# Savitribai Phule Pune University

**Four Year B.Sc. Degree Program in Aviation**
**(Faculty of Science & Technology)**
**As per NEP 2020**

## Second Year B.Sc. (Aviation)

**To be implemented from Academic Year 2025-2026**

**Course Structure:**

## B.Sc. (Aviation) Semester-III

| Course Code | Title of Course | Credits | | Lectures / Week | | Evaluation | | |
|---|---|---|---|---|---|---|---|---|
| | | Th. | Pr. | Th. | Pr. | CA | UE | Total |
| VSC-201-BAV-T | Aircraft Structure | 4 | | 4 | | 30 | 70 | 100 |
| VSC-202-BAV-T | Thermodynamics | 2 | | 4 | | 15 | 35 | 50 |
| BAV-201-P | Industrial Visit | | 2 | | 2 | 50 | 00 | 50 |
| BAV-202-T | Aircraft Hardware | 2 | | 2 | | 15 | 35 | 50 |
| OE-201-BAV-T | Fundamentals of Computer & Programming Languages | 2 | | 2 | | 15 | 35 | 50 |
| IKS-201-BAV-T | Human behaviour | 2 | | 2 | | 15 | 35 | 50 |
| BAV-203-T | Language Proficiency | 2 | | 2 | | 15 | 35 | 50 |
| BAV-204-P | Computer Programming Lab | | 2 | | 2 | 15 | 35 | 50 |
| BAV-205-P | Aircraft Structure Lab | | 2 | | 4 | 15 | 35 | 50 |
| BAV-206-P | Aircraft Hardware Lab | | 2 | | 4 | 15 | 35 | 50 |
| | **Total=** | **14** | **8** | **16** | **12** | **200** | **350** | **550** |

## B.Sc. (Aviation) Semester-IV

| Course Code | Title of Course | Credits | | Lectures / Week | | Evaluation | | |
|---|---|---|---|---|---|---|---|---|
| | | Th. | Pr. | Th. | Pr. | CA | UE | Total |
| BAV-251-T | Communication and Navigation System | 4 | | 4 | | 30 | 70 | 100 |
| BAV-252-T | Digital Electronics | 2 | | 2 | | 15 | 35 | 50 |
| BAV-253-P | Industrial Visit | | 2 | | 2 | 50 | 00 | 50 |
| BAV-254-T | Propulsion-I | 2 | | 4 | | 15 | 35 | 50 |
| OE-251-BAV-T | Professional Communication Skill | 2 | | 2 | | 15 | 35 | 50 |
| AEC-251-BAV-T | Basic Radar & Radio System | 2 | | 2 | | 15 | 35 | 50 |
| BAV-255-P | Digital Electronics Lab | | 2 | | 2 | 15 | 35 | 50 |
| BAV-256-T | Soft Skills and Organisational Behaviour | 2 | | 2 | | 15 | 35 | 50 |
| BAV-257-P | Communication & Navigation Lab | | 2 | | 4 | 15 | 35 | 50 |
| BAV-258-P | Propulsion-I Lab | | 2 | | 4 | 15 | 35 | 50 |
| | **Total=** | **14** | **8** | **16** | **12** | **200** | **350** | **550** |

**Semester-III**

**Course Code: VSC-201-BAV-T** **Course Title: Aircraft Structure**

**Total Contact Hours: 50 hrs** **Total Credits: 04** **Total Marks: 100**

**Teaching Scheme: Theory – 04 Lectures/ Week**

**Course Objectives:**

1. To study aircraft flight controls
2. To study the various concepts of aircraft structure
3. To study the Various airframe structural parts
4. To study bonding & lightning protection given in aircraft

**Learning Outcomes:**

After learning this course, the students will be able to:

1. Understand loads and stresses acting on the structural parts of aircraft
2. Compression, Tension, shear forces and stresses. Bending, Torsional forces and stresses
3. Learn about the construction of Airframe Structures
4. Identify various aircraft structural parts
5. Safe and fail safe philosophy of aircraft structures

| Sl. No. | Description | Allotted hours |
|---|---|---|
| **Unit-I: Aeroplane Flight Controls** | | |
| 1. | • Operation and effect of:<br>➢ Roll control: ailerons and spoilers,<br>➢ Pitch control: elevators, stabilators, variable incidence stabilisers and canards,<br>➢ Yaw control, rudder limiters;<br>• Control using elevons, ruddervators;<br>• High lift devices: slots, slats, flaps;<br>• Drag inducing devices: spoilers, lift dumpers, speed brakes;<br>• Operation and effect of trim tabs, servo tabs, control surface bias; | 20 hrs |
| **Unit-II: High Speed Flight** | | |
| 2. | • Speed of sound, subsonic flight, transonic flight,<br>• supersonic flight, Mach number, critical Mach number, | 10 hrs |
| **Unit-III: Airframe Structures** | | |
| 3. | • Fundamentals of structural systems;<br>• Zonal and station identification systems;<br>• Electrical bonding;<br>• Lightning strike protection provision.<br>• Primary controls: aileron, elevator, rudder, spoiler;<br>• Trim control;<br>• System operation: manual, hydraulic, pneumatic;<br>• Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks.<br>• Stall protection systems; | 20 hrs |

**Reference Books:**

| Sl. No. | Author / Publisher | Nomenclature of Book |
|---|---|---|
| 1. | AC Kermode | Mechanics of Flight |
| 2. | Aircraft Tech Book Co. | EASA Module-11A: Turbine Aero Plane Structures & Systems |
| 3. | Aircraft Tech Book Co. | EASA Module-13: Aircraft Aerodynamics Structures & Systems |
| 4. | Clancey | Aerodynamics |
| 5. | FAA | Aviation Maintenance Technician Hand Book- General |
| 6. | FAA H- 8083-31 | Aviation Maintenance Technician Handbook-Airframe (Vol-I) |
| 7. | FAA H- 8083-31 | Aviation Maintenance Technician Handbook-Airframe (Vol-II) |

**Semester-III**

**Course Code: VSC-202-BAV-T** **Course Title: Thermodynamics**

**Total Contact Hours: 50 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Theory – 04 Lectures/ Week**

**Course Objectives:**

1. To acquire the basic ideas and understanding of Concepts and First Law of Thermodynamics.
2. To understand the concept of Second Law and Entropy.
3. To acquire the basic ideas and understanding of definitions and Laws pertaining to Ideal Gas Properties and process.
4. To acquire the Knowledge and understanding of Gas Power Cycles.

**Learning Outcomes:**

Students who successfully complete this course will be able to:

1. Demonstrate knowledge on Fundamentals concepts of thermodynamic.
2. Apply the First Law of Thermodynamics to Closed and Open system with steady flow.
3. Apply the Second Law and Entropy to various thermodynamics systems.
4. Evaluate heat and Work transfer for Ideal Gas Processes.

**Unit-I: The first Law of thermodynamics: (16 hrs)**

a. Basic Ideas and definitions: Thermodynamic system, Boundary, Types of systems, State of systems, Properties of system
b. Classification of properties, Thermodynamic Process & cycle, Work transfer and Heat Transfer
c. The first Law of thermodynamics: Application of First law to Closed system, Application of First law to Open system with Steady Flow, S.F.E.E., Application of SFEE, PPM-I
d. Concept of steady flow, unsteady flow, control volume & control mass.

**Unit-II: The second Law of Entropy: (16 hrs)**

a. Limitations of First Law, H.E., H.P. and refrigerator
b. Kelvin Plank and Clausis Statements and their equivalence
c. Reversible process, cycle, Carnot theorem for Heat Engine
d. Efficiency of reversible cycle, PMM-II
e. Introduction to Entropy, Enthalpy, Carnot Cycle (T-s Diagram).

**Unit-III: Ideal Gas Properties and process (18 hrs)**

a. Definition, Laws pertaining to Ideal Gas, Specific Heats
b. Various process (Const P/T/V/H and Polytrophic, p-v diagrams)
c. Evaluation of Work transfer, Heat transfer, P-v diagram of Carnot Cycle with Ideal Gas
d. Introduction to Gas Power Cycle. Working & regeneration of Brayton cycle.

**Reference Books:**

| Sl. No. | Author / Publisher | Nomenclature of Book |
|---|---|---|
| 1. | Y. Cengel & Boles, Tata Mc Graw- Hill Publications | Thermodynamics- An Engineering Approach |
| 2. | P. K. Nag, Tata Mc Graw- Hill Publications | Engineering Thermodynamics |
| 3. | Mahesh M. Rathore, Tata Mc Graw- Hill Publications | Thermal Engineering |

**Semester-III**

**Course Code: BAV-201-P** **Course Title: Industrial Visit**

**Total Contact Hours: 30 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Theory – 02 Lectures/ Week**

**Learning Outcomes:**

After completion of technical visit, the students will be able to:

1. Understand report writing & presentation skills.
2. Understand the overall operation of the organization.
3. Understand the working culture of aviation establishment.

1. **Technical visit to any one of the nearby establishment and submit individual report:**
   a) Visit to CAMO/ AMO or any other aviation establishment.
   b) Visit to manufacturing industries.
   c) Visit to any aerodrome/ Flying Training Organization.

2. **Students have to give a presentation on the technical visit.**

**Semester-III**

**Course Code: BAV-202-T** **Course Title: Aircraft Hardware**

**Total Contact Hours: 40 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Theory – 02 Lectures/ Week**

**Course Objectives:**

1. To study aircraft fasteners
2. To study aircraft plumbing
3. To study aircraft mechanism

**Learning Outcomes:**

Students who successfully complete this course will be able to:

1. Identify aircraft fasteners
2. Identification of aircraft plumbing
3. Understand aircraft mechanism

| Sl. No. | Description | Allotted hours |
|---|---|---|
| **Unit-I: Aircraft Fasteners** | | |
| 1. | **Screw Threads**<br>• Screw nomenclature;<br>• Thread forms, dimensions and tolerances for standard threads used in aircraft;<br>• Measuring screw threads; | 20 hrs |
| 2. | **Bolts, Studs and Screws**<br>• Bolt types: specification, identification and marking of aircraft bolts, international standards;<br>• Nuts: self-locking, anchor, standard types;<br>• Machine screws: aircraft specifications;<br>• Studs: types and uses, insertion and removal;<br>• Self-tapping screws, dowels. | |
| 3. | **Locking Devices**<br>• Tab and spring washers, locking plates, split pins, palnuts, wire locking, quick release fasteners, keys, circlips, cotter pins. | |
| 4. | **Aircraft Rivets**<br>• Types of solid and blind rivets: specifications and identification, heat treatment. | |
| **Unit-II: Aircraft Plumbing** | | |
| 5. | **Pipes and Unions**<br>• Identification of, and types of rigid and flexible pipes and their connectors used in aircraft;<br>• Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes. | 10 hrs |

| Sl. No. | Description | Allotted hours |
|---|---|---|
| **Unit-III: Aircraft Mechanism** | | |
| 6. | **Springs**<br>• Types of springs, materials, characteristics and applications. | 10 hrs |
| 7. | **Bearings**<br>• Purpose of bearings, loads, material, construction;<br>• Types of bearings and their application. | |
| 8. | **Transmissions**<br>• Gear types and their application;<br>• Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns;<br>• Belts and pulleys, chains and sprockets. | |

**Reference Books:**

| Sl. No. | Author / Publisher | Nomenclature of Book |
|---|---|---|
| 1. | Aircraft Tech Book Co | EASA Module-06 Hardware and Materials |
| 2. | FAA H 8083-30 | Aviation Maintenance Technician Handbook-General |
| 3. | George F. Titterton | Aircraft Materials and Processes |
| 4. | J. A Enderson & Tatro | Shop Theory |

**Semester-III**

**Course Code: OE-201-BAV-T Course Title: Fundamentals of Computer & Programming Languages**

**Total Contact Hours: 30 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Theory – 02 Lectures/ Week**

**Course Objectives:**

1. To acquire the fundamental principles, concepts and constructs of computer.
2. To build the programming skill using 'C.
3. To study & understand the basic computer terminology of Aircraft.

**Learning Outcomes:**

Students who successfully complete this course will be able to:

1. To acquire concept of computer fundamentals.
2. To acquire knowledge of microprocessor.
3. Apply basic 'C' language constructs for programme development.

**Unit-I: Basic Computer Structure** **(10 hrs)**

a. Introduction, characteristics of computers, Basic computer structure- ALU, CU & CPU.
b. Applications of Computers.
c. Computer terminology (including bit, byte, software, hardware, CPU, IC, and various memory devices such as RAM, ROM, PROM);
d. Aircraft Computer technology- FMC, CDU, DTS.

**Unit-II: Basics of Microprocessor** **(10 hrs)**

a. Layout & block diagram of the major components in a microcomputer including their associated bus systems (data bus, address buss & control bus).
b. Working of microprocessor- fetch, decode, execute.
c. Instructions and its types of 8085 microprocessor.
d. Register array- PC, SP, Flag & general purpose register.

**Unit-III: Programming Language 'C'** **(10 hrs)**

a. Feature of C, Basic concepts, structure of a C program, declarations, variables, data types & operators.
b. Operators, Input and Output functions- Scanf and printf. Decision control structure: if else, nested if else, cascaded if else and switch statement.

**Reference Books:**

| Sl. No. | Author / Publisher | Nomenclature of Book |
|---|---|---|
| 1. | Malvino Leech | Digital Principles and Applications |
| 2. | Nasib Sing Gill, Khanna Publishers | Computing Fundamentals and Programming in C |

**Semester-III**

**Course Code: IKS-201-BAV-T** **Course Title: Human Behaviour**

**Total Contact Hours: 30 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Theory – 02 Lectures/ Week**

**Course Objectives:**

1. To understand the concepts of human behaviour and error.
2. To study human performance criteria and limitations
3. To understand various factors affecting human performance and identify the requirement in Aviation
4. To know the hazards in the workplace and identify the causes and take re medical measures.

**Learning Outcomes:**

Students will be able to:

1. Understand and analyse the causes of accidents and incidents attributable to human factor.
2. Learn about various factors affecting human performance.
3. Learn about the side effects of Alcohol, wrong medication, drug abuse, substance abuse

| Sl. No. | Description | Allotted hours |
|---|---|---|
| **Unit-I: Human Factors & Errors** | | |
| 1. | **General**<br>• The need to take human factors into account;<br>• Incidents attributable to human factors/human error;<br>• 'Murphy's' law. | 10 hrs |
| 2. | **Human Performance and Limitations**<br>• Vision;<br>• Hearing;<br>• Information processing;<br>• Attention and perception;<br>• Memory;<br>• Claustrophobia and physical access. | |
| **Unit-II: Factors Affecting Performance** | | |
| 3. | **Social Psychology**<br>• Responsibility: individual and group;<br>• Motivation and de-motivation;<br>• Peer pressure;<br>• 'Culture' issues;<br>• Team working;<br>• Management, supervision and leadership | 10 hrs |
| 4. | **Factors Affecting Performance**<br>• Fitness/ health;<br>• Stress: domestic and work related;<br>• Time pressure and deadlines; | |

| Sl. No. | Description | Allotted hours |
|---|---|---|
| | • Workload: overload and underload;<br>• Sleep and fatigue, shiftwork;<br>• Alcohol, medication, drug abuse. | |
| **Unit-III: Human Error, Hazards in Workplace & Aviation Eco System** | | |
| 5. | **Human Error**<br>• Error models and theories;<br>• Types of error in maintenance tasks;<br>• Implications of errors (i.e accidents)<br>• Avoiding and managing errors. | 10 hrs |
| 6. | **Hazards in the Workplace**<br>• Recognizing and avoiding hazards;<br>• Dealing with emergencies. | |

**Reference Books:**

| Sl. No. | Author / Publisher | Nomenclature of Book |
|---|---|---|
| 1. | Aircraft Tech Book Co | EASA Module-09 Human Factors |
| 2. | CAA | CAP 715 - An Introduction to Aircraft Maintenance Engineering Human Factors for CAR 66 |
| 3. | CAA | CAP 716 - Aviation Maintenance Human Factors (EASA Part-145) |
| 4. | CAA | CAP 718 - Human Factors in Aircraft Maintenance and Inspection |
| 5. | ICAO DOC 9683 | Human Factors Training Manual |

**Semester-III**

**Course Code: BAV-203-T** **Course Title: Language Proficiency**

**Total Contact Hours: 30 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Theory-02 Lectures/ Week**

**Objectives:**

1. To encourage the students to speak English.
2. To enable students to use English in day-to-day communication.
3. To expose them to light prose and poetry.
4. To prepare them for competitive exams.
5. To develop their sensibility towards correctness and appropriateness of language.
6. To make them aware of the various type of fiction.

**Unit-I: Grammar and vocabulary** **(8 hrs)**

- Parts of speech
- Tenses-
  a. Present tense- Simple, Continuous, Perfect, Perfect continuous
  b. Past tense- Simple, Continuous, Perfect, Perfect continuous tense
  c. Future tense- Simple, Continuous, Perfect, Perfect continuous tense
- Word formation process- Affixation, Borrowing, Coinage, and Blending
- Sentences and its types
- Subject- verb- concord

**Unit-II: Writing skill** **(6 hrs)**

- Writing a letter
  - Application letter
  - Complaint letter
  - Enquiry letter
- Writing a Resume

**Unit-III: Communication skill** **(6 hrs)**

- Introduction to communication skill and its types,
- Importance and principles of effective communication.
- Important aspects and ways of self-introduction.

**Unit-IV: Poetry (Any one)** **(3 hrs)**

- The felling of the Banyan tree- Dilip Chitre
- The Indian Women- Shiv K Kumar
- Abou Ben Adhem- James Leigh Hunt

**Unit-V: Prose (Any One)** **(3 hrs)**

- The gift of the Magi- O' Henry
- The Bet- Anton Checkhov

**Unit-VI: Short stories (Any One)** **(4 hrs)**

- The Axe- R.K. Narayan
- Luck- Mark Jwain

**Reference Books:**

| Sl. No. | Author / Publisher | Nomenclature of Book |
|---|---|---|
| 1. | S.K. Tarafder, A P H Publishing corporation | How to write better letter |
| 2. | Krishna swami | Modern English – A book of grammar, usage & composition |
| 3. | Dover Thrift Editions, O'. Henry. ies., Macmillan India Ltd | The Gift of the Magi and Other short stor |
| 4. | Jaico Publishing House | Best short stories of Anton Chekhov |
| 5. | Keval J. Kumar | Mass Communication In India |
| 6. | Hewings, M.1999, Cambridge University press | Advanced English Grammar |
| 7. | Mark Twain, Cosimo Classics | Marry Tales |
| 8. | R K Narayan, Indian Thought Publication | Malgudi Days |

**Semester-III**

**Course Code: BAV-204-P** **Course Title: Computer Programming Lab**

**Total Contact Hours: 40 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Practical – 02/ Week**

**Learning Outcomes:**

1. Student will develop a vocabulary of key terms related to the computer.
2. Student will be able to demonstrate mouse and keyboard functions.
3. Student will be able to demonstrate window and menu commands and how they are used.
4. Student will be able to compose, format and edit a word document.

**Students have to perform minimum 06 Practical listed below:**

| Sl. No. | Basic Practical Tasks |
|---|---|
| 1. | To Identify various Input/ output devices, connections and peripherals of computer system |
| 2. | To Create, edit and save document: apply formatting features on the text-line, paragraph |
| 3. | To Use bullets, numbering, page formatting |
| 4. | To Insert and edit images and shapes, sizing, cropping, color background, group/ ungroup |
| 5. | To Insert and apply various table formatting features on it. |
| 6. | To Apply page layout features<br>a. Themes, page background, paragraph, page setup<br>b. Create multicolumn page<br>c. Use different options to print the documents |
| 7. | Create slide presentation:<br>a. Apply design themes to the given presentation<br>b. Add new slides and insert pictures/images, shapes |
| 8. | Create slide presentation<br>a. Add tables and charts in the slides.<br>b. Run slide presentation in different modes<br>c. Print slide presentation as handouts |
| 9. | Apply animation effects to the text and slides. |
| 10. | Write a simple program in C. |

**Semester-III**

**Course Code: BAV-205-P** **Course Title: Aircraft Structure Lab**

**Total Contact Hours: 40 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Practical – 04/ Week**

**Learning Outcomes:**

After successful completion, the students will be able to:

1. Carry out visual inspection of structural members.
2. Learns about the basic aircraft structures.
3. Carry out inspection by removing inspection panels of different structures.
4. Carry out inspection of aircraft seats & seat belts.
5. Learns the operational check of aircraft structures.

**Students have to perform minimum 06 Practical listed below:**

| Sl. No. | Basic Practical Tasks |
|---|---|
| 1. | Identification of flight control surfaces of aircraft. Check for freedom of movement of all flight controls |
| 2. | Control columns (including control wheels and boots) for condition, proper operation, and clearances |
| 3. | Crew seats and seat belts for operation, security of mounting, and general condition |
| 4. | Associated with flap operational check. Inspect flap upper and lower surfaces for skin cracks, loose rivets, and other damage |
| 5. | Associated with spoiler & aileron operational check |
| 6. | Check exterior of aircraft, including fillets and fairings, for security and general condition. Inspect lower surface of fuselage for oil or fuel leakage |
| 7. | Check radome for general condition, finish, and security. Check upper and lower entry doors |
| 8. | Inspect aileron trim tab for general condition and security. Check static wicks for security and condition |
| 9. | Remove access panels of horizontal stabilizer and wings and inspect. Check all aircraft panels for their fitment, safety and security of attachment |

**Semester-III**

**Course Code: BAV-206-P** **Course Title: Aircraft Hardware Lab**

**Total Contact Hours: 40 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Practical – 04/ Week**

**Learning Outcomes:**

After learning this course, students will be able to:

1. Identify wide range of fasteners & their application.
2. Identify different types of rivets.
3. Identify tube fittings & their application.
4. Identify different types of bearings & gears.
5. Perform corrosion inspection.

**Students have to perform minimum 06 Practical listed below:**

| Sl. No. | Basic Practical Tasks |
|---|---|
| 1. | Identify a wide range of fasteners |
| 2. | Removal and installation of various nut, bolt & washers |
| 3. | Removal and installation of various head of screw by using various screw drivers. Perform the measurement of screw thread |
| 4. | Removal and installation of circlips, use of cotter pins |
| 5. | Different type of rivets and their uses |
| 6. | Perform of the inspection of Riveted Joints |
| 7. | Identification of different type of tube fittings. Identification by reading on aircraft tube and flexible hoses |
| 8. | Identification of different types of gears |
| 9. | Perform the inspection of control cables for corrosion. Conversant with pulleys and its uses |
| 10. | Identification of different types of electrical cables and connectors |

**Semester-IV**

**Course Code: BAV-251-T** **Course Title: Communication and Navigation System**

**Total Contact Hours: 50 hrs** **Total Credits: 04** **Total Marks: 100**

**Teaching Scheme: Theory – 04 Lectures/ Week**

**Objectives:**

1. To get familiar with basics of V.H.F. Communications, H.F. Communications
2. To understand basics of V.H.F. omnidirectional range
3. To familiarize with ELT & CVR.

**Learning outcomes:**

After learning this course, students will be able to:

1. Understand V.H.F and H.F communication.
2. Understand the operation of ELT & CVR.
3. Understand automatic direction finder & instrument landing system.

| Sl. No. | Description | Allotted hours |
|---|---|---|
| **Unit-I: Communication Systems** | | |
| 1. | Fundamentals of system lay-outs and operation of:<br>➢ Very High Frequency (VHF) communication<br>➢ High Frequency (HF) communication | 20 hrs |
| **Unit-II: ELT, CVR & VOR** | | |
| 2. | Fundamentals of system lay-outs and operation of:<br>➢ Emergency Locator Transmitters<br>➢ Cockpit Voice Recorder<br>➢ Very High Frequency unidirectional range (VOR) | 15 hrs |
| **Unit-III: Navigation Systems** | | |
| 3. | Fundamentals of system lay-outs and operation of:<br>➢ Automatic Direction Finding (ADF)<br>➢ Instrument Landing System (ILS) | 15 hrs |

**Reference Books:**

| Sl. No. | Author / Publisher | Nomenclature of Book |
|---|---|---|
| 1. | Aircraft Tech Book Co. | EASA Module-11A: Turbine Aeroplane Aerodynamics, Structures & Systems |
| 2. | Aircraft Tech Book Co. | EASA Module-13: Aircraft Aerodynamics, Structures & Systems |
| 3. | FAA H- 8083-31 | Aviation Maintenance Technician Hand Book- Airframe (Vol-II) |
| 4. | George Kennedy | Electronic Communication System |
| 5. | J. Powell | Aircraft Radio System |

**Semester-IV**

**Course Code: BAV-252-T** **Course Title: Digital Electronics**

**Total Contact Hours: 50 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Theory – 02 Lectures/ Week**

**Course Objectives:**

1. To understand number representation in digital electronics circuit.
2. To acquire basic knowledge of digital logic levels.
3. To study fiber optics used in digital circuits.

**Learning Outcomes:**

After learning this course, the students will be able to:

1. Understand the common form of number representation and to convert data in one number system to another.
2. Contrast and compare digital representation of information with the Analog representation.
3. Simplify digital circuits.

| Sl. No. | Description | Allotted hours |
|---|---|---|
| **Unit-I: Number Systems and Logic Circuits** | | |
| 1. | **Electronic Instrument Systems**<br>• Typical systems arrangements and cockpit layout of electronic instrument systems. | 15 hrs |
| 2. | **Numbering Systems**<br>• Decimal & Binary,<br>• Octal and hexadecimal;<br>• Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa. | |
| 3. | **Data Conversion**<br>• Analogue Data,<br>• Digital Data;<br>• Operation and application of analogue to digital, and digital to analogue converters, Inputs and outputs, limitations of various types. | |
| 4. | **Logic Circuits**<br>• Identification of common logic gate symbols, tables and equivalent circuits;<br>• Logic gates, their Boolean expressions and truth tables: AND, OR, EXOR, NOT, NOR, NAND.<br>• Representation of other gates in terms of Universal gates.<br>• Applications used for aircraft systems, schematic diagrams. | |

| Sl. No. | Description | Allotted hours |
|---|---|---|
| **Unit-II: Fiber Optics & ESDs** | | |
| 5. | **Fibre Optics**<br>• Advantages and disadvantages of fibre optic data transmission over electrical wire propagation;<br>• Fibre optic data bus;<br>• Fibre optic related terms; Terminations; Couplers, control terminals, remote terminals;<br>• Application of fibre optics in aircraft systems. | 15 hrs |
| 6. | **Electronic Displays**<br>• Principles of operation of common types of displays used in modern aircraft, including Cathode Ray Tubes, Light Emitting Diodes and Liquid Crystal Display. | |
| 7. | **Electrostatic Sensitive Devices**<br>• Special handling of components sensitive to electrostatic discharges;<br>• Awareness of risks and possible damage, component and personnel anti-static protection devices. | |
| **Unit-III: Electronic/ Digital Aircraft Systems** | | |
| 8. | General arrangement of typical electronic/digital aircraft systems and associated BITE (Built In Test Equipment) testing such as:<br>• ACARS-ARINC Communication and Addressing and Reporting System<br>• EICAS-Engine Indication and Crew Alerting System<br>• FBW-Fly by Wire<br>• FMS-Flight Management System<br>• IRS-Inertial reference system<br>• ECAM-Electronic Centralized Aircraft Monitoring<br>• EFIS-Electronic Flight Instrument System<br>• GPS-Global Positioning System<br>• TCAS-Traffic Collision Avoidance system | 20 hrs |

**Reference Books:**

| Sl. No. | Author / Publisher | Nomenclature of Book |
|---|---|---|
| 1. | Aircraft Tech Book Co. | EASA Module-05 Electronic Instrument System |
| 2. | B.L. Theraja | Electrical Technology |
| 3. | E.H.J. Pallett | Aircraft Instruments |
| 4. | Malvino and Leech | Digital Principle and Applications |

**Semester-IV**

**Course Code: BAV-253-P** **Course Title: Industrial Visit**

**Total Contact Hours: 30 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Theory – 02 Lectures/ Week**

**Learning Outcomes:**

After completion of technical visit, the students will be able to:

1. Understand the overall operation of the organization.
2. Understand the basic structure of any organization.
3. Understand the working culture of the organization.

1. **Technical visit to any one of the nearby establishment and submit individual report:**
   a) Visit to MRO/ Airline or any other aviation establishment.
   b) Visit to Civil/ Defense Airport to know the operation and organizational set up.
   c) Visit to Aerospace industries.

2. **Students have to give a presentation on the technical visit.**

**Semester-IV**

**Course Code: BAV-254-T** **Course Title: Propulsion-I**

**Total Contact Hours: 30 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Theory – 04 Lectures/ Week**

**Course Objectives:**

1. To study Propulsion and fundamentals
2. To study various types of turbine engines
3. To get familiar with the concepts of engine performance

**Learning Outcomes:**

After learning this course, the students will be able to:

1. Understand the propulsion & fundamentals.
2. Understand the constructional arrangement & operation of various gas turbine engines.
3. Understand the engine performance.

| Sl. No. | Description | Allotted hours |
|---|---|---|
| **Unit-I: Introduction to Propulsion and Fundamentals** | | |
| 1. | • Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle;<br>• The relationship between force, work, power, energy, velocity, acceleration; | 10 hrs |
| **Unit-II: Turbine Engines** | | |
| 2. | Constructional arrangement and operation of turbojet, turbofan, turbo shaft and turbo propeller engines. | 10 hrs |
| **Unit-III: Engine Performance** | | |
| 3. | • Thrust horsepower, specific fuel consumption;<br>• Engine efficiencies;<br>• Pressure, temperature and velocity of the gas flow;<br>• Engine ratings, static thrust, influence of speed, altitude and hot climate | 10 hrs |

**Reference Books:**

| Sl. No. | Author / Publisher | Nomenclature of Book |
|---|---|---|
| 1. | Aircraft Tech Book Co | EASA Module-15 Gas Turbine Engine |
| 2. | FAA | Aviation Maintenance Technician Hand Book- Power Plant -12A |
| 3. | FAA H- 8083-32 | Aviation Maintenance Technician handbook- Power Plant (Vol-II) |
| 4. | Irwine Treager | Aircraft Gas Turbine Technology |

**Semester-IV**

**Course Code: OE-251-BAV-T** **Course Title: Professional Communication Skill**

**Total Contact Hours: 30 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Theory – 02 Lectures/ Week**

**Course Objectives:**

1. To study communication skills
2. To study professional skills
3. To study presentation skill
4. To study how to prepare a CV or resume

**Learning Outcomes:**

After learning this course, the students will be able to:

1. Understand how to communicate verbally, nonverbally & written.
2. Understand how to develop professional skills.
3. Understand how to give presentation.
4. Understand how to make CV.

| Sl. No. | Description | Allotted hours |
|---|---|---|
| **Unit-I: Verbal & Nonverbal Communication Skills** | | |
| 1. | • Ways to increase your vocabulary.<br>• Verbal and nonverbal communication, including body language, facial expressions, eye contact, and tone of voice. | 10 hrs |
| **Unit-II: Written Communication Skills** | | |
| 2. | • Written communication in the workplace<br>• Email writing, and etiquettes<br>• Proof reading and editing | 10 hrs |
| **Unit-III: Professional Skills** | | |
| 3. | • Prepare and deliver presentations<br>• Team management skills<br>• Curriculum Vitae or resume writing<br>• Interview skills | 10 hrs |

**Semester-IV**

**Course Code: AEC-251-BAV-T** **Course Title: Basic Radar and Radio System**

**Total Contact Hours: 30 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Theory – 02 Lectures/ Week**

**Course Objectives:**

1. To study basic radio systems.
2. To study Radar theory and explain its development from its beginning.
3. To study auto flight.
4. To study Integrated Modular Avionics of aircraft.

**Learning Outcomes:**

After learning this course students will be able to:

1. Understand the basic radio systems used in aircraft.
2. Understand Radar theory and its development from its beginning.
3. Understand the use of auto flight.
4. Understand Integrated Modular Avionics of aircraft.

| Sl. No. | Description | Allotted hours |
|---|---|---|
| **Unit-I: Basic Radio Systems** | | |
| 1. | • Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver and transmitter<br>• Modulation & Demodulation | 7 hrs |
| **Unit-II: Basic Principles of Radar System** | | |
| 2. | • Introduction, the Origin of Radar, Block Diagram and Operation.<br>• Radar Frequencies, types of Radar, Radar performance factors, Maximum Unambiguous Range, Radar Waveforms. | 7 hrs |
| **Unit-III: Auto Flight** | | |
| 3. | Fundamentals of system lay-outs and operation of Auto flight | 6 hrs |
| **Unit-IV: Integrated Modular Avionics** | | |
| 4. | Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, etc. | 10 hrs |

**Reference Books:**

| Sl. No. | Author / Publisher | Nomenclature of Book |
|---|---|---|
| 1. | Aircraft Tech Book Co. | EASA Module-11A: Turbine Aeroplane Aerodynamics, Structures & Systems |
| 2. | Aircraft Tech Book Co. | EASA Module-13: Aircraft Aerodynamics, Structures & Systems |
| 3. | J. Powell | Aircraft Radio System |

**Semester-IV**

**Course Code: BAV-255-P** **Course Title: Digital Electronics Lab**

**Total Contact Hours: 60 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Practical – 02/ Week**

**Learning Outcomes:**

After performing the practical students will be able to:

1. Identify the Digital IC's.
2. Understand the use and application of Combinational Ic's.
3. Understand the use and application of logic gates.

**Students have to perform minimum 06 Practical listed below:**

| Sl. No. | Basic Practical Tasks |
|---|---|
| 1. | Practice code conversion (binary to grey and grey to binary) by using trainer kit |
| 2. | Practice by using analogue to digital and digital to analogue converter trainer kit |
| 3. | Verify the truth table of various logic gates by using IC trainer kit |
| 4. | Practice basic logic gates by using diodes |
| 5. | Practice logic circuit from a simple Boolean expression using logic gate IC |
| 6. | Practice by using Half adder trainer kit |
| 7. | Practice by using Full adder trainer kit |
| 8. | Demonstrate Light Emitting Diodes display |
| 9. | Implement universal gates using basic gates on trainer kit |
| 10. | Practice by using encoder circuit trainer kit |
| 11. | Practice by using decoder circuit trainer kit |
| 12. | Verify truth table of multiplexer, demultiplexer |

**Semester-IV**

**Course Code: BAV-256-T** **Course Title: Soft Skills and Organizational Behaviour**

**Total Contact Hours: 30 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Theory – 02 Lectures/ Week**

**Objectives:**

1. To understand the need of soft skills in Aviation.
2. To discuss the fundamentals Organizational Behavior as applicable to working in aviation field
3. To know types of soft skills used in work place
4. Introduction the concept of study of organizational culture and tools to improve Interpersonal effectiveness

**Learning Outcomes:**

After learning this course, students will be able to:

1. Understand the importance of soft skills development and its application.
2. Understand the personal attributes that enhances an individual's interactions, job Performance and career prospects
3. Understand the basic of organizational Behavior and importance of its learning.
4. Students are able to provide hands on skills to work practically in aviation field and its basic terms.

**Unit-I: Introduction to Soft Skills at Work Place: (Min 1 case Study) (10 hrs)**

a. Definition of soft skills and synonym to People Skills, Interpersonal skills And transferable skills
b. Soft skills development and its types and its application.

**Unit-II: Key Soft Skills: (Min 01 Case Study) (10 hrs)**

a. Communication, Team work and Professional Ethics.
b. Interpersonal skills and Leadership.
c. Critical thinking, problem solving, and Creativity.
d. Self-introduction.

**Unit-III: Organizational Behavior Model: (Min 01 Case Study) (10 hrs)**

a. Learning objectives and definition and need to study O B Model.
b. Study of O B attributes like Personality, Perception and Motivation at work Place.
c. Introduction an application of Herzberg's. Two Factor theory and Maslow's Need Hierarchy Theory in aviation field.

**Reference Books:**

| Sl. No. | Author / Publisher | Nomenclature of Book |
|---|---|---|
| 1. | Prashant Sharma | Soft Skills: Personality Development for Life Success |
| 2. | Aswathapp | Organizational behavior |
| 3. | Stephen P. Robbins | Organizational behavior |

**Semester-IV**

**Course Code: BAV-257-P** **Course Title: Communication & Navigation Lab**

**Total Contact Hours: 60 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Practical – 04/ Week**

**Learning Outcomes:**

After performing the practical students will be able to:

1. Understand the fundamentals of different radio equipment used in aircraft.
2. Understand the application of Antennas used in aircraft.
3. Understand HF & VHF communication system.
4. Understand VOR, ADF, ILS & CVR used in aircraft.

**Students have to perform minimum 06 Practical listed below:**

| Sl. No. | Basic Practical Tasks |
|---|---|
| 1. | Fundamentals of system lay-outs of navigational and communication equipment |
| 2. | Identification of different type of Antennas and their uses |
| 3. | Fundamentals of system lay-outs of instrument control panel |
| 4. | Familiarization of Radio altimeter system & identification of its components |
| 5. | Familiarization of GPS system & identification of its components |
| 6. | Familiarization of Weather Radar system & identification of its components |
| 7. | Familiarization of HF / VHF system & identification of its components |
| 8. | Identification of ELT and ELT antenna & its components. Demonstration of ELT Battery |
| 9. | Identification of VOR, ADF, ILS system & its components |
| 10. | Identification of CVR system & its components |
| 11. | Identification of primary & secondary glide slope antennas |
| 12. | Identification of marker beacon antenna and receiver |

**Semester-IV**

**Course Code: BAV-258-P** **Course Title: Propulsion-I Lab**

**Total Contact Hours: 60 hrs** **Total Credits: 02** **Total Marks: 50**

**Teaching Scheme: Practical – 04/ Week**

**Learning Outcomes:**

After performing the practical students will be able to:

1. Understand the constructional arrangement of different gas turbine engines.
2. Understand the removal & fitment of engine cowling.
3. Understand the inspection procedure of the gas turbine engine.

**Students have to perform minimum 06 Practical listed below:**

| Sl. No. | Basic Practical Tasks |
|---|---|
| 1. | Familiarization with constructional arrangement of turbojet engines |
| 2. | Familiarization with constructional arrangement of turbofan / turbo shaft / turboprop engines |
| 3. | Associated with inspection procedure of fan blades of jet engine |
| 4. | Associated with removal & installation of turbine blades |
| 5. | Associated with removal and fitment of engine cowling |
| 6. | Associated with engine accessory section |
| 7. | Associated with Engine Mount Inspection |
| 8. | Perform visual inspection of all bleed air ducts, lines, hoses, and electrical wiring located in the engine nacelle |
| 9. | Inspect engine for security, clamping, routing, clearance, evidence of leaks, and general condition |
| 10. | Check engine oil quantity and familiarize with the engine oil servicing |