



Savitribai Phule Pune University

Savitribai Phule Pune University

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

First Year B.Sc. (Aviation)

To be implemented from Academic Year 2026-2027

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Title of the Course: B.Sc. (Aviation)/ B.Sc. (Aviation by Research)

1. Preamble of the Syllabus:

NEP 2020 is being implemented from the academic year 2026-27. New syllabi with the addition of the fourth year will facilitate students to undertake research project dissertation in the field of aviation. The systematic and planned curriculum from 1st year to 4th years shall motivate and encourage the students pursuing the higher education in the aviation field. B.Sc. (Aviation / Aviation by Research) is a very specialized course unlike any other courses in sciences. It includes classroom teaching as well as practical on aircraft and its related systems.

2. Course Introduction:

As per the recommendations of UGC and Savitribai Phule University guidelines, the undergraduate (UG) degree course in Aviation is a 6-semester course for 3-academic years OR 8-semester course for 4-academic years. To be eligible for this Course, the applicant must have passed 10+2 examination in Physics, Chemistry & Mathematics from a recognized board or university or its equivalent Or Diploma in Aeronautical, Mechanical, Electrical or Electronics Engineering recognized by State Technical Education Board. The Teaching-Learning Process (TLP) is student- centric. It involves theory, practical and also vocational and skill- based components. It offers flexibility in Programme structure and ensures a strong foundation and in-depth knowledge in subject.

- a) **In the First Year of Under-Graduation:** The basic topics related to the workshop technology, electrical fundamentals, physics of aerodynamics aviation legislation and maintenance concepts, assembly techniques are dealt with. The practical course is designed to emphasize practical skills required for Aircraft Maintenance testing and trouble-shooting.
- b) **In the Second Year Under-Graduation:** The level of the theory and practical courses shall be of advanced stage as compared to the first year B.Sc. Courses. The course on Human Factors is introduced to understand its context in aviation. The Language Proficiency & computer programming course is also introduced to build the professional ability of students.
- c) **In the Third Year Under-Graduation:** Proportionate number of laboratory exercises will be included in the practical courses. In addition, skill enhancement project- I & II are included in third year at 5th & 6th Semester respectively in which students can independently think and carry out the project work with the aim to enhance the technical & managerial skills. The list of activities to be performed is given in the syllabi. In 6th Semester, the student is expected to complete any 4 activities from the list.
- d) **In the Fourth Year Under-Graduation:** After completion of three years of curriculum, students have option to go for the fourth year to obtain degree in B.Sc. (Aviation by Research). Fourth year is exclusively for studying advance subjects in aviation, in-plant training and research project dissertation.

3. Need for Launching B.Sc. (Aviation / Aviation by Research) Degree Course:

- a) To provide capable and trained human resource to Aviation Industry.
- b) To fulfil the minimum academic qualification requirement so as to enable the graduates to compete for higher studies/ Job Opportunities in the Aviation Industry.
- c) To encourage and facilitate students to opt for research in aviation field.
- d) To expose students to gain hands-on experience in airlines/ MROs/ technical publications/ DRDO/ HAL/ Training establishments.

The Aviation Industry is poised for substantial growth in India and this will go a long way for the country's overall development to be maintained at a high rate. The country has already witnessed the Open skies policy which led to significant increase in Air services which in turn required parallel growth in infra-structure.

The need of the future therefore will be felt in much greater requirement of skilled manpower in all streams connected with Aviation like management of increased number of airplanes and their maintenance. The movement of goods and people will have to be quick and safe and this can only be achieved by an efficient, reliable and economic aviation industry. The industry therefore needs more and more aircraft and large workforce to keep them flying safely.

The Syllabus of B.Sc. (Aviation / Aviation by Research) degree is designed to enable the student to acquire the necessary qualification to enter into the Job market in any of the related fields of Aviation such as Traffic Control, Crew and Man power Scheduling, In-flight service department, Security, Civil Works department and Line and Major maintenance department of Engineering etc. The existing highly qualified work force of AMEs (Aircraft Maintenance Engineers) shouldering huge responsibility in the certification of an Aircraft carrying large number of passengers say 400 to 500 passenger capacity, are denied the higher positions in the industry merely for not possessing Graduate degree in Aeronautics. The existing curriculum of B.Sc. (Aviation) and B.Sc. (Aviation by Research) will provide many opportunities in the field of aviation.

On completion of B.Sc. degree (Aviation / Aviation by Research) student may start his / her career as Trainee Technician with some stipend and then as Jr. Technician. Further promotional avenues could be Sr. Technician etc. depending on his / her achievements. The undergraduate study will significantly enhance the competency of the student to appear in the AME (Aircraft Maintenance Engineer) license examination conducted by DGCA (Director General of Civil Aviation).

After acquiring License qualification, he / she can start his / her career as Aircraft Maintenance Engineer category. However, it is also possible that the graduates of B. Sc. (Aviation) enter the field of Non-Technical streams in the Aviation Industry like Commercial Department, In-flight service Department, Ground Support Department and Security Department etc. With the B.Sc. (Aviation by Research) degree, students will be able to undertake any research project in government and private sector of the aviation field. It is therefore, in fitness of things that such a degree course would help the students to make his/ her career in aviation.

4. Objectives of Programme:

The systematic and planned curriculum from first year to the fourth year is aimed at focusing attention to the skills required for practicing in the field of Aircraft Maintenance. This is expected that student become more confident in working and shall motivate and encourage the student for pursuing higher studies in Aviation Maintenance and for becoming self-employed. The B.Sc. (Aviation / Aviation by Research) course shall have the following objectives.

- To provide in-depth knowledge of technological aspects of aviation maintenance.
- To familiarize with current and recent technological developments in aviation industry.
- To enrich knowledge through programmes such as industrial visits, hobby projects, market survey, projects etc.
- To train students in skills related to aviation industry and market.
- To create foundation for perfecting practical skills in aircraft maintenance and operation.
- To develop analytical abilities towards real aviation problems.
- To help students build-up a progressive and successful career in Aircraft maintenance and operation.

5. Program Duration and Exit Options:

The duration of the UG Program is 4 years or 8 semesters. Students who desire to undergo a 3- year UG Program will be allowed to exit after completion of the 3rd year. If a student wants to leave after the completion of the first or second year, the student will be given a UG Certificate or UG Diploma, respectively, provided they secure the prescribed number of credits. Students who exit with a UG certificate or UG diploma are permitted to re-enter within three years and complete the Degree Program. The minimum credit to be earned by a student per semester is 22. This provision is meant to provide students the comfort of the flexibility of semester-wise academic load. However, the mandatory numbers of credits which have to be secured for the award of Undergraduate Certificate/ Undergraduate Diploma/ Bachelor Degree in Aviation are listed in the below Table.

Sl. No.	Type of Award	Stage of Exit	Mandatory Credits to be
1	Undergraduate Certificate (Aviation)	After successful completion of First year	44
2	Undergraduate Diploma (Aviation)	After successful completion of Second Year	88
3	Bachelor of Science (Aviation)	After successful completion of Third year	132
4	Bachelor of Science (Aviation by Research)	After successful completion Fourth year	176

6. Program Outcome for B.Sc. (Aviation / Aviation by Research):

- Critical thinking:** Provide in-depth knowledge of technological aspects of aviation maintenance with recent developments in aviation industry.
- Effective citizenship:** Create foundation for perfecting practical skills in aircraft maintenance and operation for civic life activities for comprehensive development.
- Effective communication:** Communicate clearly and effectively using the professional standards in skills related to aviation industry and market.
- Environment and sustainability:** Understand the issues of environmental contexts and demonstrate the knowledge for sustainable development with analytical abilities towards real life aviation problems.
- Ethics:** Express legal and ethical issues and understand the moral dimensions of decisions and responsibilities through professional skill-based programmes.
- Life-long learning:** Gain ability to engage in independent and life-long learning with socio-technological changes to build-up successful career in Aviation.

7. Teaching-Learning Process:

The effectiveness of the teaching and learning process depends on the available infrastructure, motivated and trained teachers and quest of knowledge among the students and teachers alike.

The faculty of the college plan and execute the student-centric methodologies like experiential learning, participative learning, and problem-solving to ensure holistic development of students. This conscious effort promotes active engagement and critical thinking abilities.

Experiential Learning:

- College organizes learning activities like study tour, field visits, survey, internship, on job training, research projects etc.
- Students gain experience through experiential learning in laboratories. It involves learning by doing experiments on theoretically taught topics.

Practical training is being conducted at the Institute by its various labs/ workshops such as Airframe shop, Engine shop, Machine shop, Battery shop, Composite & NDT shop, Electrical, Instrument and Radio Navigation Labs etc. as per the proper procedures by experienced teachers.

A database of E resources for all the courses is available with the college. Practical components have been covered using virtual laboratories, simulations therein, videos and animations for better understanding along with demonstrations for enhancing the teaching learning process.

Participative Learning:

- Students are encouraged to think critically, share information, collaborate on a project, trade ideas, and learn from one another through the use of participatory learning techniques.
- The college organizes activities like group discussion, group projects, seminars, presentations, mentorship sessions to encourage participatory learning, e.g. group discussion, participation of students in science exhibition, seminars and class presentations for technical subjects etc.
- The small groups comprising three to five students collaborate to create models related to Aviation, which they subsequently present during the final semester examination. This practice fosters the exchange of knowledge and cultivates a participatory approach among the students.
- Students actively participate in NSS, NCC, sports, cultural, students' welfare activities.

The college caters to these needs by providing library facility containing more than 3000 books. The library is replete with latest editions of National and International books and subscriptions to journals and e-resources beneficial for both students and teachers.

Sample Aircraft technical documents such as Aircraft Maintenance Manual, Service Manual, Engine Service Manual, Overhaul Manual, Illustrated Parts Catalogue, Wiring Diagram Manual, Avionics Manual, Aircraft Type Certificate, Airworthiness Directives, Service Bulletins, etc. of various aircrafts are available in the library for better understanding of students.

Problem Solving:

- The syllabi of B.Sc. (Aviation) have components of problem-solving approach.
- The Skill Enhancement Project Part-II helps in the development and validation of aviation related problem-solving skills.
- All students of second year UG program have compulsory project of Human factor & Environment Awareness.

- In the final year of the under graduate degree program, Skill Enhancement Project Part-II & Activity subjects have course on projects, seminars & presentations. Students are provided assistance in identifying and selecting project topics. A project guide is also allocated to every group.

ICT Tools:

Use of tools for effective teaching learning such as:

- Computer labs
- Interactive Panel enabled classrooms
- ICT enabled labs
- Smart boards
- Media center

College has a dedicated Computer lab enabled with internet for the use of students to access the net for searching anything related to the course.

All the classrooms of the college are equipped with Interactive Panel provided with internet. Most of the laboratories are ICT enabled. The institute encourages all teachers to undergo continuous training programs to enhance their knowledge. Teachers are encouraged to use the Interactive Panel to deliver effective lectures using PPTs, online videos and animations. Besides whole building of the college is Wi-Fi enabled.

Online Resources/ Platforms:

- Google meet and Zoom
- YouTube and Whatsapp groups
- Federal Aviation Safety (FAA)

8. Methods of Assessment :

The primary objective of assessment will be to assess the learning outcomes of the course in tune with the broad outcomes of strengthening core theoretical knowledge base, practical laboratory skills, and research. Assessment will be based on continuous evaluation (MCQs, Short Questions (SQ), Class Test (CT), Seminar, Presentation (PPT), Group Discussion (GD), Quiz, Assignment, Tutorials, etc.) and end of semester examination of Savitribai Phule Pune University, Pune.

(i) Internal Assessment or Continuous Evaluation:

During a semester, students' mastery of the various learning outcomes as described in the syllabus will be assessed through MCQs, Short Questions (SQ), Class Test (CT), Seminar, Presentation (PPT), Group Discussion (GD), Quiz, Assignment, Tutorials, etc. Each theory paper and practical paper will have 20 marks for internal assessment. The critical analysis of internal assessment or continuous evaluation outcomes will provide opportunities to improve the teaching-learning process by focusing on the areas that need conceptual strengthening, laboratory exposure or design of new experiments, and research.

(ii) End of Semester University Examinations:

The summative end-semester university examinations will be conducted for both theory and practical courses. Besides internal assessment, each theory paper and each practical paper will be of 30 marks for end of semester examination of the university.

Scheme of Examination:

The total marks for a 2-credits course is 50.

- Theory Paper of 02 Credits:

- o Internal Exam (20 M) + University Theory Exam (30 M) = Total 50 M

- o Duration: For Internal exam = 60 Min. and for University Exam = 01:30 hours.

- Practical Exam of 2 Credits:

- o Internal Practical Exam (20 M) + University Practical Exam (30 M) = Total 50 M

Internal exam will be conducted by particular college/institutes at the end of each semester.

External exam will be conducted by Savitribai Phule Pune University, Pune at the end of each semester.

Note:

a. Each semester comprises of 15 weeks.

(12 weeks Actual Teaching + 3 weeks for Continuous Internal Evaluation).

b. One Credit of the Theory is equal to 15 clock hours (Teaching 1 hour per week for each credit).

(12 hours Actual Teaching + 3 hours Continuous Internal Evaluation – Assignments, Tutorials, Practice, Problem solving sessions, Group discussion, Seminars and Unit Tests.)

c. One Credit of Practical = 30 clock hours (2 Contact hours per credit per week)

(24 hours' Actual Table work + 6 hours for journal competition, and Continuous Internal Evaluation of each practical).

d. Practical for each course comprises of 02 Credits = 60 clock hours.

- a. Minimum 12 laboratory/ Filed sessions of 04 clock hours must be conducted in one semester.

- b. In case of short practical, two practicals should be conducted in one session.

- c. Each practical of 04 clock hours in the laboratory should consist of table performance for concerned practical, careful observations, calculation, writing results and conclusion, and submission of practical in written form.

- d. Pre-laboratory reading and post laboratory assignments should be given on each practical as a part of continuous internal evaluation.

Pattern for Internal Theory Assessment: (20 Marks)

Que-1: Choose correct option (MCQs) (10-MCQs with Multiple Options (1 Marks each)) – 10 marks

Que-2: Answer the following questions (Short answer questions) (2 Marks each) Attempt 2 out of 4 – 4 marks

Que-3: Answer the following questions (Long answer Definition) (3 Marks each) Attempt 2 out of 4–6 marks

Pattern for External Theory Assessment: (30 Marks)

Que-1: Answer the following questions (Long answer questions) (Any 4 out of 6) – 12 marks

i) -----

ii) -----

iii) -----

iv) -----

v) -----

vi) -----

Que- 2: Answer the following questions (Short answer questions/Problems) (Any 4 out of 6) – 8 marks

- i) -----
- ii) -----
- iii) -----
- iv) -----
- v) -----
- vi) -----

Que-3: Write a short notes on following. (Any 5 out of 6) –**10 marks**

- a) -----
- b) -----
- c) -----
- d) -----
- e) -----

9. Abbreviations Used:

- POs: Program Outcomes
- PS: Program Structure
- PSOs: Program Specific Outcomes
- COs: Course Outcomes
- TLP: Teaching-Learning Process
- AM: Assessment Method
- DSC: Discipline Specific Core
- DSE: Discipline Specific Elective
- GE: Generic Elective
- OE: Open Elective
- VSC: Vocational Skill Course
- SEC: Skill Enhancement Course
- IKS: Indian Knowledge System
- AEC: Ability Enhancement Course
- VEC: Value Education Course
- OJT: On Job Training (Internship)

10. Programme Structure :

The detailed Credit framework of undergraduate degree programme in Aviation is provided in Table 2.

Table-2: Credit framework of undergraduate degree programme in Aviation.

Level /Difficulty	Sem	Subject-1				Subject-2	Subject-3	GE/ OE	SEC	IKS	AEC	VEC	CC	Total
4.5/100	I	2(T)+2(P)				2(T)+2(P)	2(T)+2(P)	2(T)	2(T/P)	2(T) Generic	2(T)	2	-	22
	II	2(T)+2(P)				2(T)+2(P)	2(T)+2(P)	2(P)	2(T/P)	-	2(T)	2	2	22
Exit Option: Award of UG Certificate in Major with 44 credits and an additional 4 credits core NSQF Course/Internship OR Continue with Major and Minor.														
Continue Option: Student will select one subject among the (Subject-1, Subject-2, and Subject-3) as major and another as minor and third subject will be dropped.														
Level /Difficulty	Sem	Credits related to major				Minor		G E/ O E	SEC	IKS	AEC	VEC	CC	Total
		Discipline Specific Core (DSC) Major or Core	Discipline Specific Elective (DSE) Major Elective	VSC	FP/ OJT /CEP									
5.0/200	III	4(T)+2(P)	-	2(T/P)	2 (FP)	2(T)+2(P)	-	2(T)	-	2(T) Major Subject Specific	2(T)	-	2	22
	IV	4(T)+2(P)	-	2(T/P)	2(CEP)	2(T)+2(P)	-	2(P)	2(T/P)	-	2(T)	-	2	22
Exit Option: Award of UG Diploma in Major and Minor with 88 credits and an additional 4 credits core NSQF Course/Internship OR Continue with Major and Minor.														
5.5/300	V	8(T)+4(P)	2(T)+2(P)	2(T/P)	2 (FP/ CEP)	2(T)	-	-	-	-	-	-	-	22
	VI	8(T)+4(P)	2(T)+2(P)	2(T/P)	4(OJT)	-	-	-	-	-	-	-	-	22
Total 3 Years		44	8	8	10	18	8	8	6	4	8	4	6	132
Exit Option: Award of UG degree in Major with 132 credits OR Continue with Major and Minor.														
6.0/400	VII	6(T)+4(P)	2(T)+2(P)	-	4(RP)	4(T)(RM)	-	-	-	-	-	-	-	22
	VIII	6(T)+4(P)	2(T)+2(P)	-	8(RP)	-	-	-	-	-	-	-	-	22
Total 4 Years		64	16	8	22	22	8	8	6	4	8	4	6	176
Exit Option: Award of UG Honours with Research Degree in Major and Minor with 176 credits.														
-OR-														
6.0/400	VII	10(T)+4(P)	2(T)+2(P)	-	-	4(T)(RM)	-	-	-	-	-	-	-	22
	VIII	10(T)+4(P)	2(T)+2(P)	-	4(OJT)	-	-	-	-	-	-	-	-	22
Total 4 Years		72	16	8	14	22	8	8	6	4	8	4	6	176
Exit Option: Award of UG Honours Degree in Major and Minor with 176 credits.														

- FP: Field project
- CEP: Community engagement programme
- CC: Co-curricular Courses
- RM: Research Methodology
- RP: Research Project
- MJ: Major Course
- MN: Minor Course

11. Course Structure:**B.Sc. (Aviation) Semester-I**

Course Code	Title of Course	Credits		Lectures/ Week		Evaluation		
		Th.	Pr.	Th.	Pr.	CA	UE	Total
BAV 101-T	Basic Workshop Technology (Subject-I)	2		2		20	30	50
BAV 102-P	Basic Workshop Technology Lab		2		4	20	30	50
BAV 103-T	Electrical Fundamentals (Subject-II)	2		2		20	30	50
BAV 104-P	Electrical Fundamentals Lab		2		4	20	30	50
BAV 105-T	Physics of Aircraft (Subject-III)	2		2		20	30	50
BAV 106-P	Physics of Aircraft Lab		2		4	20	30	50
GE/ OE 101-T	SPPU Basket	2		2		20	30	50
SEC 101-T	Aviation Mathematics-I	2		2		20	30	50
IKS 101-T	History of Knowledge Production in India	2		2		50	--	50
AEC 101-ENG	Developing Communicative Competence in English- I	2		2		20	30	50
VEC 101-T	Environment Education-I	2		2		50	--	50
Total=		16	6	16	12	280	270	550

B.Sc. (Aviation) Semester-II

Course Code	Title of Course	Credits		Lectures/ Week		Evaluation		
		Th.	Pr.	Th.	Pr.	CA	UE	Total
BAV 151-T	Workshop Technology (Subject-I)	2		2		20	30	50
BAV 152-P	Workshop Technology Lab		2		4	20	30	50
BAV 153-T	Electronic Fundamentals (Subject-II)	2		2		20	30	50
BAV 154-P	Electronic Fundamentals Lab		2		4	20	30	50
BAV 155-T	Aircraft Metallurgy (Subject-III)	2		2		20	30	50
BAV 156-P	Aircraft Metallurgy Lab		2		4	20	30	50
GE/ OE 151-P	SPPU Basket		2		4	20	30	50
SEC 151-T	Aviation Mathematics-II	2		2		20	30	50
CC 151-3	SPPU Basket	2		2		50	--	50
AEC 151-ENG	Developing Communicative Competence in English- II	2		2		20	30	50
VEC 151-T	Environment Education-II	2		2		50	--	50
Total=		14	8	14	16	280	270	550

Course Structure:**B.Sc. (Aviation) Semester-III**

Course Code	Title of Course	Credits		Lectures/ Week		Evaluation		
		Th.	Pr.	Th.	Pr.	CA	UE	Total
BAV 201-T	Advance Workshop Technology (Major Core)	4		4		40	60	100
BAV 202-P	Advance Workshop Technology Lab		2		4	20	30	50
VSC 221-T	Aircraft Maintenance Practices	2		2		20	30	50
FP 231-P	Field Visit		2		4	50	---	50
BAV 241-T	Aircraft Structure (Minor)	2		2		20	30	50
BAV 242-P	Aircraft Structure Lab		2		4	20	30	50
GE/ OE 201-T	SPPU Basket	2		2		20	30	50
IKS-T	Human Behaviour	2		2		20	30	50
AEC 231-HIN	Hindi	2		2		20	30	50
CC 151-7	Production Handwritten / Printed or Digital Magazines		2		4	50	---	50
Total=		14	8	14	16	280	270	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	Digital Electronics (Major Core)	4		4		40	60	100
BAV 252-P	Digital Electronics Lab		2		4	20	30	50
VSC 221-T	Aircraft Communication and Navigation	2		2		20	30	50
CEP 281-P	Community Engagement Program		2		4	50	---	50
BAV 291-T	Aircraft Propulsion-I	2		2		20	30	50
BAV 292-P	Aircraft Propulsion-I Lab		2		4	20	30	50
GE/ OE-P	SPPU Basket		2		4	20	30	50
SEC-T	Soft Skills & Organisational Behaviour	2		2		20	30	50
AEC 281-HIN	Hindi	2		2		20	30	50
CC 151-11	Study & Documentation of Forts & Historical Temples/ Places of Worships in Local Area		2		4	50	---	50
Total=		12	10	12	20	280	270	550

Course Structure:**B.Sc. (Aviation) Semester-V**

Course Code	Title of Course	Credits		Lectures/ Week		Evaluation		
		Th.	Pr.	Th.	Pr.	CA	UE	Total
BAV 301-T	Aircraft Electricals-I	4		4		40	60	100
BAV 302-T	Aircraft Electricals-II	4		4		40	60	100
BAV 303-P	Aircraft Electricals Lab		4		8	40	60	100
MJ 310-T	Aircraft Instruments	2		2		20	30	50
MJ 311-P	Aircraft Instruments Lab		2		4	20	30	50
VSC 321-T	Skill Enhancement Course: Project-I	2		2		20	30	50
FP 331-P	Field Project		2		4	50	---	50
BAV 341-T	Aircraft Modular Avionics	2		2		20	30	50
Total=		14	8	14	16	250	300	550

B.Sc. (Aviation) Semester-VI

Course Code	Title of Course	Credits		Lectures/ Week		Evaluation		
		Th.	Pr.	Th.	Pr.	CA	UE	Total
BAV 351-T	Aircraft Mechanical System-I	4		4		40	60	100
BAV 352-T	Aircraft Mechanical System-II	4		4		40	60	100
BAV 353-P	Aircraft Mechanical System Lab		4		8	40	60	100
BAV 360-T	Aircraft Propulsion-II	2		2		20	30	50
BAV 361-P	Aircraft Propulsion-II Lab		2		4	20	30	50
VSC 371-P	Skill Enhancement Course: Project-II		2		4	20	30	50
OJT 381-P	On Job Training		4		8	40	60	100
Total=		10	12	10	24	220	330	550

Course Structure:**B.Sc. (Aviation by Research) Semester-VII**

Course Code	Title of Course	Credits		Lectures/ Week		Evaluation		
		Th.	Pr.	Th.	Pr.	CA	UE	Total
BAV 401-T	Engineering Aerodynamics & Flight Mechanics-I	4		4		40	60	100
BAV 402-T	Engineering Aerodynamics & Flight Mechanics-II	2		2		20	30	50
BAV 403-P	Engineering Aerodynamics & Flight Mechanics Lab		4		8	40	60	100
MJ 410-T	a) Aircraft Maintenance Engineering & Management Or b) Aviation Embedded Systems & Programming	2		2		20	30	50
MJ 411-P	Major Elective Lab		2		4	20	30	50
RP 431-P	Research Project-I		4		8	40	60	100
RM 432-P	Research Methodology		4		8	40	60	100
Total=		8	14	8	28	220	330	550

B.Sc. (Aviation by Research) Semester-VIII

Course Code	Title of Course	Credits		Lectures/ Week		Evaluation		
		Th.	Pr.	Th.	Pr.	CA	UE	Total
BAV 451-T	Unmanned Aerial Vehicle-I	4		4		40	60	100
BAV 452-T	Unmanned Aerial Vehicle-II	2		2		20	30	50
BAV 453-P	Unmanned Aerial Vehicle Lab		4		8	40	60	100
MJ 461-T	Airport Planning and Operations	2		2		20	30	50
MJ 462-P	Airport Planning and Operations		2		4	20	30	50
RP 481-P	Research Project-II		8		16	80	120	200
Total=		8	14	8	28	220	330	550

Semester-I**Course Code: BAV 101-T
Technology****Course Title: Basic Workshop****Total Contact Hours: 30 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Theory – 02 Lectures/ Week****Course Objectives:**

1. To study workshop safety norms, precaution and Fire safety.
2. To get familiar with Hand tool, Power tool, Precision Measuring equipment's and their use.
3. To understand fits and clearances.

Learning Outcome:

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

1. Understand applications of hand tools and power tools.
2. Select the appropriate tools required for specific operation.
3. Comprehend the safety measures required to be taken while using the tools.
4. Identify and use the precision measuring instruments.

Sl. No.	Description	Allotted hours
Unit-I: Basics of Workshop Practice		
1.	Safety Precautions-Aircraft and Workshop - Aspects of safe working practices including precautions to be taken when working with electricity, gases (especially oxygen), oils, and chemicals. - Fuel tank safety and fuel tank entry procedures and precautions. Awareness and precautions regarding aircraft equipped with ballistic recovery systems. - Also, instructions for the remedial action to be taken in the event of a fire or another accident with one or more of these hazards, including information on fire-extinguishing agents.	10 hrs
Unit-II: Basics Tools		
2.	Tools - Common hand tool types; - Common power tool types; - Operation and use of precision measuring tools; - Lubrication equipment and methods. - Operation, function and use of electrical general test equipment;	15 hrs
Unit-III: Fits and Clearances		
3.	- Drill sizes for bolt holes, classes of fits; - Common system of fits and clearances; - Schedule of fits and clearances for aircraft and engines; - Limits for bow, twist and wear; - Standard methods for checking shafts, bearings and other parts.	05 hrs

Reference Books

Sl. No.	Author / Publisher	Nomenclature of Book
1.	Aircraft Tech Book Co	EASA Module-07A Maintenance Practices
2.	CAIP I	Civil Aircraft Inspection Procedure - Part I
3.	FAA H 8083-30	Aviation Maintenance Technician Handbook- General
4.	J. A Enderson & Tatro	Shop Theory

Semester-I**Course Code: BAV 102-P****Course Title: Basic Workshop Technology Lab****Total Contact Hours: 40 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Practical – 04/ Week****Learning Outcome:**

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

1. Use tools and measuring instruments.
2. Perform operation like drilling, welding soldering and brazing, turning.
3. Work in workshop environment while following standard procedure and safety practices.

Students have to perform minimum 06 Practical listed below:

Sl. No.	Basic Practical Tasks
1.	Safe working practices and precautions to be taken when working with electricity, gases especially oxygen, oils and chemicals
2.	Instruction in the remedial action to be taken in the event of a fire
3.	Care of tools, control of tools and use of workshop materials. Use of common tools, tool safety and storage
4.	Cutting practice with Hacksaw. To make a square shape of 48 mm sides for given M.S. piece
5.	Drilling a hole by either hand tool or power tool and threading in 48 mm square MS Piece
6.	External threading practice with Dies and Die – holder. Tapping practice (Internal Threading)
7.	Taking the measurement with external Micrometer
8.	Use of torque wrench and measurement of torque value
9.	Use of dial test indicator. Use of callipers, feeler gauge, radius gauge, telescopic gauges
10.	Perform simple soldering tasks and inspect

Semester-I**Course Code: BAV 103-T****Course Title: Electrical Fundamentals****Total Contact Hours: 30 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Theory – 02 Lectures/ Week****Course Objectives:**

1. To get familiar with basic electricity, passive components
2. To understand DC and AC circuit theorems and their use in circuit analysis
3. To introduce Electromagnetism and Transformer.
4. To understand the construction of DC, AC Motor and Generator

Learning Outcome:

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

1. Find resistor, capacitor values with a color code and meter.
2. Use an electrical meter to measure voltage, current, Power in the circuit.
3. Simplify electrical circuit using, network theorems.
4. Understand leading/ lagging phase relationship, power factor
5. Understand the DC/ AC Generator and Motor.

Sl. No.	Description	Allotted hours
Unit-I: Basic Electricity		
1.	Electron Theory • Structure and distribution of electrical charges within: atoms, molecules, ions, compounds; • Molecular structure of conductors, semiconductors and insulators.	10 hrs
2.	Static Electricity and Conduction • Static electricity and distribution of electrostatic charges; • Electrostatic laws of attraction and repulsion; Units of charge, Coulomb's Law; • Conduction of electricity in solids, liquids, gases and a vacuum.	
3.	Electrical Terminology The following terms, their units and factors affecting them: • Potential difference, • Electromotive force, • Voltage, current, • Resistance, conductance, • Charge, conventional current flow, electron flow.	
4.	Generation of Electricity Production of electricity by the following methods: • Light, heat, • Friction, pressure, • Chemical reaction, magnetism and motion.	

Sl. No.	Description	Allotted hours
Unit-II: DC Circuits		
5.	Sources of DC Electricity - Construction and basic chemical action of: primary cells, secondary cells, lead acid cells, nickel cadmium cells, lithium cells, nickel cells and other alkaline cells; - Cells connected in series and parallel; - Internal resistance and its effect on a battery; - Construction, materials and operation of thermocouples; - Operation of photo-cells.	10 hrs
6.	DC Circuits - Ohms Law, Kirchoff's Voltage and Current Laws; - Calculations using the above laws to find resistance, voltage and current; - Significance of the internal resistance of a supply.	
Unit-III: Resistors & Capacitors		
7.	Resistance/ Resistor Resistance- - Specific resistance; - Calculation of total resistance series, parallel and series parallel combinations; - Operation and use of potentiometers and rheostats; - Operation of Wheatstone bridge. Resistor- - Positive and negative temperature coefficient conductance; - Resistor colour code, values and tolerances, preferred values, wattage ratings; - Resistors in series and in parallel;	10 hrs
8.	Capacitance/ Capacitor - Operation and function of a capacitor; - Factors that affect capacitance area of plates, distance between plates, number of plates, dielectric and dielectric constant, working voltage, voltage rating; - Capacitor types, construction and function; - Capacitor colour coding; - Calculations of capacitance and voltage in series and parallel circuits; - Exponential charge and discharge of a capacitor, time constants; - Testing of capacitors.	

Reference Books:

Sl. No.	Author / Publisher	Nomenclature of Book
1	Aircraft Tech Book Co.	EASA Module-03 Electrical Fundamental
2	B. L. Theraja	Electrical Technology
3	FAA H 8083-30	Aviation Maintenance Technician Hand Book-General
4	Thomas K Eismen	Aircraft Electricity & Electronics

Semester-I**Course Code: BAV 104-P****Course Title: Electrical Fundamentals Lab****Total Contact Hours: 40 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Practical – 04/ Week****Learning Outcome:**

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

1. Understand the fundamental of DC/AC circuits.
2. Identify the electrical components.
3. Understand the basic use and working of the electrical related components.
4. To understand various types of operation characteristics and applications of Motor/ Generator/ Transformer.

Students have to perform minimum 06 Practical listed below:

Sl. No.	Basic Practical Tasks
1.	Familiarize with construction of primary cells, secondary cells, leads acid cells, nickel cadmium cells.
2.	Conduct battery connections in series and parallel.
3.	Identify various types of resistors and make calculations to find the value of resistance, voltage and current.
4.	Demonstrate the resistors in series, parallel and in combination. Measure the value of resistors.
5.	Operation and use of potentiometers and rheostats.
6.	Application of Wheatstone Bridge to find out unknown resistance value.
7.	Identify various types of capacitors, color code. Measure the value of capacitors.
8.	Connect the capacitors in series, parallel and in combination.
9.	Show the constructional part of DC Generator & perform the inspection and operation of DC Generator.
10.	Show the constructional part of DC motor and perform the inspection and operation of DC motor

Semester-I**Course Code: BAV 105-T****Course Title: Physics of Aircraft****Total Contact Hours: 30 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Theory – 02 Lectures/ Week****Course Objectives:**

1. To understand the physics of Atmosphere.
2. To understand the physics of Aerodynamics, airflow over body of aircraft at low and high speed, forces generated on body.
3. To understand the shape of aerofoils and wing and how they affect lift and drag, effect of boundary layer on flow around the body.
4. To understand the different types of flights and calculate basic performance in steady, straight, climbing, turning, gliding and diving flight.

Learning Outcome:

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

1. Understand basic physics of fluid flow and generation of forces on bodies in air in particular.
2. Apply Newton's laws of motion to calculate the flight path under various flight conditions.
3. Determine how aerodynamic lift, drag and pitching moment are generated from the pressure and stress distributions on aerofoils.
4. Understand various devices used in connection with flight to augment or obtain required performance.

Sl. No.	Description	Allotted hours
Unit-I: Physics of the Atmosphere		
1.	Physics of the Atmosphere • Basic Aerodynamics, • Physics of the atmosphere, • International Standard Atmosphere (ISA), • Application to aerodynamics.	03 hrs
Unit-II: Physics of Aerodynamics		
2.	Aerodynamics • Airflow around a body; • Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, upwash and downwash, vortices, stagnation; • The terms: camber, chord, mean aerodynamic chord, profile (parasite) drag, induced drag, centre of pressure, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio; Thrust, Weight, Aerodynamic Resultant; Generation of Lift and Drag; Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall; Aerofoil contamination including ice, snow, frost.	15 hrs

Sl. No.	Description	Allotted hours
Unit-III: Theory of Flight		
3.	Theory of Flight - Relationship between lift, weight, thrust and drag; - Glide ratio; - Steady state flights, performance; - Theory of the turn; - Influence of load factor: stall, flight envelope and structural limitations; - Lift augmentation.	12 hrs

Reference Books

Sl. No.	Author / Publisher	Nomenclature of Book
1.	AC Kermode	Mechanics of Flight
2.	Aircraft Tech Book Co.	EASA Module- 08 Basic Aerodynamics
3.	L. J. Clancy	Aerodynamics

Semester-I**Course Code: BAV 106-P****Course Title: Physics of Aircraft Lab****Total Contact Hours: 40 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Practical – 04/ Week****Learning Outcome:**

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

1. Understand aerofoil shape used in aircraft.
2. Understand the primary control surfaces of aircraft.
3. Understand the secondary control surfaces of aircraft.
4. Understand the drag creation during flight.

Students have to perform minimum 06 Practical listed below:

Sl. No.	Basic Practical Tasks
1.	Fabrication of Aerofoil shape.
2.	Demonstration of Primary Control surfaces of aircraft.
3.	Demonstration of Secondary Control surfaces of aircraft.
4.	Study laminar and turbulent flow, free stream flow, relative airflow.
5.	Understand the application of Bernoulli's principle for lift generation.
6.	Inspection of exterior of aircraft to minimize the drag creation.
7.	Check cleanliness of aircraft which can create drag during flight.
8.	Study how lift is generated and demonstration of wing structure.
9.	Demonstration of fuselage structure.
10.	Understand the relationship between lift, weight, thrust and drag.

Semester-I**Semester-I****Course Code: SEC 101-T****Course Title: Aviation Mathematics-I****Total Contact Hours: 30 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Theory – 02 Lectures/ Week****Course Objectives:**

1. To understand mathematical concepts such as algebra, trigonometry, vectors, and coordinate geometry used in aviation navigation and flight calculations.
2. To apply mathematical techniques for solving problems related to aircraft motion, speed, distance, altitude, and flight planning.
3. To introduce basic calculus concepts like derivatives and their applications in aircraft velocity, acceleration, and rate of climb or descent.
4. To develop analytical and problem-solving abilities required for aviation operations and decision-making.
5. To build a strong mathematical foundation for advanced aviation subjects such as aerodynamics, navigation, and aircraft performance analysis.

Learning Outcomes:

1. Explain the concepts of relations, functions, domains, co-domains, ranges, and classify different types of relations and functions.
2. Apply the properties of functions, composition of functions, and trigonometric functions to solve mathematical and engineering problems.
3. Evaluate limits, determine continuity, and compute derivatives of algebraic and trigonometric functions using standard differentiation rules.
4. Apply derivatives to determine tangents, normals, intervals of increase/decrease, and maximum and minimum values of functions.
5. Verify and apply the Mean Value Theorems and use differential calculus for mathematical modeling and optimization in real-life applications.

Sl. No.	Description	Allotted hours
Unit-I: Relation & Functions		
1.	• Definition of relation & Function, • Types of relations, Equivalence Relation, • Function, Domain, Co-domain, Range, • Types of Functions and Their Graphs, • Composition of Functions. • Trigonometric Functions.	12 hrs
Unit-II: Limits, Continuity and Derivative		
2.	• Limit of a Function and Limit Laws, • Continuity of Function, • Derivatives of Functions, • Differentiation Rules.	10 hrs
Unit-III: Applications of Derivatives		
3.	• Equations of tangents and normal to a curve, • Increasing or decreasing function, • Function for maximum and minimum values, • Verify Mean value theorems.	8 hrs

Reference Books:

Sl. No.	Author / Publisher	Nomenclature of Book
1.	George B. Thomas	Jr. Thomas' Calculus
2.	M. D. Raisinghania	Advanced Differential Calculus
3.	Robert G. Bartle and Donald R. Sherbert	Introduction to Real Analysis
4.	W. Rudin	Principles of Mathematical analysis
5.	Shanti Narayan & P. K. Mittal	Differential Calculus
6.	H.K. Dass S. Chand publishers	Engineering Mathematics
7.	B.S. Grewal , Khanna Publishers	Higher Engineering Mathematics

Semester-I**Course Code: IKS 101-T****Course Title: History of Knowledge Production in India****Total Contact Hours: 30 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Theory – 02 Lectures/ Week****Course Objectives:**

1. To understand the nature of knowledge.
2. To understand the evolution of the scientific approach in the Indian subcontinent.
3. To study contributions made by different people to the various branches of knowledge before modernity evolved in India.

Learning Outcomes:

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

1. The concept of the ancient intellectual knowledge tradition will be understood.
2. Developments in science from ancient times will be introduced.
3. Developments in humanities from ancient times will be understood.

Sl. No.	Description	Allotted hours
Unit-I: Introduction to Indian Knowledge System		
1.	• Definition, Scope and importance of knowledge • Nature of Indian Knowledge System • Evolution of scientific approach	6 hrs
Unit-II: Development of Sciences		
2.	• Astronomy- Aryabhatta, Varahamihira, Sawai Jaisingh • Medicine- Ayurveda and Yunani • Metallurgy- Copper, Iron, Bronze & alloys	12 hrs
Unit-III: Development of Humanities		
3.	• Language - Prakrit, Sanskrit, Farsee • Philosophy- Vedic, Lokayat, Buddhist, Jaina • Education system in ancient India – Takshashila, Nalanda, Valabhi University • Architecture	12 hrs

Reference Books

Sl. No.	Author / Publisher	Nomenclature of Book
1.	Abdur Rahman, Indian National Science Academy, New Delhi, 1982	Science and Technology in Medieval India: A Bibliography of Source Materials in Sanskrit, Arabic, and Persian
2.	Bag A. K. (ed), Indian National Science Academy, Delhi, 1997	History of Technology in India (Vol I) (From Antiquity to C. 1200 A.D.)
3.	Chattopadhyaya, Debiprasad, Firma KLM Pvt. Ltd. 1986	History of science and technology in ancient India: the beginnings
4.	Dasgupta Surendranath, Cambridge University press, 1922	A History of Indian Philosophy

Semester-I**Course Code: AEC 101-ENG Course Title: Developing Communicative Competence in English- I****Total Contact Hours: 30 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Theory – 02 Lectures/ Week****Course Objectives:**

1. To develop students' vocabulary competence.
2. To strengthen oral communication skills.
3. To promote effective and confident language use.

Learning Outcomes:

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

1. Apply vocabulary knowledge effectively.
2. Communicate appropriately in different social and functional contexts.
3. Demonstrate confidence and accuracy in oral communication.

Sl. No.	Description	Allotted hours
Unit-I: Building Vocabulary		
1.	a. Words as 'Power' b. Word and Sense c. Literal and Figurative Meaning d. Synonyms and Antonyms e. Prefixes and Suffixes f. Lexical Webs g. Collocations	15 hrs
Unit-II: Speaking for Different Purposes		
2.	a. Greeting and Introducing b. Asking for Information c. Seeking Permission d. Making Requests e. Making Suggestions f. Agreeing, Partly Agreeing and Disagreeing g. Making Apologies	15 hrs

Reference Books

Sl. No.	Author / Publisher	Nomenclature of Book
1.	Barret Grant	Perfect English Grammar: The Indispensable Guide to Excellent Writing and Speaking. Fall River Press, 2016
2.	Prasad, H. M.	How to Prepare for Group Discussion and Interview. Tata McGraw-Hill Publishing Company Limited, 2001, New Delhi
3.	Board of Editors, Orient BlackSwan, 2024	Developing Communicative Competence in English

Semester-I**Course Code: VEC 101-T****Course Title: Environment Education-I****Total Contact Hours: 30 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Theory – 02 Lectures/ Week****Course Objectives:**

1. Study human activities that impact the environment.
2. Study principles of sustainable development and resource management.
3. Study local, regional and global environmental issues.
4. Study different strategies for conserving biodiversity and ecosystems.

Learning Outcomes:

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

1. Describe how human activities impact the environment.
2. Explain principles of sustainable development and resource management.
3. Analyze local, regional and global environmental issues and their effects.
4. Evaluate different strategies for conserving biodiversity and ecosystems.

Sl. No.	Description	Allotted hours
Unit-I: Humans and the Environment		
1.	The man-environment interaction: • Humans as hunter-gatherers; Mastery of fire; Origin of agriculture; • Emergence of city-states; Great ancient civilizations and the environment; • Middle Ages and Renaissance; • Industrial revolution and its impact on the environment; • Population growth and natural resource exploitation; Global environmental change. The emergence of environmentalism: • Anthropocentric and eco-centric perspectives (Major thinkers); • The Club of Rome- Limits to Growth; • UN Conference on Human Environment 1972; • World Commission on Environment and Development and the concept of sustainable development; • Rio Summit and subsequent international efforts.	6 hrs
Unit-II: Natural Resources and Sustainable Development		
2.	• Overview of natural resources: Definition of resource; Classification of natural resources biotic and abiotic, renewable and non-renewable. • Biotic resources: Major type of biotic resources- forests, grasslands, wetlands, wildlife and aquatic (fresh water and marine); Microbes as a resource; Status and challenges. • Water resources: Types of water resources- fresh water and marine resources; Availability and use of water resources; Environmental impact of over-exploitation, issues and challenges; Water scarcity and stress; Conflicts over water. • Soil and mineral resources: Important minerals; Mineral exploitation; Environmental problems due to extraction of minerals and use; Soil as a resource and its degradation.	8 hrs

Sl. No.	Description	Allotted hours
	Energy resources: Sources of energy and their classification, renewable and non-renewable sources of energy; Conventional energy sources- coal, oil, natural gas, nuclear energy; Nonconventional energy sources- solar, wind, tidal, hydro, wave, ocean thermal, geothermal, biomass, hydrogen and fuel cells; Implications of energy use on the environment. Introduction to sustainable development: Sustainable Development Goals (SDGs)- targets and indicators, challenges and strategies for SDGs.	
Unit-III: Environmental Issues: Local, Regional and Global		
3.	Environmental issues and scales: Concepts of micro-, meso-, synoptic and planetary scales; Temporal and spatial extents of local, regional, and global phenomena. Pollution: Impact of sectoral processes on Environment, Types of Pollution- air, noise, water, soil, municipal solid waste, hazardous waste; Transboundary air pollution; Acid rain; Smog. Land use and Land cover change: land degradation, deforestation, desertification, urbanization. Biodiversity loss: past and current trends, impact. Global change: Ozone layer depletion; Climate change.	8 hrs
Unit-IV: Conservation of Biodiversity and Ecosystems		
4.	Biodiversity and its distribution: Biodiversity as a natural resource; Levels and types of biodiversity; Biodiversity in India and the world; Biodiversity hotspots; Species and ecosystem threat categories. Ecosystems and ecosystem services: Major ecosystem types in India and their basic characteristics- forests, wetlands, grasslands, agriculture, coastal and marine; Ecosystem services- classification and their significance. Threats to biodiversity and ecosystems: Land use and land cover change; Commercial exploitation of species; Invasive species; Fire, disasters and climate change. Major conservation policies: in-situ and ex-situ conservation approaches; Major protected areas; National and International Instruments for biodiversity conservation; the role of traditional knowledge, community-based conservation; Gender and conservation.	8 hrs

Reference Books

Sl. No.	Author / Publisher	Nomenclature of Book
1.	Fisher, Michael H. (2018), Cambridge University Press	An Environmental History of India- From Earliest Times to the Twenty-First Century
2.	John W. Twidell and Anthony D. (2015), Weir Publisher (ELBS)	Renewable Energy Sources
3.	Singh, J.S., Singh, S.P. & Gupta, S.R.	Ecology, Environment and Resource Conservation
4.	Rajagopalan, R. (2011), Oxford University Press	Environmental Studies: From Crisis to Cure India
5.	Sinha, Neha (2020), Harper Collins, India	Wild and Wilful

Semester-II**Course Code: BAV 151-T****Course Title: Workshop Technology****Total Contact Hours: 30 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Theory – 02 Lectures/ Week****Course Objectives:**

1. To understand the necessity and importance of Ground handling and storage of aircraft.
2. To study disassembly, inspection, repair and assembly techniques.
3. To learn the inspections to be done after abnormal events.

Learning Outcomes:

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

1. The student would understand basics of aircraft Taxing, Towing and safety Precautions around aircraft.
2. Understand general concept of jacking and levelling Procedures.
3. Understand different Non-destructive inspection techniques.
4. Understand different abnormal events.

Sl. No.	Description	Allotted hours
Unit-I: Aircraft Handling and Storage		
1.	• Aircraft taxiing/ towing and associated safety precautions; • Aircraft jacking, chocking, securing and associated safety precautions; • Aircraft storage methods;	10 hrs
Unit-II: Disassembly, Inspection, Repair and Assembly Techniques		
2.	• Types of defects and visual inspection techniques; • Corrosion removal, assessment and re-protection; • Non-destructive inspection techniques including radiographic, eddy current and ultrasonic; including practical training in colour contrast penetrant inspection; • Disassembly and re-assembly techniques; • Troubleshooting techniques.	15 hrs
Unit-III: Abnormal Events		
3.	Inspections following lightning strikes and HIRF penetration	05 hrs

Reference Books:

Sl. No.	Author / Publisher	Nomenclature of Book
1.	Aircraft Tech Book Co	EASA Module-07A Maintenance Practices
2.	CAIP II	Civil Aircraft Inspection Procedure - Part II
3.	FAA H 8083-30	Aviation Maintenance Technician Handbook- General

Semester-II**Course Code: BAV 152-P****Course Title: Workshop Technology Lab****Total Contact Hours: 40 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Practical – 04/ Week****Learning Outcomes:**

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

1. Learn safety precautions to be taken around aeroplane.
2. Learn the use of ground support equipment.
3. Learn jacking procedure of aircraft.
4. Learn aircraft operation procedures.

Students have to perform minimum 06 Practical listed below:

Sl. No.	Basic Practical Tasks
1.	Conversant with safety precautions around aircraft, protection at engine exhaust areas.
2.	Conversant with safety from noise, FOD, tools & equipment.
3.	Perform the use of chocks, trestles. Check the tire pressure.
4.	Perform the use of sling, ladder and other ground support equipment.
5.	Perform parking procedures and use of protective covers of aircraft.
6.	Perform marshalling practices.
7.	Perform tie down procedures and mooring procedures.
8.	Connection and uses of external electrical power supply. Perform grounding/ earthing of aircraft.
9.	Perform lubrication in control hinges.
10.	Perform jacking of nose or main wheel and/or complete aircraft.

Semester-II**Course Code: BAV 153-T****Course Title: Electronic Fundamentals****Total Contact Hours: 30 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Theory – 02 Lectures/ Week****Course Objectives:**

1. To study different diodes.
2. To study transistors.
3. To study integrated circuits.
4. To study printed circuit boards.

Learning Outcomes:

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

1. Acquire a basic knowledge of diodes.
2. Acquire a basic knowledge of transistors.
3. Acquire a basic knowledge of integrated circuits.
4. Acquire a basic knowledge of printed circuit boards.

Sl. No.	Description	Allotted hours
Unit-I: Diodes		
1.	Description and characteristics- • Diode symbols; • Diode characteristics and properties; • Diodes in series and parallel; • Materials, electron configuration, electrical properties; • P and N type materials: effects of impurities on conduction, majority and minority characters; • P N junction in a semiconductor, development of a potential across a P N junction in unbiased, forward-biased and reverse-biased conditions; • Diode parameters: peak inverse voltage, maximum forward current, temperature, frequency, leakage current, power dissipation; • Main characteristics and use of silicon-controlled rectifiers (thyristors), light-emitting diodes (LEDs), photo-conductive diodes, rectifier diodes.	15 hrs
Unit-II: Transistors & Integrated Circuits		
2.	Transistors • Transistor symbols; • Component description and orientation; • Transistor characteristics and properties.	10 hrs
3.	Integrated Circuits • Description and operation of logic circuits and linear circuits/operational amplifiers.	
Unit-III: Printed Circuit Boards		
4.	• Description of printed circuit boards. • Uses of printed circuit boards.	05 hrs

Reference Books:

Sl. No.	Author / Publisher	Nomenclature of Book
1.	Aircraft Tech Book Co.	EASA Module- 04 Electrical Fundamentals
2.	Bernard Grob	Basic Electronics
3.	FAA H 8083-30	Aviation Maintenance Technician Handbook- General
4.	Thomas K Eismen	Aircraft Electricity & Electronics
5.	V K Mehta	Principle of Electronics

Semester-II**Course Code: BAV 154-P****Course Title: Electronic Fundamentals Lab****Total Contact Hours: 40 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Practical – 04/ Week****Learning Outcomes:**

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

1. Study different diodes and their application.
2. Understand transistor biasing.
3. Understand the truth tables of various logic gates.
4. Understand the use of Printed Circuit Boards.

Students have to perform minimum 06 Practical listed below:

Sl. No.	Basic Practical Tasks
1.	Study the characteristics of PN Junction by using trainer kit.
2.	Study Half wave & Full wave rectifier in trainer kit and observe the output waveform using CRO.
3.	Study Bridge rectifier in trainer kit and observe the output waveform using CRO.
4.	Study the Zener Diode by using trainer kit.
5.	Study the multivibrator circuit by using trainer kit.
6.	Study the clipper circuit by using trainer kit.
7.	Study the clamper circuit by using trainer kit.
8.	Study the voltage tripler by using trainer kit.
9.	Study of transistor biasing by using trainer kit.
10.	Study the truth tables of various logic Gates by using trainer kit.
11.	Study the design of Printed Circuit Boards
12.	Study the uses of Printed Circuit Boards

Semester-II**Course Code: BAV 155-T****Course Title: Aircraft Metallurgy****Total Contact Hours: 30 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Theory – 02 Lectures/ Week****Course Objectives:**

1. Introduction to ferrous materials used in aircraft.
2. Introduction to non-ferrous materials used in aircraft.
3. To introduce aircraft corrosion.

Learning Outcomes:

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

1. Understand the basic concept of ferrous materials used in aviation.
2. Understand the basic concept of non-ferrous materials used in aviation.
3. Know importance of corrosion and its prevention in aviation.

Sl. No.	Description	Allotted hours
Unit-I: Aircraft Materials- Ferrous		
1.	• Characteristics, properties and identification of common alloy steels used in aircraft; • Heat treatment and application of alloy steels.	12 hrs
Unit-II: Aircraft Materials- Non Ferrous		
2.	• Characteristics, properties and identification of common non-ferrous materials used in aircraft; • Heat treatment and application of non-ferrous materials.	8 hrs
Unit-III: Corrosion		
3.	• Chemical fundamentals; • Formation by galvanic action process, microbiological contamination, mechanical stress; • Types of corrosion and their identification; • Causes of corrosion; • Material types, susceptibility to corrosion.	10 hrs

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-II**Course Code: BAV 156-P****Course Title: Aircraft Metallurgy Lab****Total Contact Hours: 40 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Practical – 04/ Week****Learning Outcomes:**

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

1. Learn safety precautions to be taken in lab.
2. Learn the identification of ferrous & non-ferrous metals used in aircraft.
3. Learn the identification of composite materials used in aircraft.
4. Learn the identification & removal of aircraft corrosion.

Students have to perform minimum 06 Practical listed below:

Sl. No.	Basic Practical Tasks
1.	Conversant with safety precautions, safety of tools & equipment.
2.	Identification of common ferrous metals used in aircraft construction.
3.	Identification of common non-ferrous metals used in aircraft construction.
4.	Identification of various non-metallic materials used in aircraft.
5.	Identification of different types of corrosion.
6.	Identification of microbiological contamination.
7.	Study the factors affecting corrosion.
8.	Perform corrosion removal process.

Semester-II**Course Code: SEC 151-T****Course Title: Aviation Mathematics-II****Total Contact Hours: 30 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Theory – 02 Lectures/ Week****Course Objectives:**

1. Apply transformation matrices to perform translation, rotation, reflection, scaling, and shearing of geometric objects.
2. Develop analytical and computational skills for solving geometric transformation problems used in engineering, aviation, computer graphics, and related fields.
3. Understand the principles of matrix algebra and its applications in solving systems of linear equations and transformation problems.
4. Analyze matrices using rank, Gaussian elimination, Gauss-Jordan elimination, eigenvalues, and eigenvectors for practical engineering applications.
5. Study coordinate geometry in two and three dimensions, which helps in understanding aircraft positioning and spatial orientation.
6. Study matrices and system of linear equations.

Learning Outcomes:

After learning this course, the student will be able to: Apply matrix methods to perform two-dimensional geometric transformations such as translation, rotation, reflection, and scaling on points and lines.

1. Solve problems involving composite transformations, including rotation about an arbitrary point and reflection through an arbitrary line in two-dimensional space.
2. Perform three-dimensional transformations including translation, scaling, shearing, rotation, reflection, and multiple transformations using transformation matrices.
3. Analyze and solve systems of linear equations using matrix techniques such as Gauss Elimination and Gauss-Jordan methods.
4. Determine the rank, eigenvalues, and eigenvectors of matrices (up to 3×3 order) and interpret their mathematical significance.

Sl. No.	Description	Allotted hours
Unit-I: Co-ordinate Geometry 2 D		
1.	- Transformation & Matrices - Transformation of : point, straight line, parallel lines, intersecting line - Transformation : rotation , reflection, scaling - Rotation about arbitrary point - Reflection through arbitrary line	12 hrs
Unit-II: Three Dimensional Transformation		
2.	- Three Dimensional : Scaling , Shearing , rotation , reflection, translation - Multiple Transformation - Rotation About an axis - Reflection Through Arbitrary Plane	10 hrs
Unit-III: Applied Algebra-		
3.	- System of linear equations, Matrix form of system of linear equations, Rank of a matrix; - Gauss Elimination and Gauss Jordan Methods; - Eigen values, Eigen vectors, characteristic equation of a matrix of order up to 3×3.	8 hrs

Reference Books:

Sl. No.	Author / Publisher	Nomenclature of Book
1.	Shantinakaran	Analytical Solid Geometry
2.	K.B. Datta	Matrix and Linear Algebra
3.	P. K. Jain and Khalil Ahmed	A Text Book of Analytical Geometry of Three Dimensions
4.	Shanti Narayan and P. K. Mittal	<i>Analytical Solid Geometry</i> , S. Chand & Company Ltd., New Delhi.
5.	Dr. S. Arumugam & A. Thangapandi Isaac	<i>Analytical Geometry of Two and Three Dimensions</i> , New Gamma Publishing House.
6.	S. Kumaresan	<i>Linear Algebra – A Geometric Approach</i> , Prentice Hall of India
7.	S. L. Loney	<i>The Elements of Coordinate Geometry</i> , Arihant Publications.

Semester-II**Course Code: AEC 151-ENG Course Title: Developing Communicative Competence in English-II****Total Contact Hours: 30 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Theory – 02 Lectures/ Week****Course Objectives:**

1. To develop effective reading skills.
2. To enhance written communication skills.
3. To foster critical thinking and functional communication.

Learning Outcomes:

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

1. Develop a positive attitude toward reading.
2. Become competent in communication.
3. Realize that literary pieces are very good examples of effective communication.

Sl. No.	Description	Allotted hours
Unit-I: Joy of Reading		
1.	a. Reading for Comprehension b. Skimming and Scanning c. Speed Reading and Loud Reading d. Reading for Different Purposes e. Reading and Making Notes	15 hrs
Unit-II: Forms of Writing		
2.	a. Paragraph Writing b. Expansion of Ideas c. Summarizing d. Letter Writing e. Writing Notices, Agendas and Minutes f. E-mail Writing g. Writing for Digital Platforms	15 hrs

Reference Books:

Sl. No.	Author / Publisher	Nomenclature of Book
1.	Sharma, R. C. & Krishna Mohan.	Business Correspondence and Report Writing: Third Edition. New Delhi: Tata McGraw-Hill Publishing company Limited, 2007
2.	Board of Editors, Orient BlackSwan, 2024	Developing Communicative Competence in English
3.	Monippally, Matthukutty, M.	Business Communication Strategies, New Delhi: Tata McGraw-Hill Publishing Company Ltd., 2001

Semester-II**Course Code: VEC 151-T****Course Title: Environment Education-II****Total Contact Hours: 30 hrs****Total Credits: 02****Total Marks: 50****Teaching Scheme: Theory – 02 Lectures/ Week****Course Objectives:**

1. To study environmental pollution and their impacts on health.
2. To study climate change, including its causes and effects.
3. To study environmental management practices and their effectiveness.
4. To study key environmental treaties and legislation.

Learning Outcomes:

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

1. Identify various types of environmental pollution and their impacts on health.
2. Explain the basic concepts of climate change, including its causes and effects.
3. Evaluate various environmental management practices and their effectiveness.
4. Understand key environmental treaties and legislation.

Sl. No.	Description	Allotted hours
Unit-I: Environmental Pollution and Health		
1.	• Understanding pollution: Production processes and generation of wastes; Assimilative capacity of the environment; Definition of pollution; Point sources and non-point sources of pollution. • Air pollution: Sources of air pollution; Primary and secondary pollutants; Criteria pollutants carbon monoxide, lead, nitrogen oxides, ground-level ozone, particulate matter and sulphur dioxide; Other important air pollutants- Volatile Organic compounds (VOCs), Peroxyacetyl Nitrate (PAN), Polycyclic aromatic hydrocarbons (PAHs) and Persistent organic pollutants (POPs); Indoor air pollution; Adverse health impacts of air pollutants; National Ambient Air Quality Standards. • Water pollution: Sources of water pollution; River, lake and marine pollution, groundwater pollution; water quality Water quality parameters and standards; adverse health impacts of water pollution on human and aquatic life. • Soil pollution and solid waste: Soil pollutants and their sources; Solid and hazardous waste; Impact on human health. • Noise pollution: Definition of noise; Unit of measurement of noise pollution; Sources of noise pollution; Noise standards; adverse impacts of noise on human health. • Thermal and Radioactive pollution: Sources and impact on human health and ecosystems.	8 hrs

Sl. No.	Description	Allotted hours
Unit-II: Climate Change: Impacts, Adaptation and Mitigation		
2.	• Understanding climate change: Natural variations in climate; Structure of atmosphere; Anthropogenic climate change from greenhouse gas emissions– past, present and future; Projections of global climate change with special reference to temperature, rainfall, climate variability and extreme events; Importance of 1.5 °C and 2.0 °C limits to global warming; Climate change projections for the Indian sub-continent. • Impacts, vulnerability and adaptation to climate change: Observed impacts of climate change on ocean and land systems; Sea level rise, changes in marine and coastal ecosystems; Impacts on forests and natural ecosystems; Impacts on animal species, agriculture, health, urban infrastructure; the concept of vulnerability and its assessment; Adaptation vs. resilience; Climate-resilient development; Indigenous knowledge for adaptation to climate change. • Mitigation of climate change: Synergies between adaptation and mitigation measures; Green House Gas (GHG) reduction vs. sink enhancement; Concept of carbon intensity, energy intensity and carbon neutrality; National and international policy instruments for mitigation, decarbonizing pathways and net zero targets for the future; Energy efficiency measures; Renewable energy sources; Carbon capture and storage, National climate action plan and Intended Nationally Determined Contributions (INDCs); Climate justice.	6 hrs
Unit-III: Environmental Management		
3.	• Introduction to environmental laws and regulation: Constitutional provisions- Article 48A, Article 51A (g) and other derived environmental rights; Introduction to environmental legislations on the forest, wildlife and pollution control. • Environmental management system: ISO 14001 Life cycle analysis; Cost-benefit analysis Environmental audit and impact assessment; Environmental risk assessment, Pollution control and management; Waste Management- Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling/ Ecomark scheme.	6 hrs
Unit-IV: Environmental Treaties and Legislation		
4.	An overview of instruments of international cooperation; bilateral and multilateral agreements; conventions and protocols; adoption, signature, ratification and entry into force; binding and non-binding measures; Conference of the Parties (COP). • Major International Environmental Agreements: Convention on Biological Diversity (CBD); Cartagena Protocol on Biosafety; Nagoya Protocol on Access and Benefit-sharing; Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES); Ramsar Convention on Wetlands of International Importance; United Nations Convention to Combat Desertification (UNCCD); Vienna Convention for the Protection of the Ozone Layer; Montreal Protocol on Substances that Deplete the Ozone Layer and the Kigali Amendment; Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal; Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade; Stockholm Convention on Persistent Organic Pollutants; Minamata Convention on Mercury; United Nations Framework Convention on Climate Change (UNFCCC); Kyoto Protocol; Paris Agreement;	10 hrs

Sl. No.	Description	Allotted hours
5.	India's status as a party to major conventions Major Indian Environmental Legislations: The Wild Life (Protection) Act, 1972; The Water (Prevention and Control of Pollution) Act, 1974; The Forest (Conservation) Act, 1980; The Air (Prevention and Control of Pollution) Act, 1981; The Environment (Protection) Act, 1986; The Biological Diversity Act, 2002; The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006; Noise Pollution (Regulation and Control) Rules, 2000; Industry-specific environmental standards; Waste management rules; Ramsar sites; Biosphere reserves; Protected Areas; Ecologically Sensitive Areas; Coastal Regulation Zone; Status phase-out of production and consumption of Ozone Depleting Substances by India; National Green Tribunal; Some landmark Supreme Court judgements. • Major International organisations and initiatives: United Nations Environment Programme (UNEP), International Union for Conservation of Nature (IUCN), World Commission on Environment and Development (WCED), United Nations Educational, Scientific and Cultural Organization (UNESCO), Intergovernmental Panel on Climate Change (IPCC), and Man and the Biosphere (MAB) programme.	

Reference Books

Sl. No.	Author / Publisher	Nomenclature of Book
1.	Ahluwalia, V. K. (2015) The Energy and Resources Institute (TERI)	Environmental Pollution, and Health
2.	www.ipcc.org	https://www.ipcc.ch/report/sixth-assessment-report-cycle/
3.	Kanchi Kohli and Manju Menon (2021), Cambridge University Press.	Development of Environment Laws in India,