Region, Role of Flight Information Centre,
- Five different Flight information regionin India, Roles and responsibilities of Various air traffic control units-Ground control, Tower, Approach, Area control,
- Flight Plan briefing and filling, Flight Dispatch, ATC briefing

## IMPORTANT ORGANIZATIONS

- Roles and Responsibility of International Air Transport Association (IATA)
- International Civil Aviation Organization (ICAO) –
- Director General Civil Aviation (DGCA)
- Airport Authority of India (AAI)& its wings-
- Ministry of Civil Aviation
- Bureau of Civil Aviation Security
- Central Industrial Security Force.
- Important convention with these organization

## TOPICS FOR SELFSTUDY

| Sl. No | Topics                          | WebLinks                                                                                                                                                                            |
|--------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | Airport Marking Aids and Signs  | <a href="https://www.faa.gov/air_traffic/publications/atpubs/aim_html/cha_p2_section_3.html">https://www.faa.gov/air_traffic/publications/atpubs/aim_html/cha_p2_section_3.html</a> |
| 2      | Air traffic control position    | <a href="https://mediawiki.iviao.aero/index.php?title=Air_traffic_control_position">https://mediawiki.iviao.aero/index.php?title=Air_traffic_control_position</a>                   |
| 3      | Important Aviation organization | <a href="https://www.civilaviation.gov.in/en/aboutus/orgsetup">https://www.civilaviation.gov.in/en/aboutus/orgsetup</a>                                                             |

## REFERENCEBOOKS:

1. ICAO Annex 14 Volume 1 Aerodrome Design and Operations
2. Civil Aviation Requirements Section-4, Aerodrome Standards & Air Traffic Services.
3. R.K. Bali Air Regulations.  
Airport council international (Second Edition)

## COURSE OUTCOMES:

On completion of this course, the students will be able to:

| CO  | Course Outcomes                                                                         | LO  |
|-----|-----------------------------------------------------------------------------------------|-----|
| CO1 | Understand basic airport areas like terminal, runway, taxiway, apron, and hangar.       | LO1 |
| CO2 | Learn about airport markings, lighting, and signboards used for safe aircraft movement. | LO6 |
| CO3 | Understand basic navigation and communication systems used in aviation.                 | LO2 |
| CO4 | Learn how Air Traffic Control (ATC) works and its                                       | LO2 |

|     |                                                                                                                                    |     |
|-----|------------------------------------------------------------------------------------------------------------------------------------|-----|
|     | different units.                                                                                                                   |     |
| CO5 | Understand flight planning and basic dispatch procedures.                                                                          | LO3 |
| CO6 | Know the roles of important aviation organizations like International Civil Aviation Organization and Airports Authority of India. | LO6 |

### **SPECIFIC LEARNING OUTCOMES:**

| <b>UNIT</b> | <b>COURSE CONTENTS</b>                                                                                                                                                                           | <b>LEARNING OUTCOMES</b>                                                                                                   | <b>TAXONOMY LEVEL</b> |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------|
| <b>I</b>    | <b>Buildings &amp; Installations</b>                                                                                                                                                             |                                                                                                                            |                       |
| 1.1         | Basic definitions and understanding of Terminals, Apron, Hangar, Taxiway, Runway, Fire Station, Airport Vehicles, Fuel depot                                                                     | Explain the definitions of Terminals, Security, Apron, Hangar, Taxiway, Runway, Fire Station, Airport Vehicles, Fuel depot | K2                    |
| 1.2         | Regulations related to each of airport services                                                                                                                                                  | Identify the relevant air regulations related to a particular airport service                                              | K3                    |
| 1.3         | Purpose hanger, apron, Aircraft stand, taxi way and runway                                                                                                                                       | Analyze the work done in a particular area in an airport                                                                   | K4                    |
| <b>II</b>   | <b>Markings &amp; Lightings</b>                                                                                                                                                                  |                                                                                                                            |                       |
| 2.1.0       | Difference between markings, Lightings and Signboards                                                                                                                                            | Distinguish the purpose of marking, lighting and sign age                                                                  | K4                    |
| 2.1.1       | Apron markings-movement are a markings, stand lead inline, Apron edge marking, Aircraft stand identification marking, Taxiway centerline and edge marking & lighting, Run way marking & lighting | Interpret apron, Taxiway, Run way marking and lightings                                                                    | K2                    |
| 2.1.2       | Declared distances                                                                                                                                                                               | Identify the different declared distances                                                                                  | K3                    |
| 2.1.3       | PCN                                                                                                                                                                                              | Solve PCN calculations                                                                                                     | K3                    |
| 2.1.4       | Lighting system, Aero drome Beacon, Obstacle Lighting &                                                                                                                                          | Distinguish different lights used in and around airport                                                                    | K4                    |

|            |                                                                                                                |                                                                                      |    |
|------------|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----|
|            | Marking.                                                                                                       |                                                                                      |    |
| 2.1.5      | Location, Direction & Destination signboard.                                                                   | Interpret the meaning of different sign board                                        | K2 |
| <b>III</b> | <b>Facilities &amp; Equipment's</b>                                                                            |                                                                                      |    |
| 3.1.0      | Basic understanding of Navigational facilities                                                                 | Outline the purpose and uses of Navigation facilities                                | K2 |
| 3.1.1      | Basic radio principle                                                                                          | Explain the basic principle of radio aids                                            | K2 |
| 3.1.2      | Frequency used                                                                                                 | Choose the appropriate Radio frequency                                               | K5 |
| 3.1.3      | Introduction about various Navigational equipment VOR, NDB/ADF, DME                                            | Explain the functions of various Navigation Equipment's                              | K2 |
| 3.1.4      | Basic radar principle                                                                                          | Summarize the basic Principle of RADAR                                               | K2 |
| 3.1.5      | Primary and secondary radar                                                                                    | List out the principle, advantages And disadvantages of primary and secondary RADAR  | K4 |
| 3.1.6      | SSR, Surface Movement Radar, ADS; GPS, VHF antennae, ILS                                                       | Make use of different Navigation Instrument for safe and efficient conduct of flight | K3 |
| <b>IV</b>  | <b>Air Traffic Control</b>                                                                                     |                                                                                      |    |
| 4.1.0      | Different Air Traffic Control Units                                                                            | Compare the different air traffic Control unit                                       | K4 |
| 4.1.1      | Concept of FIR                                                                                                 | List out the boundaries and functions of FIR                                         | K4 |
| 4.1.2      | Role of FIC                                                                                                    | Identify a particular FIC to obtain Information service                              | K3 |
| 4.1.3      | Five different Flight Information region in India                                                              | Identify a particular region comes under which FIR                                   | K3 |
| 4.1.4      | Roles and responsibilities of Various air traffic control units- Ground control, Tower, Approach, Area control | List out the roles and responsibilities of various ATC control unit                  | K3 |



|          |                                                                            |                                                                      |    |
|----------|----------------------------------------------------------------------------|----------------------------------------------------------------------|----|
| 4.1.5    | Flight Plan briefing and filling                                           | Built a fully filled flight plan                                     | K3 |
| 4.1.6    | Flight Dispatch                                                            | Explain the functions of flight Dispatch                             | K2 |
| 4.1.7    | ATC briefing                                                               | Interpret ATC briefing                                               | K2 |
| <b>V</b> | <b>Important Organizations</b>                                             |                                                                      |    |
| 5.1.0    | Roles and Responsibility of International Air Transport Association (IATA) | List out the Roles and Responsibilities of IATA                      | K4 |
| 5.1.1    | International Civil Aviation Organization (ICAO)                           | Explain the various functions of ICAO                                | K2 |
| 5.1.2    | DGCA                                                                       | Categorize the roles and functions of DGCA                           | K4 |
| 5.1.3    | AAI and its wings                                                          | Explain the functions of AAI and its Units                           | K2 |
| 5.1.4    | Ministry of Civil Aviation                                                 | Outline the functions of civil Aviation ministry                     | K2 |
| 5.1.5    | BCAS                                                                       | Analyze how security is maintained in Aviation                       | K4 |
| 5.1.6    | CISF                                                                       | Summarize the function of CISF under the guidance of BCAS            | K2 |
| 5.1.7    | Important convention with these organization                               | List out the important convention made by the important organization | K4 |

### COURSE ARTICULATION MATRIX (CAM) for defined COs

| CO         | Program Outcomes |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|------------|------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|            | 1                | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| <b>C01</b> | H                | M | L |   | L | H | M | L |   | M  | M  |    | L  | L  | L  |
| <b>C02</b> | H                |   | H | M | L |   | M | H | L |    |    |    |    |    | M  |
| <b>C03</b> | L                | M | L |   | H | M |   |   |   | M  | L  |    | M  | L  | L  |
| <b>C04</b> | H                | L |   | L |   |   | L |   |   | H  |    |    | L  |    |    |
| <b>C05</b> | M                |   | L |   | L | M | L | H | L | M  | L  | M  |    |    | L  |
| <b>C06</b> | H                | M | M | L |   | H |   | L |   | L  |    |    | L  |    | M  |

L – Low

M- Medium

H-High

**COURSE OBJECTIVE:**

To understand the theory concepts and fundamental principles of motion, force and energy.

**UNIT-I MEASUREMENTS:**

Vectors, scalars –examples for scalars and vectors from physical quantities –addition, subtraction of vectors – resolution and resultant of vectors – units and dimensions–standard physics constants

**UNIT-II FORCE:**

Different types of forces–gravitational, electrostatic, magnetic, electromagnetic, nuclear –mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces

**UNIT-III ENERGY:**

Different forms of energy– conservation laws of momentum, energy – types of collisions–angular momentum–alternate energy sources–real life examples

**UNIT-IV MOTION:**

Types of motion– linear, projectile, circular, angular, simple harmonic motions – satellite motion–banking of a curved roads–streamline and turbulent motions – wave motion – comparison of light and sound waves – free, forced, damped oscillations

**UNIT-V SURFACETENSION:**

Surface tension – shape of liquid drop – angle of contact – viscosity – lubricants – capillary flow – diffusion – real life examples– properties and types of materials in daily use–conductors, insulators–thermal and electric

**UNIT-VI CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):**

- i)Observe moving objects (vehicle, aircraft, fan)
- ii)Record speed, distance, and time in a simple table
- iii) List examples of push and pull forces in aviation (thrust, drag)
- iv)Relate motion, force, and energy to aircraft operation, Example: take off (thrust vs drag, lift vs weight)

**TEXTBOOKS:**

1. D.S.Mathur,2010,Elements of Properties of Matter, S. Chand and Co
2. BrijlalandN.Subrahmanyam,2003, Properties of Matter, S. Chand and Co.

**REFERENCEBOOKS:**

1. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition, S. Chand and Co.

**WEBRESOURCES:**

1. <http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html><https://science.nasa.gov/ems/>
2. [https://eesc.columbia.edu/courses/ees/climate/lectures/radiation\\_hays/](https://eesc.columbia.edu/courses/ees/climate/lectures/radiation_hays/)

**COURSE OUTCOMES:**

| CO  | COURSE OUTCOMES                                                                                                                                    | LO   |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------|------|
| CO1 | Apply concept of vectors to understand concepts of Physics and solve problems                                                                      | LO4  |
| CO2 | Appreciate different forces present in nature while learning about phenomena related to these different forces.                                    | LO1  |
| CO3 | Quantify energy in different process and relate momentum, velocity and energy                                                                      | LO5  |
| CO4 | Differentiate different types of motions they would encounter in various courses and understand their basics                                       | LO6  |
| CO5 | Relate various properties of matter with their behavior and connect them with different physical parameters involved.                              | LO6  |
| CO6 | Apply concepts of motion, force, and energy by observing real-life examples and relating them to aircraft operations such as takeoff and movement. | LO11 |

**COURSE ARTICULATION MATRIX (CAM) for defined COs**

| CO  | Program Outcomes |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|-----|------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|     | 1                | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| CO1 | H                |   | M | M |   | L |   | L |   | M  | H  |    |    |    | L  |
| CO2 | M                |   |   |   | L | M |   |   | L | M  | L  |    | L  |    |    |
| CO3 | H                |   | L |   |   |   |   | M |   | L  | M  | L  |    |    |    |
| CO4 | M                |   |   | M |   | M | L |   | M |    | H  |    |    |    | L  |
| CO5 | H                | L |   |   | M |   |   | L |   | H  | M  |    |    |    |    |
| CO6 | H                |   | M | L | L | H | L |   | L |    | L  |    |    |    | M  |

L – Low

M- Medium

H-High

|                   |                                    |                   |
|-------------------|------------------------------------|-------------------|
| <b>First Year</b> | <b>ALLIED COURSE PRACTICAL 1</b>   | <b>Semester I</b> |
| <b>Code:</b>      | <b>PHYSICS LAB<br/>(Practical)</b> | <b>Credits:**</b> |

### **COURSE OBJECTIVE:**

To develop practical skills in measuring and analyzing physical properties and principles through hands-on experiments involving mechanics, optics, electricity, and material science.

### **List of experiments**

1. Non-uniform bending-micro scope method.
2. Compound pendulum-g and K.
3. Surface tension and interfacial tension-drop weight method.
4. Sonometer-verification of laws.
5. Long focus convex lens-f, R.
6. Characteristics of junction diodes.
7. Static torsion-determination of n.
8. Spectrometer-refractive index of the prism.
9. Digital Screw Gauge-Basic measurements
10. Digital Vernier Calipers-Dimensions of materials
11. Mega Ohmmeter-Measurement of High Resistance
12. Cantilever depression-scale and telescope.
13. Meld's string Arrangement-Transverse and longitudinal mode

### **COURSE OUTCOMES (CO):**

After the completion of this course the student will be able to:

| <b>CO</b> | <b>Course Outcomes</b>                                                                                                                        | <b>LO</b> |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| CO1       | Determine surface tension and inter facial tension by weight drop method, measurements and dimension of materials                             | LO4       |
| CO2       | Analyze the basic operations and the characteristics of Zener diode in various configuration                                                  | LO1       |
| CO3       | Demonstrate and apply the concept of optical theory of lenses to find the focal Length, radius of curvature of long focus convex lens         | LO4       |
| CO4       | Determine the frequency of AC mains using Sono meter and find wave length, period, amplitude using Melde's method                             | LO6       |
| CO5       | Estimate the moduli of elasticity, rigidity modulus for different materials using non uniform bending pin and micro scope and torsion method. | LO1       |
| CO6       | Determine refractive index of given prism by spectrometer and measure g and K using compound pendulum.                                        | LO4       |

### COURSE ARTICULATION MATRIX (CAM) for defined COs

| CO  | Program Outcomes |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|-----|------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|     | 1                | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| CO1 | H                |   |   | H | M | H |   | H | L | M  |    |    |    |    | L  |
| CO2 |                  |   | L | M | H | L |   |   |   | L  | H  |    |    |    |    |
| CO3 | H                |   |   | L | M | H |   | L | L |    | M  |    |    |    |    |
| CO4 |                  |   | L | H | L | M | L |   |   | L  | M  |    |    |    |    |
| CO5 | M                |   |   | M | M | L |   | M | M | M  | H  |    |    |    |    |
| CO6 | H                |   | L | H | H | M |   | M | L | L  | M  |    |    |    |    |

L – Low

M- Medium

H-High

|                   |                                              |                   |
|-------------------|----------------------------------------------|-------------------|
| <b>First Year</b> | <b>INTERDISCIPLINARY COURSE 1</b>            | <b>Semester I</b> |
| <b>Code:</b>      | <b>INTRODUCTION TO AVIATION<br/>(Theory)</b> | <b>Credits: 2</b> |

### **COURSEOBJECTIVE:**

To understand the aviation industry, including its structure, operations, and fundamental concepts related to air transport and aircraft.

### **UNIT – I: Basics of Aviation & Aircraft Knowledge**

Introduction to Aviation Industry, History of Aviation (World & India), Types of Aircraft: Fixed wing Rotary wing, Basic Parts of Aircraft: Fuselage, Wings, Empennage, Landing gear, Aircraft systems overview, Role of aviation authorities (DGCA, ICAO basics)

### **UNIT – II: Air Regulations & Aviation Safety**

Introduction to Air Regulations, ICAO & DGCA rules (basic understanding) Rules of the Air, Aviation Safety & Security, Airport safety procedures, Emergency procedures: Fire safety, Evacuation, Dangerous goods awareness, Human factors in aviation

### **UNIT – III: Theory of Flight**

Four forces of flight: Lift, Weight, Thrust, Drag, Principles of lift generation (Bernoulli's theorem), Drag types (parasite, induced), Glide ratio, Steady and unsteady flight, Theory of turn, Load factor and stall, Flight envelope and limitations, Lift augmentation (flaps, slats)

### **UNIT – IV: AIR NAVIGATION**

Time – Midnight – Time Zones – Daylight Saving Time – Indian Standard Time, Understanding the Earth, Distance and Speed, Unit Conversions

### **UNIT – V: Aviation Meteorology (Basics)**

Atmosphere structure, Temperature, pressure, and density, Wind: Types and measurement, Clouds: Types and formation Visibility and fog, Thunderstorms and hazards, Air masses and fronts, Basic weather charts and METAR introduction

### **UNIT – VI CURRENT CONTOURS (Self – directed learning activities for Continuous Internal Assessment Only):**

i) Prepare a comparison chart Fixed-wing vs Rotary-wing aircraft. ii) Write about human errors in aviation and their impact. iii) Explain steady vs unsteady flight with diagrams. iv) Convert between IST, GMT, Local Time. v) Draw and label layers of the atmosphere.

**TOPICS FOR SELF STUDY:**

| <b>Sl. No</b> | <b>Topics</b>    | <b>Web Links</b>                                                                                                                                                                                                                        |
|---------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1             | Basics of Flight | <a href="https://www.aopa.org/training-and-safety/online-learning/safety-spotlights/pinch-hitter/the-basics-of-flight">https://www.aopa.org/training-and-safety/online-learning/safety-spotlights/pinch-hitter/the-basics-of-flight</a> |
| 2             | Air Regulation   | <a href="https://iclg.com/practice-areas/aviation-laws-and-regulations/india">https://iclg.com/practice-areas/aviation-laws-and-regulations/india</a>                                                                                   |
| 3             | Air Navigation   | <a href="https://www.faa.gov/air_traffic/publications/atpubs/aim_html/chap1_section_1.html">https://www.faa.gov/air_traffic/publications/atpubs/aim_html/chap1_section_1.html</a>                                                       |

**REFERENCEBOOKS:**

- 1) R.K. Bali- Air Regulation
- 2) Oxford – Navigation
- 3) Oxford–Aircraft General Knowledge

**COURSEOUTCOMES:**

On completion of this course, the students will be able to:

| <b>CO</b> | <b>Course Outcomes</b>                                                                                                                             | <b>LO</b> |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| CO1       | Understanding Basics of Aviation & Aircraft Knowledge                                                                                              | LO1       |
| CO2       | Understand the basic of Air Regulations & Aviation Safety                                                                                          | LO3       |
| CO3       | Demonstrate knowledge of Lift, Weight, Thrust, Drag, Principles of flight.                                                                         | LO1       |
| CO4       | To Understand the basic concept of Air navigation                                                                                                  | LO4       |
| CO5       | Demonstrate knowledge Atmosphere structure, Temperature, pressure, and density knowledge, Wind: Types and measurement, Clouds: Types and formation | LO6       |
| CO6       | Demonstrate Visibility and fog, Thunderstorms and hazards, Air masses and fronts, Basic weather charts and METAR introduction                      | LO3       |

**SPECIFIC LEARNING OUTCOMES(SLO)**

| <b>UNIT</b> | <b>COURSECONTENTS</b>                              | <b>LEARNINGOUTCOMES</b>                            | <b>TAXONOMY LEVEL</b> |
|-------------|----------------------------------------------------|----------------------------------------------------|-----------------------|
| <b>I</b>    | <b>Basics of Aviation &amp; Aircraft Knowledge</b> |                                                    |                       |
| 1.1         | Introduction to Aviation Industry                  | Understand basic aviation terminology and concepts | K1                    |
| 1.2         | History of Aviation                                | Describe key milestones in                         | K3                    |

|     |                                                                   |                                                                                                                                                |    |
|-----|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|----|
|     | (World & India)                                                   | global aviation development                                                                                                                    |    |
| 1.3 | Types of Aircraft: Fixed wing Rotary wing                         | Differentiate between fixed-wing and rotary-wing aircraft Identify examples and uses of each aircraft type                                     | K2 |
| 1.4 | Basic Parts of Aircraft: Fuselage, Wings, Empennage, Landing gear | Identify major aircraft components: fuselage, wings, empennage, landing gear Explain the function of each part                                 | K1 |
| 1.5 | Aircraft systems overview                                         | Understand basic aircraft systems (engine, fuel, electrical, hydraulic) Explain how these systems support aircraft operations                  | K3 |
| 1.6 | Role of aviation authorities (DGCA, ICAO basics)                  | Understand the role of regulatory bodies in aviation safety Identify functions of DGCA and ICAO Explain the importance of aviation regulations | K3 |

| <b>II</b> | <b>Air Regulations &amp; Aviation Safety</b>                            |                                                                                                            |    |
|-----------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----|
| 2.1       | Introduction to Air Regulations                                         | Understand the purpose of aviation laws and regulations Identify key regulatory principles                 | K3 |
| 2.2       | ICAO & DGCA rules (basic understanding)<br>Rules of the Air             | Explain basic ICAO standards and DGCA regulations Understand fundamental rules governing aircraft movement | K3 |
| 2.3       | Aviation Safety & Security                                              | Distinguish between safety and security in aviation Identify common safety and security measures           | K2 |
| 2.4       | Airport safety procedures Emergency procedures: Fire safety, Evacuation | Understand airport safety practices Demonstrate knowledge of fire safety and evacuation procedures         | K3 |
| 2.5       | Dangerous goods awareness                                               | Identify hazardous materials in aviation Understand handling and labelling of dangerous goods              | K2 |
| 2.6       | Human factors in aviation                                               | Understand the role of human performance in safety Identify common human errors and their impact           | K2 |



| <b>III Theory of Flight</b> |                                                     |                                                                                                       |    |
|-----------------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------|----|
| 3.1.0                       | Four forces of flight: Lift, Weight, Thrust, Drag   | Explain lift, weight, thrust, and drag Understand how these forces interact during flight             | K2 |
| 3.1.1                       | Principles of lift generation (Bernoulli's theorem) | Explain how lift is generated using Bernoulli's principle Relate airflow to pressure differences      | K3 |
| 3.1.2                       | Drag types (parasite, induced)                      | Differentiate between parasite drag and induced drag Understand their effects on aircraft performance | K3 |
| 3.1.3                       | Glide ratio                                         | Define glide ratio Calculate and interpret glide performance                                          | K4 |
| 3.1.4                       | Steady and unsteady flight                          | Differentiate between steady and unsteady flight conditions                                           | K2 |
| 3.1.5                       | Theory of turn                                      | Explain how an aircraft turns Understand banking and centripetal force                                | K2 |
| 3.1.6                       | Load factor and stall                               | Define load factor Explain stall conditions and their causes                                          | K3 |
| 3.1.7                       | Flight envelope and limitations                     | Understand aircraft operational limits Interpret flight envelope diagrams                             | K3 |
| 3.1.8                       | Lift augmentation (flaps, slats)                    | Explain how flaps and slats increase lift Understand their role during take-off and landing           | K4 |
| <b>IV Air Navigation</b>    |                                                     |                                                                                                       |    |
| 4.1.0                       | Time – Midnight – Time Zones – Daylight Saving Tim  | Understand aviation time concepts Convert between time zones                                          | K3 |
| 4.1.1                       | Indian Standard Time                                | Explain IST and its application in aviation                                                           | K4 |
| 4.1.2                       | Understanding The Earth                             | Understand Earth's shape, latitude, and longitude Interpret basic geographic concepts                 | K4 |
| 4.1.3                       | Distance and Speed, Unit Conversions                | Calculate speed, distance, and time, unit conversions relevant to aviation                            | K4 |

| <b>V</b> | <b>Aviation Meteorology (Basics)</b> |                                                                                |    |
|----------|--------------------------------------|--------------------------------------------------------------------------------|----|
| 5.1.0    | Atmosphere structure                 | Identify layers of the atmosphere Understand their characteristics             | K2 |
| 5.1.1    | , Temperature, pressure, and density | Explain how these factors affect flight Understand their relationship          | K2 |
| 5.1.2    | Wind: Types and measurement          | Identify different types of winds Understand wind measurement techniques       | K2 |
| 5.1.3    | Clouds: Types and formation          | Identify cloud types Understand cloud formation processes                      | K1 |
| 5.1.4    | Visibility and fog                   | Explain causes of reduced visibility Identify types of fog                     | K2 |
| 5.1.5    | Thunderstorms and hazards            | Understand thunderstorm formation Identify associated aviation hazards         | K1 |
| 5.1.6    | Air masses and fronts                | Differentiate between air masses and fronts Understand their impact on weather |    |
| 5.1.7    | Basic weather charts                 | Interpret simple aviation weather charts                                       |    |
| 5.1.8    | METAR introduction                   | Decode basic METAR reports Understand aviation weather reporting format        |    |

### **COURSE ARTICULATION MATRIX (CAM) for defined COs**

| <b>CO</b> | <b>Program Outcomes</b> |   |   |   |   |   |   |   |   |    |    |    |    |    |    |
|-----------|-------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
|           | 1                       | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| CO1       | H                       | M |   | M | H | M |   |   | M | M  | L  | M  |    |    |    |
| CO2       | M                       |   | L | H |   |   | L | H | L | M  | H  |    |    | M  | L  |
| CO3       | H                       | L | M | M | L |   |   |   | H | H  | L  | L  |    |    |    |
| CO4       | H                       |   | L |   | M | L |   | M |   | M  |    |    | M  |    |    |
| CO5       | H                       |   | H | M |   | M |   |   | H | M  | L  |    |    |    | M  |
| CO6       | H                       | M | M | L | L | H | L | H | L | H  | M  | M  |    |    |    |

L – Low

M- Medium

H-High