INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)
PALLAVARAM - CHENNAI
ACCREDITED BY NAAC WITH 'A' GRADE
Marching Beyond 25 Years Successfully

BSc Aviation

Curriculum and Syllabus
Regulations 2021

(Based on Choice Based Credit System (CBCS)
and
Learning Outcomes based Curriculum Framework (LOCF))

Effective from the Academic year
2021-2022

Department of Aviation

Department of Aviation

VISION

To be forefront in the aviation field by contributing to the intellectual, social and economic development of the aviation industry and the citizens of our nation. It is served through precept, research fueled by the advanced curriculum to endeavour the highest standards to excel in their Aviation profession.

MISSION

- To empower and encourage the students with the knowledge and practical skills required in the field of Aviation and Aviation.
- To impart quality education through the technologically advanced curriculum which would be delivered by the industry experts.
- To train the students to have in-depth knowledge of the subjects in the field of aviation and groom them in soft skills & survival skills.

PROGRAMME EDUCATIONAL OUTCOME (PEOs)

PEO 1: To Produce Graduates demonstrating their critical thinking, communication, team work and situational awareness skills on daily basis

PEO 2: To produce graduates who can meet the diversified needs of the aviation industry.

PEO 3: To gain an understanding of professional and ethical behaviour in the aviation field.

PROGRAM OUTCOMES (POs)

PO 1: Disciplinary knowledge

Students will demonstrate in-depth knowledge and understanding of Aviation field

PO 2: Communication Skills

Students can express thoughts and ideas effectively in writing and orally, and also able to present complex information clearly and concisely to different groups.

PO 3: Critical thinking

Students can apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs based on empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following a scientific approach to knowledge development.

PO 4: Problem-solving

Students can build the capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one’s learning to real-life situations.

PO 5: Analytical reasoning

Students can evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.

PO 6: Research-related skills

Students can recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; the ability to plan, execute and report the results of an experiment or investigation.

PO 7: Cooperation/Team work

Students can work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.

PO 8: Scientific reasoning

Students can analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.

PO 9: Reflective thinking

Students can develop Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.

PO 10: Information/digital literacy

Students can use ICT in a variety of learning situations, demonstrate the ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO 11: Self-directed learning

Students can work independently, identify appropriate resources required for a project, and manage a project through to completion.

PO 12: Multicultural competence

Students can get knowledge of the values and beliefs of multiple cultures and a global perspective, and the capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO 13: Moral and ethical awareness/reasoning

Students can embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting an objective, unbiased and truthful actions in all aspects of work.

PO 14: Leadership readiness/qualities

Students can develop the ability to mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team that can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, smoothly and efficiently.

PO 15: Lifelong learning

Students can acquire knowledge and skills, including "learning how to learn", that is necessary for participating in learning activities throughout life.

PROGRAMME SPECIFIC OUTCOME (PSOS)

At the end of the program, the students are

PSO 1: Able to understand the various scientific principles and they can able to apply in the field of Aviation.

PSO 2: Demonstrate ability to research information pertinent to their aviation discipline.

PSO 3: Realize the need to continuously gain knowledge throughout life within and outside of aviation

LIST OF BOARD OF STUDIES (BOS) MEMBERS

S.NO	NAME OF THE MEMBERS	DESIGNATION & ROLL
1	Mr. T. Gopalakrishnan	Assistant Professor & HOD, Department of Aviation, VISTAS Chairman.
2	Mr. C.V.Raveendran	Training Manager MH Cockpit
3	Capt. Adil Bharia	Internal Board Member MH Cockpit
4	Mrs. Farah Khan	Internal Board Member MH Cockpit
5	Mrs. Vandhika Lambha	Internal Board Member MH Cockpit
6	Mrs. Lina Bose	Internal Board Member MH Cockpit
7	Mr. Waseem Raja	Internal Board Member MH Cockpit
8	Mrs. Ashika parveen	Internal Board Member MH Cockpit

UG REGULATIONS 2021

DEGREE OF BACHELOR OF SCIENCE (AVIATION)

1. DURATION OF THE PROGRAMME

1.1. Three years (six semesters)

1.2. Each academic year shall be divided into two semesters. The odd semesters shall consist of the period from July to November of each year and the even semesters from January to May of each year.

1.3 There shall be not less than 90 working days for each semester.

2. ELIGIBILITY FOR ADMISSION

2.1. The details of Eligibility for Admission – Pass in Higher Secondary or equivalent to HSC

3. MEDIUM OF INSTRUCTION

The medium of instruction for all UG programmes is English excluding Tamil, Hindi and French Language Papers.

4. CREDIT REQUIREMENTS AND ELIGIBILITY FOR AWARD OF DEGREE

A Candidate shall be eligible for the award of Degree only if he/she has undergone the prescribed course of study in VISTAS for not less than three academic years and passed the examinations of all the prescribed courses of Six Semesters earning a minimum of 140 credits as per the distribution given in for Part I, II, III and also fulfilled such other conditions as having been prescribed thereof.

5. COURSE

Each course/subject is to be designed under lectures/tutorials/laboratory or fieldwork/seminar / practical training / Assignments / Term paper or Report writing etc., to meet effective teaching and learning needs.

6. COURSE OF STUDY AND CREDITS

The Course Components and Credit Distribution shall consist of Part I, II & III:

The programme consists of some courses. The term ‘course’ is applied to indicate a logical part of the subject matter of the programme and is invariably equivalent to the subject

matter of a 'paper' in the conventional sense. The following are the various categories of courses suggested for the UG programmes.

Part I – Language Courses (LC) (any one of Tamil, Hindi, French or special subject designed in place of the above).

Part II – English Language courses (ELC) or special subject designed in place of.

The Language courses and English Language Courses are 4 each / 2 each in number and the LC and ELC are meant to develop the student's communicative skill at the UG level.

Part III – Core courses i.e., major courses that are compulsorily required for each of the programmes of study (CC), Ability Enhancement Course (AEC), Discipline Specific Elective Course (DSE) and Skill Enhancement Course (SEC).

For each course, credit is assigned based on the following:

Contact hour per week		CREDITS
1 Lecture hour	-	1 Credit
1 Tutorial hour	-	1 Credit
2 Practical hours	-	1 Credit

(Laboratory / Seminar / Project Work / etc.)

7. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER

7.1. **Eligibility:** Students shall be eligible to go to subsequent semesters only if they earn sufficient attendance as prescribed therefore by the Board of Management from time to time.

7.2. **Attendance:** All Students must earn 75% and above of attendance for appearing for the University Examination. (Theory/Practical)

7.3. **Condonation of shortage of attendance:** If a student fails to earn the minimum attendance (Percentage stipulated), the HODs shall condone the shortage of attendance on medical grounds up to a maximum limit of 10% (i.e. between 65% and above and less than 75%) after paying the prescribed fee towards the condonation of shortage of attendance. The students with attendance of less than 65 and more than 50% shall be

condoned by VC on the recommendation of HODs on genuine grounds, will be permitted to appear for the regular examination on payment of the prescribed condonation fee.

7.4. **Detained students for want of attendance:** Students who have earned less than 50% of attendance shall be permitted to proceed to the next semester and to complete the Program of study. Such Students shall have to repeat the semester, which they have missed by rejoining after completion of the final semester of the course, by paying the fee for the break of study as prescribed by the University from time to time.

7.5. **Transfer of Students and Credits:** The strength of the credits system is that it permits inter Institutional transfer of students. By providing mobility, it enables individual students to develop their capabilities fully by permitting them to move from one Institution to another following their aptitude and abilities.

7.5.1. Transfer of Students is permitted from one Institution to another Institution for the same program with the same nomenclature, provided, there is a vacancy in the respective program of Study in the Institution where the transfer is requested.

7.5.2. The marks obtained in the courses will be converted into appropriate grades as per the University norms.

7.5.3. The transfer students are not eligible for Rankings, Prizes and Medals.

7.5.4. Students who want to go to foreign Universities for up to two semesters or Project Work with the prior approval of the Departmental / University Committee are allowed to transfer their credits. Marks obtained in the courses will be converted into Grades as per the University norms and the students are eligible to get CGPA and Classification.

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (LOCF)

TABLE OF CONTENTS

Learning Outcomes-Based Curriculum Framework for Undergraduate Education in BSc (Aviation)

1. Introduction

The Learning Outcomes-based Curriculum Framework (LOCF) for the undergraduate programs in BSc Aviation is intended to make available an extensive structure to create an academic base that responds to the requirements of the students to understand the basics of Aviation. The learning outcomes-based curriculum framework (LOCF) for B.Sc. Aviation is intended to prepare a curriculum that enables the graduates to respond to the current needs of the industry and equip them with skills relevant to national and global standards. The framework will assist in maintaining international standards to ensure global competitiveness and facilitate student/graduate mobility after completion of B.Sc. Aviation program. The framework intends to allow for greater flexibility and innovation in curriculum design and syllabus development, teaching-learning process, assessment of student learning levels.

Many courses incorporate training and practical experience, in the form of projects, presentations, internships, industrial visits, and interaction with experts from the industry as a part of the BSc Course syllabus.

2. Learning Outcomes-based Curriculum framework

2.1 Nature and extent of BSc Aviation Programme

The UG programs in BSc Aviation builds on the basic physics and maths taught at the +2 level in all the schools in the country. Ideally, the +2 senior secondary school education should aim and achieve a sound grounding in understanding the fundamentals of science orientated subjects with sufficient content of topics from the modern science subjects and contemporary areas of exciting developments in science to ignite the young minds. The curriculum provides skills in mathematics, physics, Air Navigation, Aviation Meteorology, Air Regulation, Aircraft and Engines, Aircraft structures, Aerodynamics.

The Bachelor of Science in Aviation is a broad-based multi-disciplinary programme with a wide spectrum of courses in aircraft technology such as Air navigation,

aerodynamics/propulsion and aerospace management targeted for the MRO and applied research and development sector of the aviation industry. the programme also includes courses in airport and airline ground operations, flight operations, Air traffic management to educate and equip the graduates employable in various roles of the airline, aerospace industries. Students of this program have the privilege to earn a Bachelor degree in their area of specialization. After graduation in Aviation, students have the option of further advanced courses in the field such as CPL, ATPL, M.E. (Aeronautical Engineering), M.Tech. (Aeronautical Engineering), PhD (Aeronautical Engineering).

2.2 The aim and objectives of the BSc Aviation

The aims and objectives of our BSc Programme are structured to:

1. To produce Aviation professionals who are knowledgeable, competent and innovative which will contribute towards the human capital in airline/ Aerospace/Air traffic management/ engineering technology-related industry.
2. To produce aviation professional who has effective leadership and teamwork skills as well as verbal, non-verbal and interpersonal communication skills to support their role in the industry.
3. To produce aviation professionals who are committed to the importance of lifelong learning and continuous improvement.
4. To produce leaders who practise professionalism with ethics and social responsibility.
5. To practice a high level of professionalism necessary to deliver the knowledge, expertise and skill of students through the application of research to business problems and issues.

3. Graduate attributes in BSc Aviation

Some of the characteristic attributes of a graduate in BSc Aviation are

i. **Disciplinary knowledge and skills:** Capable of Understanding the major concepts and principles in Aviation and its different subfields like aerodynamics, aircraft structures, aero engines, navigation, meteorology etc.,

ii. **Skilled communicator:** Ability to transmit National and international information relating to all areas in the aviation field clearly and concisely in writing and oral.

iii. **Critical thinker and problem solver:** Ability to employ critical thinking and efficient problem-solving skills in all the fields in business and management to meet the competition and for proper decision making in business.

iv. **Sense of inquiry:** Capability for asking relevant/appropriate questions relating to contemporary issues and problems in the field of Aviation and aviation.

v. **Team player/worker**: Capable of working effectively in diverse teams in both classroom and field visits like industry and market.

vi. **Digitally Efficient*:*** Capable of using computers for design, analysis and computation with appropriate software, and employing modern e-library search tools.

vii. **Ethical awareness/reasoning*:*** The graduate should be capable of demonstrating the ability to think and analyse rationally with a modern and scientific outlook and identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights, and adopting objectives, unbiased and truthful actions in all aspects of work.

viii. **National and international perspective*:*** The graduates should be able to develop a national as well as international perspective for their career in the chosen field of academic activities. They should prepare themselves during their most formative years for their appropriate role in contributing towards the national development and projecting our national priorities at the international level about their field of interest and future expertise.

ix. **Lifelong learners:** Capable of self-paced and self-directed learning aimed at personal development and for improving knowledge/skill development and reskilling in all areas of business management.

4. Qualification descriptors for BSc Aviation Program

A qualification descriptor indicates the generic outcomes and attributes expected for the award of a particular type of qualification. The learning experiences and assessment procedures are expected to be designed to provide every student with the opportunity to achieve the intended programme learning outcomes. The qualification descriptors reflect the followings:

1. Disciplinary knowledge and understanding

2. Skills & Ability

3. Global competencies that all students in different academic fields of study should acquire/attain and demonstrate.

Qualification descriptors for B.Sc. Aviation programme:

Some of the expected learning outcomes that a student should be able to demonstrate on completion of a B.Sc. Aviation programme may include the following:

Knowledge & Understanding

i. Demonstrate extensive knowledge of the disciplinary foundation in the various areas of Aeronautics, as well as insight into contemporary research and development.
ii. Demonstrate specialized methodological knowledge in the specialized areas of aeronautics about professional literature, principles of flight and reviewing scientific work.

Skills & Ability

i. Demonstrate ability to apply aeronautics knowledge & experimental skills critically and systematically for assessment and solution of complex problems and issues related to aircraft design, Flight operation and other specialized areas of aviation.
ii. Demonstrate ability to model, simulate and evaluate the phenomenon and systems in the aircraft.
iii. Demonstrate ability to apply one's Aviation knowledge, experimental skills, scientific methods & advanced design, simulation and validation tools to identify and analyse complex real-life problems and frame technological solutions for them.

Competence

i. Communicate his or her conclusions, knowledge & arguments effectively and professionally both in writing and utilizing presentation to different audiences in both national and international context.
ii. Ability to work collaboratively with others in a team, contributions to the management, planning and implementations.
iii. Ability to independently propose research/developmental projects, plan their implementation, undertake its development, evaluate its outcomes and report its results properly.
iv. Ability to identify the personal need for further knowledge relating to the current and

emerging areas of study by engaging in lifelong learning in practices.

5. Programme learning outcomes relating to BSc Aviation

PL01: Able to apply knowledge of science and mathematics to their aviation discipline.

PL 02: An ability to function on a multidisciplinary team.

PL03: An ability to design, troubleshoot system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.

PL04: Be able to research, analyze, interpret, and apply various data.

PL05: Understand the fundamental technical aspects of flight and aircraft systems and operation

PL06: Recognition of the need for, and an ability to engage in life-long learning.

PL07: Gain knowledge of the business structure, management and administrative aspects of airlines, corporate flight operations and airport operations.

PL08: Have knowledge of regulatory and legal issues which impact the industry.

PL09: An understanding of professional and ethical responsibility.

TEACHING-LEARNING PROCESS

Teaching-learning process and assessment of student learning levels. Instead, they are intended to allow for flexibility and innovation in (i) programme design and syllabi development by higher education institutions (HEIs), (ii) teaching-learning process, (iii) assessment of student learning levels, and (iv) periodic programme review within a broad framework of agreed expected graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes. The overall objectives of the learning outcomes-based curriculum framework are to:

- Formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes that are expected to be demonstrated by the holder of a qualification;
- Enable prospective students, parents, employers and others to understand the nature and level of learning outcomes (knowledge, skills, attitudes and values) or attributes a graduate of a programme should be capable of demonstrating on successful completion of the programme of study;
- Maintain national standards and international comparability of learning outcomes and academic standards to ensure global competitiveness, and to facilitate student/graduate mobility; and
- Provide higher education institutions with an important point of reference for designing teaching-learning strategies, assessing student learning levels, and periodic review of programmes and academic standards.

7. ASSESSMENT METHODS

Examination And Evaluation

7.1 Examination:

i) There shall be examinations at the end of each semester, for odd semesters in October / November, for even semesters in April / May. A candidate who does not pass the examination in any course(s) shall be permitted to appear in such failed courses in the subsequent examinations to be held in October / November or April / May.

ii) A candidate should get registered for the first-semester examination. If registration is not possible owing to a shortage of attendance beyond condonation limit/regulations prescribed OR belated joining OR on medical grounds, the candidates are permitted to move to the next semester. Such candidates shall re-do the missed semester after completion of the programme.

iii) The results of all the examinations will be published through University Website. In the case of passed out candidates, their arrear results will be published through University Website.

7.2 **To Register for all subjects**: Students shall be permitted to proceed from the First Semester up to the Final Semester irrespective of their failure in any of the Semester Examination, except for the shortage of attendance programs. For this purpose, Students shall register for all the arrear subjects of earlier semesters along with the current (subsequent) Semester Subjects.

7.3. **Marks for Continuous Internal Assessment** (CIA) Examinations and End Semester Examinations (ESE) for PART I, II, III

7.3.1 There shall be no passing minimum for Continuous Internal Assessment (CIA) Examinations.

7.3.2 For the End Semester Examination, the passing minimum shall be 40% (Forty Percentage) of the maximum marks prescribed for the Course/Practical/Project and Viva-Voce.

7.3.3 In the aggregate (CIA and ESE) the passing minimum shall be 40%.

7.3.4. He / She shall be declared to have passed the whole examination, if he/she passes in all the courses wherever prescribed in the curriculum by earning 140 CREDITS in Part I, II, III.

7.4. **Question Paper Pattern** for End Semester Examination

SECTION – A 10 questions 10 X 2 = 20 Marks

SECTION – B 5 questions either or pattern 5 X 16 = 80 Marks

Total 100 Marks

7.5 SUPPLEMENTARY EXAMINATION:

Supplementary Examinations are conducted for the students who appeared in the final semester examinations. Eligible criteria for appearing in the Supplementary Examinations are as follows:

7.5.1. Eligibility: A Student who is having a maximum of two arrear papers is eligible to appear for the Supplementary Examination.

7.5.2. Non-eligibility for those who completed the program: Students who have completed their Program duration but having arrears are not eligible to appear for Supplementary Examinations.

7.6. RETOTALLING, REVALUATION AND PHOTOCOPY OF THE ANSWER SCRIPTS:

7.6.1. Re-totaling: All UG Students who appeared for their Semester Examinations are eligible for applying for re-totalling of their answer scripts.

7.6.2. Revaluation: All current batch Students who have appeared for their Semester Examinations are eligible for the Revaluation of their answer scripts. Passed out candidates are not eligible for Revaluation.

7.6.3. Photocopy of the answer scripts: Students who have applied for revaluation can download their answer scripts from the University Website after fifteen days from the date of publication of the results.

7.7. The examination and evaluation for MOOCs will be as per the requirements of the regulatory bodies and will be specified at the beginning of the Semester and notified by the university NPTEL-SWAYAM Coordinator (SPOC).

7.8. CLASSIFICATION OF SUCCESSFUL STUDENTS

7.8.1. PART I TAMIL / OTHER LANGUAGES; PART II ENGLISH AND PART III CORE SUBJECTS, ALLIED, ELECTIVES COURSES AND PROJECT: Successful Students passing the Examinations for the Part I, Part II and Part III courses and securing the marks

a) CGPA 9.00 to 10.00 shall be declared to have passed the examination in **First class with Outstanding**.

b) CGPA 7.50 to 8.99 shall be declared to have passed the examination in **First class with distinction**.

c) CGPA 6.00 to 7.49 shall be declared to have passed the examination in **First Class**.

d) CGPA 5.00 to 5.99 in the aggregate shall be declared to have passed the examination in the **Second** Class.

e) CGPA 4.00 to 4.99 shall be declared to have passed the examination in the **THIRD** Class.

7.9. MARKS AND GRADES:

The following table shows the marks, grade points, letter grades and classification to indicate the performance of the student:

7.9.1. Computation of Grade Point Average (GPA) in a Semester, Cumulative Grade Point Average (CGPA) and Classification.

GPA for a Semester: = $\sum iCiGi \div \sum iCi$ That is, GPA is the sum of the multiplication of grade points by the credits of the courses divided by the sum of the credits of the courses in a semester.

Where Ci= Credits earned for course I in any semester,

Gi = Grade Points obtained for course I in any semester

n = Semester in which such courses were credited.

Grade Conversion Table – UG			
Range of Marks	**Grade Points**	**Letter Grade**	**Description**
90 – 100	10	O	Outstanding
82 – 89	9	A+	Excellent
75 – 81	8	A	Very Good
67 – 74	7	B+	Good
60 – 66	6	B	Above Average
50 – 59	5	C	Average
40 – 49	4	D	Minimum for pass
0 – 39	0	RA	Reappear
		AAA	Absent

Letter Grade and Class CGPA

Overall Performance – UG		
CGPA	**GRADE**	**CLASS**
4.00 - 4.99	D	Third Class
5.00 - 5.99	C	Second Class
6.00 - 6.69	B	First Class
6.70 - 7.49	B+	
7.50 - 8.19	A	First Class with Distinction*
8.20 - 8.99	A+	
9.00 - 10.00	O	First Class - Outstanding*

7.10. RANKING

- The students who have passed in the first appearance and within the prescribed semester of the UG Programme (Major, Allied and Elective courses only) are eligible.
- Students who pass all the examinations prescribed for the Program in the FIRST APPEARANCE ITSELF ALONE are eligible for Ranking / Distinction.
- The case of Students who pass all the examinations prescribed for the Program with a break in the First Appearance is only eligible for Classification.
- Students qualifying during the extended period shall not be eligible for RANKING.

7.11 MAXIMUM PERIOD FOR COMPLETION OF THE PROGRAMS TO QUALIFY FOR A DEGREE

7.11.1. A Student who for whatever reason is not able to complete the programs within the normal period (N) or the Minimum duration prescribed for the programme, maybe allowed two years period beyond the normal period to clear the backlog to be qualified for the degree. (TimeSpan = N + 2 years for the completion of programme)

7.11.2. In exceptional cases like major accidents and childbirth an extension of one year is considered beyond the maximum period (Time Span= N + 2 + 1 years for the completion of programme).

7.12. REVISION OF REGULATIONS, CURRICULUM AND SYLLABI

The University may from time-to-time revise, amend or change the Regulations, Curriculum, Syllabus and Scheme of examinations through the Academic Council with the approval of the Board of Management.

Structure of Courses in BSc. Aviation

The B.Sc. The Aviation program consists of 140 credits based on the Choice Based Credit System (CBCS) approved by the UGC with 1 hour for each credit for theory/tutorials and 2 hours for each credit for laboratory work. The 140-credit course comprises 88 credits of Core courses (CC) and 4 credits of Ability Enhancement Compulsory Courses (AECC) which are mandatory as well as 33 credits of Discipline-specific courses (DSE), 12 credits of Skilled Enhancement courses (SEC) and 03 credits of Generic Elective. A student must take 140 credits in total to qualify for the grant of the BSc degree after completing them successfully as per rules and regulations of the HEI.

A detailed list of Core Courses, Discipline Specific Courses (DSE), Discipline Elective Course (DE), Generic Elective Courses (GEC), Skill Enhancement Courses (SEC) and Ability Enhancement Compulsory Courses (AECC) are given in Section 6.2.

Structure of UG Courses in BSc Aviation

Distribution of different Courses in each semester with their credits for BSc Aviation

Semester	Compulsory Core Courses (CC)	Discipline Specific Elective (DSE) each with 05 credit	Ability Enhancement Compulsory Courses (AECC) each with 04 credit	Skill Enhancement Course (SEC) each with 02 credit	Generic Elective (GE) each with 02 credit	Total Credits
Sem I	CC – 1		AECC-1			**24**
	CC – 2					
	CC – 3					
	CC – 4					
	CC – 5					
	CC – 6					
	CC – 7					
Sem II	CC – 8			SEC – 1		**24**
	CC – 9					
	CC – 10					
	CC – 11					
	CC – 12					
	CC – 13					
	CC – 14					
Sem III	CC – 15		AECC-2	SEC – 2		**24**
	CC – 16					
	CC – 17					
	CC – 18					
	CC – 19					
	CC – 20					
Sem IV	CC – 21			SEC – 3		**24**
	CC – 22			SEC – 4		
	CC – 23					
	CC – 24					
	CC – 25					
	CC – 26					
	CC – 27					
SEM V	CC – 28	DSE – 1		SEC – 5		**22**
		DSE – 2				
		DSE – 3				
		DSE – 4				
		DSE – 5				
		DSE – 6				
SEM VI		DSE - 7		SEC – 6	GE – 1	**22**
		DSE – 8		SEC – 7		
		DSE – 9 & DE – 1				
Total Credits	**88**	**33**	**4**	**12**	**3**	**140**

***Language and English are treated as core papers in the SEM I and SEM II**

Vels Institute of Science and Technology and Advanced studies (VISTAS)

B.Sc. Aviation

Courses of Study and Scheme of Assessment

(Minimum Credits to be earned :140)

B.Sc Aviation Course Components

Component	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	Total Credits
Core Courses & Languages	16 +6	16+6	14+6	15+6	3	-	88
Ability Enhancement t Courses (AEC)	2	-	2	-	-	-	4
Discipline Specific Elective (DSE) & Generic Elective (GEC)	-	-	-	-	17	19	36
Skill enhancement Course (SEC)	-	2	2	3	2	3	12
Total Credits	**24**	**24**	**24**	**24**	**22**	**22**	**140**

VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES

(VISTAS)

B.Sc. Aviation

COURSES OF STUDY AND SCHEME OF ASSESSMENT

(MINIMUM CREDITS TO BE EARNED: 140)

Code No.	Course	Hours/Week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	SEE	Total
SEMESTER 1								
LANG	Tamil I/ Hindi / French	3	0	0	3	40	60	100
ENG	English I	3	0	0	3	40	60	100
CORE	Mathematics	3	1	0	4	40	60	100
CORE	Fundamentals of physics	3	1	0	4	40	60	100
CORE	Familiarization of Airport	4	0	0	4	40	60	100
CORE	Physics Lab	0	0	4	2	40	60	100
CORE	Workshop Practices Lab	0	0	4	2	40	60	100
AECC	Communication Skills	1	0	2	2	40	60	100
SEC	Orientation/Induction programme / Life skills	-	-	-	-	-	-	-
		17	**2**	**10**	**24**			
SEMESTER 2								
LANG	Tamil II/ Hindi / French	3	0	0	3	40	60	100
ENG	English II	3	0	0	3	40	60	100
CORE	Theory of Flight (Aerodynamics)	3	1	0	4	40	60	100
CORE	Familiarization of Aircraft	3	1	0	4	40	60	100
CORE	Radio Telephony	4	0	0	4	40	60	100
CORE	Radio Telephony workshop	0	0	4	2	40	60	100
CORE	Aerodynamics Lab	0	0	4	2	40	60	100
SEC	Soft Skills - I / Sector Skill Council Course	2	0	0	2	40	60	100
SEC	NSS / NCC / Swachh Bharat / Inplant Training	-	-	-	-	-	-	-
		18	**2**	**8**	**24**			

CA - Continuous Assessment **SEE - Semester End Examination**

VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES

(VISTAS)

B.Sc. Aviation

COURSES OF STUDY AND SCHEME OF ASSESSMENT

Code No.	Course	Hours/Week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	SEE	Total
SEMESTER 3								
CORE	Air Regulation I	3	0	0	3	40	60	100
CORE	Air Navigation	3	0	0	3	40	60	100
CORE	Aviation Meteorology	4	0	0	4	40	60	100
CORE	Aircraft Power Plants	4	1	0	4	40	60	100
CORE	Introduction to airline Industry	4	0	0	4	40	60	100
AECC	Environmental Studies	2	0	0	2	40	60	100
CORE	ATC Communication and Its Units	0	0	4	2	40	60	100
SEC	Soft Skills - II / Sector Skill Council Course	2	0	0	2	40	60	100
SEC	Orientation/Induction programme / Life skills	-	-	-	-	-	-	-
		22	**1**	**4**	**24**			
SEMESTER 4								
CORE	Air Regulation II	4	0	0	3	40	60	100
CORE	Radio Aids	3	0	0	3	40	60	100
CORE	Piston Engine and Propellers	4	0	0	4	40	60	100
CORE	Human Factors	3	1	0	4	40	60	100
CORE	Aircraft Instruments	3	0	0	3	40	60	100
CORE	Flying Synthetic	0	0	4	2	40	60	100
CORE	Aero Engine Lab	0	0	4	2	40	60	100
SEC	Soft Skills III / Sector Skill Council Course	2	0	0	2	40	60	100
SEC	Internship / Capability Enhancement Programme	-	-	2	1	-	-	-
		19	**1**	**10**	**24**			

CA - Continuous Assessment **SEE - Semester End Examination**

VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES

(VISTAS)

B.Sc. Aviation

COURSES OF STUDY AND SCHEME OF ASSESSMENT

Code No.	Course	Hours/Week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	SEE	Total
SEMESTER 5								
CORE	Aircraft systems	3	0	0	3	40	60	100
DSE	Civil Aviation Requirements (CAR) and Safety management system	3	0	0	3	40	60	100
DSE	Flight Performance and Planning	3	1	0	3	40	60	100
DSE	Dangerous Goods and Cargo	3	0	0	3	40	60	100
DSE	Airport and airline passenger management	3	0	0	3	40	60	100
DSE	Load and Trim	3	0	0	3	40	60	100
DSE	Hangar workshop	0	0	4	2	40	60	100
SEC	Internship / Mini Project / Sector Skill Council Course	0	0	4	2	40	60	100
SEC	Skill Enhancement Training / Student Club Activities	-	-	-	-	-	-	-
		18	**1**	**8**	**22**			
SEMESTER 6								
DSE	Air route planning and fleet planning	4	0	0	4	40	60	100
DSE	Airline and Airport Operations	4	0	0	4	40	60	100
DSE	Flight Planning and Operations	0	0	4	2	40	60	100
DSE DSE	Aircraft Maintenances workshop	0	0	4	2	40	60	100
GE	Disaster Management	3	0	0	3	40	60	100
SEC	Entrepreneurship Development	2	0	0	2	40	60	100
DE	Project Work	0	0	8	4	40	60	100
SEC	Technical Seminar / Innovation Council / Start up Initiative	0	0	1	1	40	60	100
		13	**0**	**17**	**22**			

CA - Continuous Assessment **SEE - Semester End Examination**

LIST OF CORE COURSES (Theory)		
S.NO	**COURSE CODE**	**COURSE TITLE**
1		**MATHEMATICS**
2		**FUNDAMENDALS OF PHYSICS**
3		**FAMILIARIZATION OF AIRPORT**
4		**THEORY OF FLIGHT (AERODYNAMICS)**
5		**FAMILIARIZATION OF AIRCARFT**
6		**RADIO TELEPHONY**
7		**AIR REGULATION I**
8		**AIR NAVIGATION**
9		**AVIATION METEOROLOGY**
10		**AIRCRAFT POWER PLANTS**
11		**INTRODUCTION TO AIRLINE INDUSTRY**
12		**AIR REGULATION II**
13		**RADIO AIDS**
14		**PISTON ENGINE AND PROPELLERS**
15		**HUMAN FACTORS**
16		**AIRCRAFT INSTRUMENTS**
17		**AIRCRAFT SYSTEMS**
LIST OF CORE COURSES (Practical)		
18		**PHYSICS LAB**
19		**WORKSHOP PRACTICES LAB**
20		**RADIO TELEPHONY WORKSHOP**
21		**AERODYNAMICS LAB**
22		**ATC COMMUNICATION AND ITS UNITS**
23		**AERO ENGINE LAB**
24		**FLYING SYNTHETIC**

LIST OF DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE) (Theory)		
S.NO	**COURSE CODE**	**COURSE TITLE**
1		**CIVIL AVIATION REQUIREMENTS (CAR) AND SAFETY MANAGEMENT SYSTEM**
2		**FLIGHT PERFORMANCE AND PLANNING**
3		**DANGEROUS GOODS AND CARGO**
4		**AIRPORT AND AIRLINE PASSENGER MANAGEMENT**
5		**LOAD AND TRIM**
6		**AIR ROUTE PLANNING AND FLEET PLANNING**
7		**AIRLINE AND AIRPORT OPERATIONS**
8		**AIRCRAFT STRUCTURES**
9		**AIRCRAFT DESIGN**
10		**NON-DESTRUCTIVE TESTING**
11		**AIRLINE OPERATIONS CONTROL CENTRE (AOCC)**
12		**AVIONICS**
13		**AIR TRAFFIC MANAGEMENT/ RTR**
14		**MASS AND BALANCE - AERO PLANES**
15		**AIRCRAFT ELECTRICAL FUNDAMENTALS**
LIST OF DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE) **(Practical)**		
1		**HANGAR WORKSHOP**
2		**FLIGHT PLANNING AND OPERATIONS**
3		**AIRCRAFT MAINTENANCES WORKSHOP**
4		**AIRCRAFT STRUCTURES LAB**
5		**AIRCRAFT INSTRUMENTATION LAB**
6		**AIRCRAFT ELECTRICAL FUNDAMENTALS LAB**

LIST OF DISCIPLINE ELECTIVE COURSES (DE)		
S.NO	**COURSE CODE**	**COURSE TITLE**
1		**PROJECT WORK**

LIST OF ABILITY ENHANCEMENT COMPUSLORY COURSE (AECC)		
S.NO	**COURSE CODE**	**COURSE TITLE**
1		**COMMUNICATION SKILLS**
2		**ENVIRONMENTAL STUDIES**

LIST OF SKILL ENHANCEMENT COURSE (SEC)		
S.NO	**COURSE CODE**	**COURSE TITLE**
1		**ORIENTATION / INDUCTION PROGRAMME / LIFE SKILLS**
2		**SOFT SKILLS –I**
3		**NSS / NCC / SWACHH BHARAT/ INPLANT TRAINING**
4		**SOFT SKILLS – II**
5		**SWAYAM / NPTEL / VALUE ADDED COURSE**
6		**SOFT SKILLS – III**
7		**INTERNSHIP**
8		**MINI PROJECT**
9		**SKILL ENHANCEMENT TRAINING / STUDENT CLUB ACTIVITIES**
10		**ENTREPRENUERSHIP DEVELOPMENT**
11		**TECHNICAL SEMINAR / INNOVATION COUNCIL / START UP INITIATIVE**

LIST OF GENERIC ELECTIVE COURSES (GE) (UGC Recommended)		
S.NO	**COURSE CODE**	**COURSE TITLE**
1		**CONSUMER AFFAIRS**
2		**DISASTER MANAGEMENT**
3		**UNIVERSAL HUMAN VALUES**

TAMIL – I

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	3	Exam Marks		60	
Total Number of Lecture Hours	45	L	T	P	C
Credits	3	3	0	0	3

COURSE OBJECTIVES:

இக்காலக் கவிதைகள் – உரைநடை – பண்பாடு – மொழித்திறன் பற்றி அறிந்து கொள்ளுதல்

அலகு 1	**மரபுக்கவிதை**	**9 மணிநேரம்**

1. பாரதியார் - பாரத தேசம் என்னும் தலைப்பில் ஆறு பாடல்கள். (பாடல் எண்கள் 1, 6, 7, 9, 12, 13).
2. பாரதிதாசன் – தமிழுக்கும் அமுதென்று பேர் என்னும் தலைப்பிலான கவிதை.
3. தேசிக விநாயகம் பிள்ளை - உடல் நலம் பேணல் என்னும் தலைப்பிலான கவிதை.
4. முடியரசன் - காவியப் பாவை – "புண்படுமா" என்னும் கவிதை.

அலகு 2	**புதுக்கவிதை**	**9 மணிநேரம்**

1. நா. காமராசன் - ***கறுப்பு மலர்கள்*** தொகுப்பில் ***காகிதப்பூக்கள்*** என்னும் தலைப்பிலான கவிதை.
2. அப்துல் ரகுமான் - ***ஆலாபனை*** தொகுப்பில் ***போட்டி*** என்னும் தலைப்பிலான கவிதை
3. ஈரோடு தமிழன்பன் - ***ஒரு வண்டி சென்ரியு*** தொகுப்பில் தேர்ந்தெடுக்கப்பட்ட சென்ரியு கவிதைகள்
4. ஆண்டாள் பிரியதர்ஷினி – ***முத்தங்கள் தீர்ந்துவிட்டன*** தொகுப்பில் ***'இங்கே வரும் போது'*** என்னும் தலைப்பிலான கவிதை

அலகு 3	**உரைநடை**	**9 மணிநேரம்**

1. **மாணாக்கரும் தாய்மொழியும் - திரு.வி.க.,**
2. **மன வலிமை வேண்டும் - மு.வரதராசனார்**
3. **செம்மொழித் தமிழின் சிறப்புகள்**
4. **பண்டைத் தமிழரின் சாதனைச் சுவடுகள்**

அலகு 4	**தமிழர் வாழ்வும் பண்பாடும்**	**9 மணிநேரம்**

பண்பாடு – வாழ்வியல் முறை – அகம், புறம் - உணவு முறை - விருந்தோம்பல் - நம்பிக்கைகள் – விழாவும் வழிபாடும் - கலைகள் - கட்டடம் - சிற்பம் - ஓவியம் - இசை – கூத்து – தொழிலும் வணிகமும் – அறிவியல் நோக்கு.		
அலகு 5	**மொழித்திறன், இலக்கிய வரலாறு, இலக்கணம்**	**9 மணிநேரம்**
1. எழுத்துப் பிழை, தொடர்ப் பிழைகள் 2. வேற்றுமை இலக்கணம் 3. செய்யுள் நலம் பாராட்டல் 4. பாடம் தழுவிய இலக்கிய வரலாறு (மரபுக் கவிதை, புதுக்கவிதை, உரைநடை).		

COURSE OUTCOMES:

CO 1: Recall and recognize heritage and culture of Tamils through History of Tamil Language.

CO 2: Interpret the cultural life style of Ancient Tamils.

CO 3: Evaluate social and individuals' moral value after studying Ethics In modern Literature.

CO 4: Build the humanistic concept and moral life skills after studying divine and minor Literature.

CO 5: Improve their own creativity and writing skills after studying history of Modern Tamil Literature.

பார்வைநூல்கள்

1. **தமிழர்நாகரிகமும்பண்பாடும்,** டாக்டர் அ.தட்சிணாமூர்த்தி, ஐந்திணைப்பதிப்பகம்
2. **தவறின்றித்தமிழ்எழுதுவோம்**, மா. நன்னன், ஏகம்பதிப்பகம்
3. **தவறின்றித்தமிழ்எழுத**-மருதூர்அரங்கராசன், ஐந்திணைப்பதிப்பகம்
4. **தமிழ்இலக்கியவரலாறு**, வரதராசன், மு., புதுதில்லி : சாகித்தியஅக்காதெமி ,
5. **புதியதமிழ்இலக்கியவரலாறு**, நீல. பத்மநாபன், சிற்பிபாலசுப்ரமணியம், சாகித்தியஅகாடெமி
6. **செம்மொழிதமிழின்சிறப்பியல்புகள்** - முனைவர்மறைமலைஇலக்குவனார்;

பாடநூல்தேடலுக்கானஇணையம்

1. https://www.youtube.com/watch?v=HHZnmJb4jSY
2. https://archive.org/

HINDI - I

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	3	Exam Marks		60	
Total Number of Lecture Hours	45	L	T	P	C
Credits	03	3	0	0	3

COURSE OBJECTIVES:

- To enable the students to develop communication skills.
- To train students in official language.
- To enrich their knowledge in Hindi literature.
- To teach them human values & create awareness towards exploitation

UNIT I		**9 Hours**

‘Ek atuut kadi’ by shri Rajkishore.

Letter writing (application),

Technical words (prashasanik vakyansh:1-50).

UNIT II		**9 Hours**

‘Devi singh’ by agyeya,

Letter writing (bank A/C opening & closing),

Technical words (prashasanik vakyansh:51-100).

UNIT III		**9 Hours**

‘kabiraa ki kaashi ’by Kumar Ravindra

UNIT IV		**9 Hours**

‘bharathiya vigyan ki kahaani - ‘hamne diyaa ,hamne liyaa’

’By Gunakar mule, letter writing (shikayath pathra, gyapan)

Technical words: takniki shabd-25.

UNIT V		**9 Hours**

Letter writing (sarkari pathra, ardha sarkaari pathra, kaaryalaya aadesh),

Technical words: takniki shabd-25.

COURSE OUTCOMES:

At the end of this course students will be able to,

CO 1: Students will be familiar with official letter writing

CO 2: will understand their responsibility in the society

CO 3: students will be moulded with good character understand human values

CO 4: students will gain knowledge about ancient &, rich culture of India

CO 5: will know the equivalent Hindi words for scientific terms

Text / Reference books:

1. Agyeya ki sampoorna kahaniyaa - Rajpal &sons, year 2017,
2. Yatraye our bhi, Kumar Ravindra Rashmi prakashan, Lucknow.
3. Bharathiya vigyan ki kahani, Hindi book centre, NewDelhi.
4. Gadya Khosh

WEBLINKS:

1. http://www.hindisamay.com/content/1321/1/%E0%A4%B0%E0%A4%BE%E0%A4
2. http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0
3. http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0
4. http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0

FRENCH - I

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	3	Exam Marks		60	
Total Number of Lecture Hours	45	L	T	P	C
Credits	03	3	0	0	3

COURSE OBJECTIVES:

- To introduce French language.
- To enable the students to understand and to acquire the basic knowledge of French language with elementary grammar.

UNIT I	**INTRODUCTION**	**09 Hours**

Introduction-Alphabet-comment prononcer, écrire et lire les mots-base: les prénoms personnel de 1er, 2eme et 3eme personnes-conjugaisons les verbes être et avoir en forme affirmative, negative Et interrogative.

UNIT II	**LECON 1-3**	**09 Hours**

Leçon 1: Premiers mots en français- 2. Les hommes sont difficiles 3. Vive la liberté-Réponses aux questions tires de la leçon-Grammaire: Les adjectives masculines ou féminines-Les article définies et indéfinis-Singuliers et pluriels.

UNIT III	**LECON 4-6**	**09 Hours**

Leçons 4. L'heure c'est l'heure 5.Elle va revoir sa Normandie 6.Mettez-vous d'accord groupe de nom-Réponses aux questions tires de la leçon-Grammaire :A placer et accorder l'adjectif en groupe de nom-Préposition de lieu-A écrire les nombres et l'heure en français.

UNIT IV	**LECON 7-9**	**09 Hours**

Leçon 7. Trois visage de l'aventure, 8. A moi Auvergne 9. Recit de voyage-Réponses aux questions tires de la leçon- Grammaire : Adjectif processif- Les phrases au présent de l'indicatif-Les phrases avec les verbes pronominaux au présent.

UNIT V	**COMPOSITION:**	**09 Hours**

A écrire une lettre a un ami l'invitant a une célébration différente ex: mariage-A faire le dialogue- A lire le passage et répondre aux questions.

COURSE OUTCOMES:

At the end of this course students will be able to,

CO1: The content of the unit 1 aids the students to explore the basics of the new foreign language.

CO2: The content of unit 2 to experience the basic formations of words and its basic grammar by differentiating with English.

CO3: This imparts the additional information in terms of general in the sense of geographical and culture.

CO4: Enable students for framing the basics sentence.

CO5: Making the students community to know the French format of letter writing and essay writing.

TEXT BOOKS:

1. Jack GIRARDER & Jean Marie GRIDLIG, <<Méthode de Français PANORAMA>>, Clé Internationale, Goyal Publication, New Delhi Edition 2014.

REFERENCE BOOKS:

1. DONDO Mathurin, "Modern French Course", Oxford University Press, New Delhi Edition 2014.
2. Nithya Vijayakumar get ready French grammar-Elementary Goyal publications, New Delhi Edition 2014.

WEB LINKS:

1. https://www.thoughtco.com/french-reading-tips-1369373
2. https://www.bnf.fr/fr
3. https://www.laits.utexas.edu/tex/

ENGLISH - I

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	3	Exam Marks		60	
Total Number of Lecture Hours	45	L	T	P	C
Credits	03	3	0	0	3

COURSE OBJECTIVES:

- To enable students to develop their communication skills effectively. To make students familiar with usage skills in English Language.
- To enrich their vocabulary in English.
- To develop communicative competency.

UNIT I		**09 Hours**

1. Dangers of Drug Abuse - Hardin B Jones.
2. Tight Corners - E. V. Lucas

UNIT II		**09 Hours**

1. Futurology - Aldous Huxley.
2. If You are Wrong, Admit it - Dale Breckenridge Carnegie

UNIT III		**09 Hours**

1. Industry - Dr.M.Narayana Rao & Dr.B.G.Barki
2. Turning Point of My Life - A.J Cronin

UNIT IV		**09 Hours**

1. Excitement - Mack R. Douglas
2. The Kanda Man Eater - Jim Corbett

UNIT V		**09 Hours**

Vocabulary and Exercises under the Lessons

Note: Lessons prescribed are from various anthologies and respective exercises therein will be taught.

COURSE OUTCOMES:

At the end of this course the students will be able to,

CO1: Examine the language of prose.

CO2: Utilize instructions on fundamentals of grammar

CO3: Develop their own style of writing after studying diverse prose essays.

CO4: Classify different essays on the basis of their types.

CO5: Critically comment on the textual content of prose.

Books Prescribed:

1. English for Communication Enrichment: by Jeya Santhi June 2015.
2. Dr. M. Narayana Rao and Dr. B. G. Barki – Anu's Current English for Communication (AnuChitra). June 2012.
3. Dr. Ananthan, R. Effective Communication. Ed. Chennai: Anu Chithra Pub.2010.

WEB LINKS:

1. https://www.gradesaver.com/
2. https://www.enotes.com/
3. https://www.jstor.org/
4. https://www.sparknotes.com/
5. https://www.cliffsnotes.com/

MATHEMATICS

Subject Code		IA Marks			40
Number of Lecture Hours/Week	4	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	4	3	1	0	4

COURSE OBJECTIVES:

To develop the skills of the students in the areas of Set Theory, Calculus and Algebra. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I	**SET THEORY**	**12 Hours**

Sets –Operations on sets – Relations – Relations and functions: Equivalence relations – Partial order relation.

UNIT II	**MATRICES**	**12 Hours**

Introduction-Basic Operations-Symmetric-skew symmetric-Hermitian-Skew Hermitian –Unitary-orthogonal-Inverse of a matrix -Solution of linear system (Cramer's rule)- Finding the Eigen roots and Eigen vectors of a matrix-Cayley Hamilton theorem (without proof).

UNIT III	**DIFFERENTIAL CALCULUS**	**12 Hours**

Differentiation – Successive differentiation – Partial differentiation – Maxima and Minima of functions of two variables-Method of Lagrange Multipliers.

UNIT IV	**INTEGRAL CALCULUS**	**12 Hours**

Integration – definite integrals – Bernoulli's formula -Reduction formula for $\int sin^n x\, dx, \int cos^n x\, dx, \int tan^n x\, dx\,, \int x^n e^{ax} dx.$

UNIT V	**ORDINARY DIFFERENTIAL EQUATIONS**	**12 Hours**

First order of higher degree equations – second order and non-homogenous linear differential equations with constant coefficient – second order linear differential equations with variable coefficients.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Apply appropriate set theoretic concepts to various conceptual or real-world problems.

CO2: Find the Eigen values and Eigen vectors to diagonalize and reduce a matrix to quadratic form.

CO3: Calculate the maxima and minima value for functions of two variables.

CO4: Evaluate integrals by different methods of Bernoulli's formula.

CO5: Identify different types of differential equations and solve them.

TEXT BOOKS:

1. A.Singaravelu , "Allied Mathematics" ARS Publication, 9 August 2018.
2. Shanti Narayan, "Differential Calculus", S Chand; Fifteenth edition (1 January 1942).
3. Shanti Narain, "Integral Calculus", S Chand; 35th edition (17 March 2005).
4. Seymour Lipschutz and Marc Lipson, "Schaum's Outline of Linear Algebra", McGraw-Hill Education, 4th Edition1 (6 September 2008).

REFERENCE BOOKS:

1. Ram Krishna Ghosh, "An Introduction to Analysis Integral Calculus", New Central Book Agency; 12th Revised edition (1 January 2013).
2. Elliott Mendelson and Frank Ayres, "Schaums Easy Outline Of Calculus", McGraw Hill, 2nd Edition (8 January 2020).

WEB LINKS:

1. https://www.khanacademy.org/math/integral-calculus
2. https://nptel.ac.in/courses/111/104/111104092/
3. https://nptel.ac.in/courses/111/107/111107058/

FUNDAMENDALS OF PHYSICS

Subject Code		IA Marks			40
Number of Lecture Hours/Week	4	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	4	3	1	0	4

COURSE OBJECTIVES:

To make the students to understand, the elasticity of a material and different kinds of moduli; surface tension and viscosity of fluids; transmission of heat via Conduction, Radiation process involved in thermal physics; properties of sound using experimental methods and principles of electricity and its conversion into ammeter and voltmeter.

UNIT I	**ELASTICITY AND BENDING MOMENT**	**12 Hours**

Hooke's law - Elastic moduli - Work done in stretching and work done in twisting a wire - Twisting couple on a wire - Determination of rigidity modulus of a wire using torsion pendulum - Expression for bending moment - Uniform bending - Experiment to determine young's modulus using pin and microscope method.

UNIT II	**FLUIDS**	**12 Hours**

Surface Tension: Definitions - Expression for surface tension of a liquid by capillary rise method - Viscosity: Poiseuille's formula for rate of flow of liquid in a capillary tube by dimensions - Analogy between current flow and liquid flow - streamlined motion – Stoke's formula.

UNIT III	**THERMAL PHYSICS**	**12 Hours**

Conduction in solids: Thermal conductivity - Lee's disc method - Wiedemann-Franz law - Convection: Newton's law of cooling – Radiation: Distribution of energy in the spectrum of a black body – Planck's law of radiation (no derivation) and its deduction.

UNIT IV	**SOUND**	**12 Hours**

Simple harmonic motion: free, damped, forced vibrations and resonance - Intensity and loudness of sound - Decibels – Melde's string experiment – Determination of frequency of tuning fork - Acoustics of buildings: Reverberation time - Sabine's formula.

UNIT V	**ELECTRICITY**	**12 Hours**

Current and Current density – Ohm's law - Resistors - I-V characteristics - color coding- conversion of galvanometer into an ammeter and voltmeter – Kirchhoff's laws – Balance condition of Wheatstone's bridge

- Potentiometer – Measurement of potential difference and current.

COURSE OUTCOMES:

At the end of this course the students will be able to,

CO1: Understand the bending of beams under different loading conditions.

CO2: Demonstrate the rate of flow of liquid in a capillary tube.

CO3: Identify the good and bad conductors and concepts of blackbody radiation and their applications.

CO4: Analyze acoustic properties of typically used materials for design consideration.

CO5: Illustrate Kirchhoff's law and analyze circuit diagram.

TEXT BOOKS:

1. Properties of Matter: R. Murugeshan, S Chand & Co. Pvt. Ltd., New Delhi
2. Heat and thermodynamics: D S Mathur, S Chand & Co., New Delhi.
3. Text book of Sound by M N Srinivasan – Himalaya Publications, 1991.
4. Electricity & Magnetism by K K Tewari, S Chand & Co., 3rd Edition, 2001

REFERENCE BOOKS:

1. Fundamentals of Physics, 6th Edition by D Halliday, R Resnick and J Walker, Wiley NY 2001.
2. C. J. Smith - General Properties of Matter, Orient & Longman Publishers, 1960.

WEB LINKS:

1. https://www.youtube.com/watch?v=74pm8A0RJ-0
2. https://www.youtube.com/watch?v=fa0zHI6nLUo&list=PLbMVogVj5nJTZJHsH6uLCO00I-ffGyBEm
3. https://www.youtube.com/watch?v=Lzrjqy4PImE
4. https://www.youtube.com/watch?v=lvyUCk5_tEw&list=PLq-Gm0yRYwTgNH_J_73OAyrskU659k64I

FAMILIARIZATION OF AIRPORT

Subject Code		IA Marks			40
Number of Lecture Hours/Week	4	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	4	4	0	0	4

COURSE OBJECTIVES:

To acquire basic understanding of the layout of an airport; its buildings, facilities, installations and their functioning.

UNIT I	**BUILDINGS & INSTALLATIONS**	**12 Hours**

Terminals, Security, Apron, Hangar, Taxiway, Runway, Fire Station, Airport Vehicles, Fuel depot.

UNIT II	**MARKINGS& LIGHTINGS**	**12 Hours**

RWY & TWY markings, Lightings, Signboards, declared distances, PCN, Lighting system, Aerodrome Beacon, Obstacle Lighting & Marking.

UNIT III	**FACILITIES & EQUIPMENT**	**12 Hours**

Navigational facilities: OR, NDB, DME; Surveillance equipment: Primary Radar, SSR, Surface Movement Radar, ADS; GPS, VHF antennae, ILS.

UNIT IV	**AIR TRAFFIC CONTROL**	**12 Hours**

ATC Units, Concept of FIR, Role of FIC, Roles of Tower & SMC Controllers, Flight Plan, Flight Dispatch, ATC briefing.

UNIT V	**IMPORTANT ORGANIZATIONS**	**12 Hours**

Ministry of Civil Aviation, ICAO, DGCA, AAI & its wings, BCAS, CISF, MLU

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Describe about an airport Buildings and Installations.

CO2: Analyze an airport signs, markings, and lighting.

CO3: Examine the various facilities and equipment used in an airport.

CO4: Explain the functions of ATC.

CO5: Write the role and functions of various organization related to aviation field.

TEXT BOOKS:

1. ICAO Annex 14 Volume 1 Aerodrome Design and Operations, 8th Edition, July 2018.
2. CIVIL AVIATION REQUIREMENTS SECTION-4, AERODROME STANDARDS & LICENSING SERIES 'B', PART I ISSUE II, 26th August, 2015.

REFERENCE BOOKS:

1. Asheesh Kumar, "Planning and Design of Airport", Vayu Education of India, 2nd Edition, 2020.
2. Norman J. Ashford, Saleh Mumayiz, Paul H. Wright, "Airport Engineering", Wiley, 4th Edition, 6 April 2011.

WEB LINKS:

1. https://mycfibook.com/book_pages/airport-signs-markings-and-lighting/
2. https://www.faa.gov/airports/engineering/design_standards/
3. https://www.skybrary.aero/bookshelf/books/291.pdf

PHYSICS LAB

Laboratory Code		IA Marks		40	
Number of Practical Hours/Week	4	Exam Marks		60	
Total Number of Practical Hours	40	L	T	P	C
Credits	2	0	0	4	2

COURSE OBJECTIVES:

- To enable the student to explore the field of properties of matter and electricity.
- To gain knowledge in the scientific methods and learn the process of measuring different Physical variables.

Exp no	EXPERIMENTS	Number Of Hours
1	Young's modulus by uniform bending - Pin and Microscope.	4
2	Young's modulus by non-uniform bending - Pin and Microscope.	4
3	Rigidity modulus - torsion pendulum	4
4	Coefficient of viscosity of a liquid – Poiseuille's method	4
5	Thermal conductivity of a bad conductor - Lee's disc method.	4
6	Coefficient of viscosity of a liquid – Stoke's method	4
7	Surface tension of water - capillary rise method	4
8	Ultrasonic Interferometer	4
9	Sonometer-Frequency of Tuning Fork	4
10	Compound Pendulum.	4

COURSE OUTCOMES:

At the end of this course the students will be able to,

CO1: Calculate the Young's modulus of the material.

CO2: Estimate the parameters associated with torsional oscillation.

CO3: Analyze the coefficient of viscosity at different pressure head.

CO4: Measure the acceleration due to gravity.

CO5: Determine the velocity and compressibility of the given liquid.

REFERENCES:

1. C. C. Ouseph, U. J. Rao, V. Vjiayendran, Practical Physics,1st Edition, 2015.

WORKSHOP PRACTICES LAB

Laboratory Code		IA Marks		40	
Number of Practical Hours/Week	4	Exam Marks		60	
Total Number of Practical Hours	48	L	T	P	C
Credits	2	0	0	4	2

COURSE OBJECTIVES:

1. To provide exposure to the students with hands on experience on various basic engineering practices.
2. To Study and practice the various operations that can be performed in lathe, shaper, drilling, milling machines etc. and to equip with the practical knowledge required in the core industries.
3. To Study and acquire knowledge on various basic machining operations in special purpose machines and its applications in real time manufacturing of components in the industries.

Exp no	EXPERIMENTS	Number of Hours
1	Sheet metal marking, cutting, sheet metal structural defects	4
2	Practice of 1st model. Butt Joint and inspect	4
3	Practice of 2nd model. Lap Joint and inspect	4
4	Practice of 3rd model. V-Joint and inspect	4
5	Practice of 3rd model. T-Joint and inspect	4
6	Demonstration of 1st model – Dovetail	4
7	Demonstration of 2nd model- Radius Gauge	4
8	Inspection of various welded samples with / without defects and record Observation	4
9	Soldering Exercises, inspection and defects	4
10	Cable splicing and swaging	4
11	Pipe bending and inspection of pipe assembly	4
12	Taps and dies, thread cutting and inspection	4

COURSE OUTCOMES:

Upon the completion of this course the students will be able to

CO1: Use sheet metal fabrication tools and make simple models as per the given diagram.

CO2: Fabricate carpentry components and pipe connections including plumbing works.

CO3: Use welding equipment to join the structures.

CO4: Utilize different machine tools like Surface Grinding Cylindrical Grinding etc,

CO5: Inspect Taps, Dies and Thread cutting components.

REFERENCES:

1. Sk Hajra Choudhury, Ak Hajra Choudhury, Nirjhar Roy, “Elements of Workshop Technology”, Media Promoters & Pub Pvt Ltd, 2015.
2. Sathish.D, “Engineering Workshop Practices Laboratory Manual”, Notion Press; 1st edition (1 January 2019).
3. James Anderson, “Shop Theory”, McGraw Hill Education; 6th edition (1 July 2017).

TAMIL – II

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	3	Exam Marks		60	
Total Number of Lecture Hours	45	L	T	P	C
Credits	3	3	0	0	3

COURSE OBJECTIVES:

அற இலக்கியம் – சிற்றிலக்கியம் – சிறுகதை – பயன்பாட்டுத் தமிழ் பற்றி அறிந்து கொள்ளுதல்.

அலகு 1	**அற இலக்கியங்கள்**	**10 மணிநேரம்**

1. திருக்குறள் - வான் சிறப்பு(அறம்), ஊக்கமுடைமை(பொருள்), குறிப்பறிதல்(இன்பம்) – மூன்று அதிகாரங்கள் முழுமையும்.
2. நாலடியார் – மூன்று பாடல்கள். (2, 3, 5)
3. பழமொழி நானூறு – மூன்று பாடல்கள் (74, 75, 78)
4. திரிகடுகம் – மூன்று பாடல்கள் (10, 12, 22)
5. இனியவை நாற்பது – மூன்று பாடல்கள் (1, 12, 16)

அலகு 2	**சிற்றிலக்கியம்**	**10 மணிநேரம்**

1. முத்தொள்ளாயிரம்
   சேரன் – வீரம் 14, 15 பாடல்கள்
   சோழன் – காதல் 23, 24 பாடல்கள்
   பாண்டியன் – நாடு 87, 88 பாடல்கள்
2. தமிழ்விடு தூது – முதல் 20 கண்ணிகள்
3. திருக்குற்றாலக் குறவஞ்சி – மலைவளம் கூறுதல் – முதல் 5 பாடல்கள்
4. முக்கூடற்பள்ளு – மூத்த பள்ளி நாட்டு வளம் கூறுதல் 3 பாடல்கள், இளைய பள்ளி நாட்டு வளம் கூறுதல் 3 பாடல்கள்.
5. கலிங்கத்துப் பரணி – பாலை பாடியது – முதல் 5 பாடல்கள்

அலகு 3	**சிறுகதை**	**9 மணிநேரம்**

1. அறிஞர் அண்ணா - செவ்வாழை
2. புதுமைப்பித்தன் - கடவுளும் கந்தசாமிப் பிள்ளையும்
3. ஜெயகாந்தன் - யுகசந்தி
4. கு.அழகிரிசாமி - காற்று
5. அம்பை - காட்டில் ஒரு மான்

அலகு 4	**பேச்சுத் தமிழ்**	**8 மணிநேரம்**

பேச்சுத் திறன் – விளக்கம் – பேச்சுத்திறனின் அடிப்படைகள் – வகைகள் –

மேடைப்பேச்சு – உடையாடல் – பயிற்சிகள்		
அலகு 5	**எழுத்துத் தமிழ், இலக்கிய வரலாறு, இலக்கணம்**	**8 மணிநேரம்**

1. கலைச் சொல்லாக்கம் – தேவைகள் – கலைச்சொற்களின் பண்புகள் – அறிவியல் கலைச் சொற்கள் – கடிதம் – வகைகள் – அலுவலகக் கடிதங்கள் – உறவுமுறைக் கடிதங்கள்.
2. பாடம் தழுவிய இலக்கிய வரலாறு (அற இலக்கியம், சிற்றிலக்கியம், சிறுகதை)
3. அணி இலக்கணம்
4. விண்ணப்பக் கடிதம் எழுதுதல்

COURSE OUTCOMES:

At the end of this course the students will be able to,

CO 1: Measure human mind through the studying of Tamil charity Literature in the aspect of moral value.

CO 2: Justify the contemporary social issues through studying Tamil Epics.

CO 3: Build the life skills after studying of the poetry.

CO 4: Develop narrative skill after reading short stories.

CO 5: Improve their own style of writing after studying Terminology methods.

பார்வைநூல்கள்

1. **பேசும்கலை,**முனைவர்கு.ஞானசம்பந்தன்விஜயாபதிப்பகம்
2. **தமிழ்இலக்கியவரலாறு**, வரதராசன், மு., சாகித்தியஅக்காதெமி ,புதுதில்லி
3. **தமிழ்நடைக்கையேடு,** மொழிஅறக்கட்டளை
4. **பயன்பாட்டுத்தமிழ்**, முனைவர்அரங்கஇராமலிங்கம்,முனைவர்ஒப்பிலாமதிவாணன், சென்னைபல்கலைக்கழகம், 2007
5. **மொழிபெயர்ப்பியல்அடிப்படைகள்,** கா.பட்டாபிராமன், யமுனைப்பதிப்பகம், திருவண்ணாமலை

பாடநூல்தேடலுக்கானஇணையம்

1. http://www.tamilvu.org/library
2. https://archive.org/

HINDI – II

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	3	Exam Marks		60	
Total Number of Lecture Hours	45	L	T	P	C
Credits	03	3	0	0	3

COURSE OBJECTIVES:

- To train students in translation.
- To develop reading & writing skills.
- To create interest towards reading different types of literature.

UNIT I		**9 Hours**
‘ idgah’ by Premchand’ (kahani), Translation- Definition,Types		
UNIT II		**9 Hours**
‘pitha ‘ by gyanranjan (kahani), Translation - Anuvadak ke gun		
UNIT III		**9 Hours**
jamun ka ped by Krishna chander ‘ (kahani) , Translation Practice		
UNIT IV		**9 Hours**
adhi rath ke baad by Shankar shesh (naatak), Translation Practice		
UNIT V		**9 Hours**
adhi rath ke baad by Shankar shesh (naatak), Translation Practice		

COURSE OUTCOMES:

At the end of this course students will be able to,

CO 1: Students will know the importance & process of translation

CO 2: Understand the values of elders in a family & extend their support

CO 3: Will know the different writing skills of authors

CO 4: Gain knowledge in Hindi literature

CO 5: Will acquire knowledge in Hindi Sahithya.

Text / Reference books:

1. Adhi rath ke baad ,by Shankar shah ,kitabhghar prakashan ,2000
2. Idgah by Premchand,Bharathiya gyan peeth ,NewDelhi ,
3. Jamun ka ped by Krishna Chandra, Deepak publishers, Nov. 2019
4. Pitha by gyan ranjan,Rajkamal publication,Jan 2018.
5. Glossary of Administrative terms, Commission for scientific terms & Technical Terminology,2007.
6. Patralekhan kala by Dr.Shivshankar Pandey,2018.
7. Gadya khosh

WEBLINKS:

1. https://premchandstories.in/eidgaah-story-munshi-premchand-pdf/
2. https://www.google.com/search?q=pita+by+gyan+ranjan&oq=pitha+by+gya&aqs=chrome.1.69i57j0i13j0i22i30.10387j0j4&sourceid=chrome&ie=UTF-8
3. http://db.44books.com/2020/04/%e0%a4%86%e0%a4%a7%e0%a5%80-%e0%a4%b0%e0%a4%be%e0%a4%a4-%e0%a4%95%e0%a5%87-%e0%a4%ac%e0%a4%be%e0%a4%a6.html
4. http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0%A4%B8%E0%A4%BF%E0%A4%82%E0%A4%B9_/_%E0%A4%85%E0%A4%9C%E0%A5%8D%E0%A4%9E%E0%A5%87%E0%A4%AF

FRENCH – II

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	3	Exam Marks		60	
Total Number of Lecture Hours	45	L	T	P	C
Credits	03	3	0	0	3

COURSE OBJECTIVES:

- To fortify the grammar and vocabulary skills of the students.
- To enable the students, have an idea of the French culture and civilization

UNIT I	**LECON 10-11**	**09Hours**
Leçons :10 Les affaires marchent,11 un repas midi a problèmes- Réponses aux questions tires de la leçon-grammaire ;présent progressif passe récent ou future proche-complément d'Object directe-complément d'objet		
UNIT II	**LECON 12-13**	**09 Hours**
Leçons 12 :tout est bien qui fini bien,-13 aux armes citoyens-réponses aux questions tires de la leçon-grammaire :les pronoms<<en ou y>> rapporter des paroles-Les pronoms relatifs que, qui ou ou.		
UNIT III	**LECON 14-15**	**09 Hours**
Leçons 14.Qui ne risque rien n'a rien-15.la fortune sourit aux audacieux-réponses aux questions tires de la leçon-grammaire : comparaison-les phrases au passe compose.		
UNIT IV	**LECON 16-18**	**09 Hours**
Leçons 16 la publicité et nos rêves 17 la France la monde 18 campagne publicitaire réponses aux questions tires de la leçon-grammaire :les phrases a l'imparfait-les phrases au future		
UNIT V	**COMPOSITION:**	**09 Hours**
A écrire une lettre de regret//refus a un ami concernant l'invitation d'une célébration reçue-a écrire un essaie sur un sujet générale-a lire le passage et répondre aux questions.		

COURSE OUTCOMES:

At the end of this course students will be able to,

CO 1: This enables students to learn the language without any grammatical errors.

CO 2: As a result of the content makes the students to known about the types of pronouns and their usage.

CO 3: This imparts the students in order to develop their basic writing skills.

CO 4: Enable students for framing the basics sentence.

CO 5: Making the students community to know the French format of letter writing and essay writing.

TEXT BOOKS:

1. Jack GIRARDER & Jean Marie GRIDLIG,<<Méthode de Français PANORAMA>>, Clé Internationale, Goyal Publication, New Delhi Edition 2014.

REFERENCE BOOKS:

1. DONDO Mathurin, "Modern French Course", Oxford University Press, New Delhi Edition 2014.
2. Nithya Vijayakumar get ready French grammar-Elementary Goyal publications, New Delhi Edition 2014.

WEB LINKS:

1. https://www.thoughtco.com/french-reading-tips-1369373
2. https://www.bnf.fr/fr
3. https://www.laits.utexas.edu/tex/

ENGLISH – II

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	3	Exam Marks		60	
Total Number of Lecture Hours	45	L	T	P	C
Credits	03	3	0	0	3

COURSE OBJECTIVES:

- To enable students to develop their communication skills effectively.
- To enrich their vocabulary in English
- To develop communicative competency.

UNIT I		**09 Hours**

1. Growing Old - Winston Farewell
2. Ecology - A. K. Ramanujan

UNIT II		**09 Hours**

1. Stopping by Woods on a Snowy Evening - Robert Frost
2. Our Casuarina Tree - Toru Dutt

UNIT III		**09 Hours**

1. Goodbye Party for Miss Pushpa T.S. - Nissim Ezekiel
2. The Bull - Ralph Hodgson

UNIT IV		**09 Hours**

1. If - Rudyard Kipling
2. The Drowned Children - Louise Glück

UNIT V		**09 Hours**

1. Australia - A.D.Hope
2. A Far Cry from Africa - Derek Walcott

COURSE OUTCOMES:

At the end of this course the students will be able to,

CO1: Learn to employ Poetic expressions in the course of daily speech.

CO2: Prove their better communicative ability.

CO3: Prove their skill in writing sentences with poetic impact.

CO4: Develop different sensibilities in approaching life.

CO5: Solve life’s problems as highlighted in the selections.
Books Prescribed:
1. Selections from Caribbean Literature. Mahaam Publishers, Chennai. 2. Our Casuarina Tree - Vasan Publication By Dr.A Shanmugakani
WEB LINKS:
1. https://www.gradesaver.com/ 2. https://www.enotes.com/ 3. https://www.jstor.org/ 4. https://www.sparknotes.com/ 5. https://www.cliffsnotes.com/

THEORY OF FLIGHT (AERODYNAMICS)

Subject Code		IA Marks			40
Number of Lecture Hours/Week	4	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	4	4	0	0	4

COURSE OBJECTIVES:

To Understand the principles of flying, application of theory in subsonic and transonic operations.

UNIT I	**AERODYNAMICS**	**12 Hours**

Airflow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, up wash and downwash, vortices, stagnation; The terms: camber, chord mean aerodynamic chord, aerodynamic centre, centre of pressure, stagnation point, profile (parasite) drag, induced drag, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio; Thrust, Weight, Aerodynamic Resultant; Generation of Life and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall; Aerofoil contamination including ice, snow, frost.

UNIT II	**THEORY OF FLIGHT**	**12 Hours**

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.

UNIT III	**FLIGHT STABILITY AND DYNAMICS**	**12 Hours**

Longitudinal, lateral, and directional stability.

UNIT IV	**AERODYNAMICS AND FLIGHT CONTROLS**	**12 Hours**

Operation and effect of:

roll control: ailerons and spoilers:

pitch control: elevators, stabilators, variable incidence stabilizers and canards;

yaw control, rudder limiters;

Control using elevens, rudder, elevators; High lift devices, slots, slats, flaps, flaperons; Drag inducing devices, spoilers, lift dumpers, speed brakes; Effects of wing fences, saw tooth leading edges; Boundary layer control using, vortex generators, stall wedges or leading edge devices; Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels; Pressure measuring devices and systems; Pitot static systems, Altimeters; Vertical speed indicators;

Airspeed indicators; Machmeter; Altitude reporting/alerting systems; Air data computers; rate of climb/vertical speed indicator, cabin pressure indicator.

UNIT V	**HIGH SPEED FLIGHT**	**12 Hours**

Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number, compressibility effect, buffet, shock wave, aerodynamic heating, area rule; Factors affecting airflow in engine intakes of high-speed aircraft; Effects of sweepback on critical Mach number.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the geometric characteristics of airfoil and wing.

CO2: Analyze the forces and its effects on the aircraft when approaching extreme limits of the flight condition.

CO3: Demonstrate concept of stability and application to dynamic systems like Aircraft.

CO4: Relate basic aerodynamic principles and practices regarding flight controls.

CO5: Examine the factors affecting high-speed flight.

TEXT BOOKS:

1. Anderson, J.D., "Introduction to Flight", 8th edition, McGraw-Hill Higher Education,2015.
2. Clancy, "Aerodynamics", Shroff (1 January 2006).
3. A. C. KERMODE, "Mechanics of Flight", Pearson Education Limited, 11th Edition, 2006.
4. Steven Brandt, "Introduction to Aeronautics: A Design Perspective" 3rd edition, AIAA Education series, 2015.

REFERENCE BOOKS:

1. CAE Oxford Aviation Academy, "PRINCIPLES OF FLIGHT", Singapore by KHL Printing Co. Pte Ltd, 2014.
2. Jeppesen, EASA ATPL Training, "Principles of Flight Aeroplanes", Jeppesen Gmbh (1 January 2014).
3. William Rees Sears, "Introduction to Theoretical Aerodynamics and Hydrodynamics" AIAA Education series, 2011.

WEB LINKS:

1. https://www.ksu.lt/wp-content/uploads/2017/06/M8-Selected-pages-Basic-Aerodynamics.pdf
2. https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak/media/07_phak_ch5.pdf
3. https://nptel.ac.in/courses/101/104/101104062/
4. https://nptel.ac.in/courses/101/105/101105059/

FAMILIARIZATION OF AIRCARFT

Subject Code		IA Marks			40
Number of Lecture Hours/Week	4	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	4	4	0	0	4

COURSE OBJECTIVES:

To know the various systems and their utilization / involvement in an aircraft.

UNIT I	**UNDERSTANDING OF BASIC MECHANICS, THERMODYNAMICS AND FLUID MECHANICS**	**12 Hours**

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

UNIT II	**AIRFRAME & SYSTEMS**	**12 Hours**

Types of Fuselages; Various Wing Structures; Control Surfaces; Airframe carburetor, fuel system, oil System, Cooling System.

UNIT III	**LANDING GEAR, WHEEL BRAKES**	**12 Hours**

Main Landing Gears and different types of Shock Strut; Brake System.

UNIT IV	**AIRCRAFT ENGINE (PISTON)**	**12 Hours**

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

UNIT V	**AIRCRAFT ENGINE (JET)**	**12 Hours**

Propeller, Parts of Propeller, Types of Compressors: Axial, Centrifugal; Types of Combustion Chambers, gas turbine engine.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the basic laws of mechanics, thermodynamics and fluid mechanics.

CO2: Describe the various structural components of aircraft.

CO3: Analyze the different types of shock struct used in aircrafts.

CO4: Explain about the aircraft piston engine.

CO5: Explain about the aircraft jet engine.

TEXT BOOKS:

1. Trevor Thom, "The Aeroplane, Technical", Air Pilot Publisher Ltd; 4th edition (28 May 2003).
2. Airframe and Power plant Mechanics Airframe Handbook (AC65 – 15A), Aviation Theory Centre (11 February 2008)
3. Airframe and Power plant Mechanics Airframe Handbook (AC65 – 9A), Aviation Theory Centre (11 February 2008).

REFERENCE BOOKS:

1. Smith, "Aircraft Piston Engines", Sterling Book House, 1999.
2. Irwine Treager, "Aircraft Gas Turbine Technology by", McGraw Hill Education; Third edition (1 July 2017).
3. EASA-part-66-module-13, Aircraft tech book co.
4. T. H. G. Megson, "Aircraft structures for engineering students", Butterworth Heinemann, 2011.

WEB LINKS:

1. https://nptel.ac.in/content/storage2/courses/101106035/039_Chapter%206_L30%20_(04-10-2013).pdf
2. https://nptel.ac.in/content/storage2/courses/101101001/downloads/Intro-Propulsion-Lect-25.pdf
3. https://nptel.ac.in/courses/101/101/101101002/
4. https://www.grc.nasa.gov/www/k-12/airplane/airplane.html
5. https://www.flyaeroguard.com/learning-center/parts-of-an-airplane/

RADIO TELEPHONY

Subject Code		IA Marks			40
Number of Lecture Hours/Week	4	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	4	4	0	0	4

COURSE OBJECTIVES:

To understand various aviation terminologies, Standard Universal Communication Procedures followed by different departments of Aviation.

UNIT I	**REGULATIONS**	**12 Hours**

Duties of ITU, ICAO, AAI, WPC, ICAO Annexure, Spelling of Alphabets and Transmission of numerical, Aircraft Identification, Location Indicators, Flight Information Regions, Identification of Ground Services.

UNIT II	**RADIO PROPAGATION**	**12 Hours**

(a) Relationship between wavelength, frequency and speed of light
(b) Frequency bands and ranges
(c) Ionosphere layers during day and night
(d) Mode of Propagation MF, HF and VHF & above
(e) Operation of Geostationary Satellites
(f) Operation of Polar orbiting Satellites
(g) Diving
(h) Skip Distance
(i) Choice of Frequencies during Day & Night

UNIT III	**PHRASEOLOGY**	**12 Hours**

Phraseology used in Aeronautical Communication Services; Abbreviations used in Aeronautical Communication Services.

(a) Distress
(b) Distress Relay
(c) Wrench
(d) Direction Finding
(e) Flight Safety
(f) Metrological
(g) Flight regulatory

UNIT IV	'Q' CODES	12 Hours
'Q' Codes used in Aeronautical Communication Services, QNH, QFE, Height, Elevation, Altitude, Flight Level.		
UNIT V	**COMMUNICATION**	**12 Hours**
Terminal Communication &En-route Communication, NOTAM and SNOWTAM,Need of Primary and Secondary Frequencies.		

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the basic regulations of Radio communications.

CO2: Describe the principles of Radio waves and its Propagation

CO3: Illustrate the Phraseologies used in Aviation sector.

CO4: Decode the aviation code communication.

CO5: Demonstrate the Notices to Airmen.

TEXT BOOKS:

1. K.D. Tuli, "Guide To Flight Radiotelephony Radio Aids & Avionics Vol I & II", Himalayan Books, 11TH Edition, 2018.
2. R. B. Underdown and David Cockburn, "Ground Studies for Pilots: Radio Aids", Wiley India Pvt Ltd; Sixth edition (7 July 2008).
3. Trevor Thom, "Radio Navigation and Instrument Flying: Air Pilot's Manual", Airlife Pub Ltd (1 July 2002).

REFERENCE BOOKS:

1. Keith Williams, "Radio Navigation 1000 questions and answers with explanation", The English Book Store (The Aviation People) (1 January 2013).
2. Alan E. Bramson, Neville Birch and Alan Branson, "Radio Navigation for Pilots", Gardners Books; 3rd edition (June 30, 1996).

WEB LINKS:

1. https://www.ealts.com/documents/ICAO%20Doc%209432%20Manual%20of%20Radiotelephony%20(4th%20ed.%202007).pdf
2. https://www.skybrary.aero/bookshelf/books/249.pdf
3. https://www.udemy.com/course/manual-of-radio-telephony-part-1/

RADIO TELEPHONY WORKSHOP

Laboratory Code		IA Marks		40	
Number of Practical Hours/Week	4	Exam Marks		60	
Total Number of Practical Hours	50	L	T	P	C
Credits	2	0	0	4	2

COURSE OBJECTIVES:

To understand various aviation terminologies, Standard Universal Communication Procedures followed by different departments of Aviation.

Exp no	EXPERIMENTS	Number of Hours
01	Aircraft identification: IC 517, Type of Aircraft : Airbus, Level FL 280, Dep Aerodrome: VECC, Destination Aerodrome: VOMM Route: Over flying VEBS & VEVZ Selcal combination: ALCH	10
	Q 1. Before Departure from Kolkata obtain the following i) Startup Clearance ii) Taxi Instruction iii) Take Off clearence Q 2. Over Kolkata Chennai FIR boundry you have received a SELCAL indication. Take action. Departure Time 1400 Q 3.a) When crossing DOCKET, you observed fire on left engine and decided to make force landing. b) The fire was minor and you are able to extinguish the fire and decided to proceed as per flight plan. Take action. Q 4. When you are 30 NM DME distance of Chennai request for Visual approach. Q 5. Transmit the following phrases as per Radiotelephony procedure. (a) WAIT, I SHALL CALL YOU. (b) ESTABLISH RADIO CONTACT (c) MY TRANSMISSION IS ENDED AND I EXPECT RESPONSE FROM YOU (d) EXAMINE A SYSTEM OR PROCEDURE	

	(e) CONTINUE IN ACCORDANCE WITH THE CONDITION SPECIFIED	
02	Aircraft identification : IC 402, Type of Aircraft : bOEING, Level FL 320, Dep Aerodrome : VIDP, Destination Aerodrome: VOMM Route : Over flying VOBP & VIHY Selcal combination : CMJL	10
	Q 1. Obtain ATC and Takeoff Clearence. Departure Time 0235 Q 2. On reaching "BUKLO" you get Selcal Indication in the cockpit. Take action. Q 3. On reaching "BUSBO" report position. Q 4. While passing "BODEL" a passenger on board is seriously fallen sick. Take action. Q 5. Transmit the following phrases as per Radiotelephony procedure. i. THAT IS NOT CORRECT. ii. PERMISSION FOR PROPOSED ACTION GRANTED iii. I UNDERSTAND YOUR MESSAGE AND WILL COMPLY FOR IT. iv. REDUCE YOUR RATE OF SPEECH. v. LET ME KNOW THAT YOU HAVE RECEIVED AND UNDERSTOOD THIS MESSAGE.	
03	Aircraft identification : IC 181, Type of Aircraft : Boeing 737, Level FL 370, Dep Aerodrome : VIDP, Destination Aerodrome: VABB Route : Over flying VIUD & VAAH Selcal combination : CDJK	10
	Q 1.a) Carry out preflight check and Selcal check. b) Obtain departure on taxi holding point received instruction from appropriate services that there will be a delay of 30 minutes. Ask for alternative Taxi way. Departure Time 1400 Q 2. At 20 NM DME distance from Jaipur, unable to establish communication. Take action. Assume that now the communication system starts working normal and at 70 NM DME distance from Ahmadabad observed fire alarm activated. Take action. alarm found false and decided to continue the flight to destination. Take action. Q 4. Over BOFIN, report your position. Q 5. Transmit the following phrases as per Radiotelephony procedure. i. A change has been made to your last clearence and supersedes your previous clearance. ii. Reduce your rate of speech iii. No iv. I can not comply with your request vi. Yes	
04	Aircraft identification : 9W 465 (JET 465), Type of Aircraft : B737, Level FL 300, Dep Aerodrome : VOMM, Destination Aerodrome: VIDP	10

	Route : o/f VOHY, VABP Selcal combination : RMLD	
	Q 1.a) As you approach Runway holding position you get ready for an immediate take off in order to avoid delay. Take action b) On getting airborne you see birds ahead, take appropriate action. Departure Time 0940 Q 2. You are maintaining your cruising level, and reach BODEL. Take action. Q 3.a) At 30 DME distance inbound Bhopal you are informed that a passenger has fallen sick and needs immediate medical attention. Take action. b) After sometime the passenger gets well and is normal, you decide to continue the flight to Delhi as per flight plan. Take action. Q 4. While on final approach Runway 28, you reach decision height and do not see the runway. Take action. Q 5. Transmit the following phrases as per Radiotelephony procedure. i. Wind direction & speed 250 degrees 15 knots, 070 degresse 10 knots gusting to 20 knots. ii. Headings. 330 degrees, 080 degrees iii. Flight level 200 , 310 iv. Visiblity 1000, 2000 v. Runway Visual Range 500 , 1200	
05	Aircraft identification : DN 786, Type of Aircraft : Airbus, Level FL 320, Dep Aerodrome : VIDP, Destination Aerodrome: VOMM Route : Over flying VEBS & VEVZ Selcal combination : ALCH	10
	Q 1. You are parked in Bay No 7. Obtain the following i. Startup Clearence ii. Line up instruction iii. Take Off clearence Departure Time 1400 Q 2.i. Over Bhopal you notice right engine is on fire. You plan to carry out force landing on an open field. fire was minor and you are able to extinguish the fire and decided to proceed as per flight plan. Take action. ver BODAL your Co Pilot is hurt due to Bird Hit. Take action. Q 4. On finals you are not able to get three greens. Ask for visual check. Q 5. Transmit the following phrases as per Radiotelephony procedure. i. IC 439 ii. VT ATT iii. VISIBLITY 2000 iv. RUNWAY VISUAL RANGE 800, RUNWAY VISUAL RANGE 550 v. FL 250, FL 050	
After the course the students are expected to be able to		

CO1: Explain the basic regulations of Radio communications.

CO2: Describe the principles of Radio waves and its Propagation

CO3: Illustrate the Phraseologies used in Aviation sector.

CO4: Decode the aviation code communication.

CO5: Demonstrate the Notices to Airmen.

REFERENCES

1. K.D. Tuli, "Guide To Flight Radiotelephony Radio Aids & Avionics Vol I & II", Himalayan Books, 11TH Edition, 2018.
2. R. B. Underdown and David Cockburn, "Ground Studies for Pilots: Radio Aids", Wiley India Pvt Ltd; Sixth edition (7 July 2008).
3. Trevor Thom, "Radio Navigation and Instrument Flying: Air Pilot's Manual", Airlife Pub Ltd (1 July 2002).
4. Keith Williams, "Radio Navigation 1000 questions and answers with explanation", The English Book Store (The Aviation People) (1 January 2013).
5. Alan E. Bramson, Neville Birch and Alan Branson, "Radio Navigation for Pilots", Gardners Books; 3rd edition (June 30, 1996).
6. https://www.ealts.com/documents/ICAO%20Doc%209432%20Manual%20of%20Radiotelephony%20(4th%20ed.%202007).pdf
7. https://www.skybrary.aero/bookshelf/books/249.pdf
8. https://www.udemy.com/course/manual-of-radio-telephony-part-1/

AERODYNAMICS LAB

Laboratory Code		IA Marks		40	
Number of Practical Hours/Week	4	Exam Marks		60	
Total Number of Practical Hours	45	L	T	P	C
Credits	2	0	0	4	2

COURSE OBJECTIVES:

The practical sessions assigned to this course are intended to perform aerodynamic tasks to help students understand the basic principles of aerodynamics and improve their experimental skills. The course includes identifying different airfoil sections; primary and secondary flight controls; studying the nature of airflow around aerodynamic bodies; Determining the optimum angle of attack (AoA) and the stall angle of airfoil sections.

Exp no	EXPERIMENTS	Number of Hours
01	Flow around various objects in a 'Water Channel' - Square, Cylinder, Aerofoil, Understanding laminar flow, turbulent flow, stagnation point, flow separation, boundary layer	3
02	Fabricate Aerofoil Model - Understanding associated terms	3
03	Water Channel - Effect of vortex generator on boundary layer control	3
04	Effect of angle of attack and airflow velocity on lift and Stalling	3
05	Study of flow over streamlined bodies with different angle of attack by flow visualization technique	3
06	Identification of flight control surfaces and their effect on flight control - Aircraft Model	3
07	Identifying High lift devices and practical understanding of their effect on lift with respect to aircraft speed (Air flow)	3
08	Practical understanding of lift spoiling devices	3
09	Removal / installation of Pitot Static Instruments	3
10	Calibration of a Pitot Static System using a Pitot Static Leak tester	3
11	Fabrication of model - high speed flight	3
12	Practical study of various factors affecting lift and drag on an aerofoil	3
13	Factors affecting flow of fluid over an aerofoil surface and demonstrate the Venturi effect	3
14	Identify various type of flap surfaces and their effect on high lift and high drag characteristic	3
15	Identification of various parts of Rotary wing	3

COURSE OUTCOMES:

On completion of the course students will be able to

CO1: Explain the nature of aerodynamic forces.

CO2: Define the aerodynamic center and the center of pressure for an airfoil.

CO3: Calculate aerodynamic forces and moments on bodies.

CO4: Use flow similarity to design wind tunnel tests.

CO5: Describe and perform flow visualization tests to study the characteristics of the flow around aerodynamic bodies.

REFERENCES:

1. John Anderson Jr., "Fundamentals of Aerodynamics", McGraw Hill Education; 5th edition (6 July 2010).
2. R. K. Goyal & Kamal Kishore Khatri, "Fundamentals of Aerodynamics", Neelkanth Publishers (1 January 2012).
3. https://www.youtube.com/watch?v=ewMJuzqK58s&ab_channel=AnsysLearning
4. https://www.youtube.com/watch?v=edLnZgF9mUg&ab_channel=MITOpenCourseWare
5. https://www.youtube.com/watch?v=eCH8UNG_4qc&ab_channel=NPTELIITGuwahati
6. https://www.youtube.com/watch?v=eCH8UNG_4qc&list=RDCMUCCDzHkpuIuD1ZC0wsCXUuPQ&start_radio=1&rv=eCH8UNG_4qc&t=14&ab_channel=NPTELIITGuwahati

AIR REGULATION I

Subject Code		IA Marks			40
Number of Lecture Hours/Week	3	Exam Marks			60
Total Number of Lecture Hours	45	L	T	P	C
Credits	3	3	0	0	3

COURSE OBJECTIVES:

To improve the students' knowledge of international air law, conventions and recommended practices to better serve for airlines.

UNIT I	**INTERNATIONAL AGREEMENTS AND ORGANIZATIONS**	**15 Hours**

The Convention of Chicago, The International Civil Aviation Organization, Other International Agreements, PIC authority and responsibility regarding safety and security, Operators and pilots liabilities, Commercial practices and associated rules.

UNIT II	**AIRWORTHINESS OF AIRCRAFT, AIRCRAFT NATIONALITY AND REGISTRATION MARKS, PERSONNEL LICENSING**	**15 Hours**

Airworthiness of Aircraft (Annex 8), Aircraft Nationality and Registration Marks (Annex 7), Personnel Licensing (Annex 1), Rules of the Air (Annex 2).

UNIT III	**PROCEDURES FOR AIR NAVIGATION AND AIR TRAFFIC SERVICES**	**15 Hours**

Aircraft Operations Doc. 8168, Foreword – introduction, Definitions and abbreviations, Departure procedures, Approach procedures, holding procedures, Altimeter setting procedures, Secondary surveillance radar transponder operating procedures, Air Traffic Services – Annex 11, General, Air Traffic Control, Flight Information Service, Alerting Service, identification of RNP types and the identification of ATS routes, Rules of the Air and Air Traffic Services (ICAO Doc. 4444 – RAC/501/11 and ICAO Doc. 7030 – Regional Supplementary Procedures), general air traffic services operating practices, Area Control Service, Approach Control Service, Aerodrome Control Service, Flight Information Service and Altering Service, Use of radar in Air Traffic Services.

UNIT IV	**AERONAUTICAL INFORMATION SERVICE, AERODROMES, FACILITATION, SEARCH AND RESCUE**	**15 Hours**

Aeronautical Information Service (based on Annex 15 and AIP, India), Aerodromes (Based on Annex 14, Vol. 1 & 2), Visual aids for navigation, Visual aids for denoting obstacles, Visual aids for denoting restricted

use of areas, Emergency and other services, Facilitation (based on Annex 9), Search and Rescue (based on Annex 12), Annex 12 – definitions- Organization - Operating procedures, Search and Rescue Signals.

UNIT V	**SECURITY, AIRCRAFT ACCIDENT INVESTIGATION, AERONAUTICAL INFORMATION SERVICE, CARS: SECTIONS 2, 7 AND 8, NATIONAL LAW**	**15 Hours**

Annex 17 – General – aims and objectives, Aircraft Accident Investigation (based on Annex 13), CARs: Sections 2, 7 and 8, National Law – National Law and differences to relevant ICAO Annexes and CARs.

Indian aircraft act 1934-section 1,2,8,10,11A,11B, 17&18(3/9), Aircraft Rule 1937- Rule No. 1-19,21-29A.30,33,37A,38-48,50,52,53,55,65,67,67A,67B,68-70,76,79-89,133A,134,140,140(AB&C)15&161 Schedule I, II, VI, & XI , INDAIN AIRCRAFT RULES 1920-RULE NO 53-64, AIRCRAFT RULES 1954 (Public Health Rules) , AIRCRAFT RULES 2003 (Carriage of Dangerous Goods)

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Discuss the international agreements and organization.

CO2: Explain the Aircraft Nationality and Registration Marks.

CO3: Investigate the procedure for air navigation.

CO4: Explain the operating regulation for aerodrome.

CO5: Illustrate the Indian aircraft rules.

TEXT BOOKS:

1. ICAO Annex – 8 to the convention on international civil aviation International standards and recommended practices.
2. RK Bali, “Air Regulations”, Sterling Book House (1 January 2019).
3. OXFORD ATPL GRN TRAINI SERIES AIR LAW 1.
4. Nordian, Air Law & ATC Procedures, Edition 7.2 (2018).
5. V. Krishnan & S.R. Iyer, “A Handbook on Air Regulations for Pilots”, The English Book Store (The Aviation People) (1 January 2014).

REFERENCE BOOKS:

1. Nordian, Air Law & ATC Procedures, Edition 7.2 (2018).
2. V. Krishnan & S.R. Iyer, “A Handbook on Air Regulations for Pilots”, The English Book Store (The Aviation People) (1 January 2014).

WEB LINKS:

1. https://iclg.com/practice-areas/aviation-laws-and-regulations/india
2. https://www.icao.int/Meetings/anconf12/Document%20Archive/an02_cons%5B1%5D.pdf
3. https://www.mod.gov.in/sites/default/files/AFAct.pdf
4. https://www.civilaviation.gov.in/sites/default/files/moca_000947.pdf
5. http://164.100.60.133/rules/car-ind.htm

AIR NAVIGATION

Subject Code		IA Marks			40
Number of Lecture Hours/Week	4	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	3	4	0	0	3

COURSE OBJECTIVES:

The objective of the course is to develop student understanding and skills in fundamental concepts of communication and general navigation.

UNIT I	**DIRECTION, POSITION AND LINES ON THE EARTH SURFACE**	**12 Hours**

Direction: The form of the Earth**,** Basic Direction. **Position:** Latitude, Longitude, Chlat, Chlong. **Lines on the Surface of the Earth**: Great Circle, Small circle, Vertices, Rhumb Line.

UNIT II	**MEASUREMENT OF DISTANCE AND EARTH MAGNETISM**	**12 Hours**

Distance: Measurement of distance Chlat, chlong distance determination. **Earth Magnetism:** Variation, Magnetic dip and Deviation. **1 in 60 Rule:** Rule and geometry, Application in Basic Navigation, Techniques for Other Uses.

UNIT III	**TOPOGRAPHICAL MAPS**	**12 Hours**

Topographical Maps: Features, Map Reading and Navigation Techniques, Symbology. **Convergence:** Convergency, Conversion Angle. **Departure:** Departure. **Scale:** Scale, **Chart Overview:** Types of projections, Conformality.

UNIT IV	**NORMAL, TRANSVERSE AND OBLIQUE MERCATOR**	**12 Hours**

Normal Mercator: Mercator - Intro and Overview of Projections, Mercator - Principle of Construction, Mercator Properties, Mercator Scale, Mercator Plotting. **Lambert's Conformal:** Lambert's Projection and properties, Lambert's scale and convergence, Lambert's plotting. **Polar Stereographic:** Polar Projection and properties, Determination of Track, **Transverse and Oblique Mercator:** Transverse Mercator Oblique Mercator. Time, Solar system and Kepler, Seasons, Declination and Hour Angle, Local Mean Time, Sunrise and Sunset **Grid Navigation:** Convergence, Steering, Problems, Plotting.

UNIT V	**PET, PSR, INS, IRS AND FMS**	**12 Hours**

PET: Introduction, PET: Calculations, PSR: Introduction, PSR: Calculations, The Direct Reading Compass, Gyro-magnetic Compass: Principle of Construction, Flux Valve, Compass Components and Remote

Transmission, Aircraft Magnetism, INS: Principle of Operation, Data Flow, Platform Stabilization, Alignment, Operation, Errors, IRS: Introduction, Ring Laser Gyro, IRS: Summary, FMS - Purpose and Components, FMS - Equipment Operation.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Describe the geometric properties of a great circle, including vertex.

CO2: Examine the method to measure the Distance and Earth Magnetism.

CO3: Use the topographical maps to navigate.

CO4: Use normal, transverse and oblique Mercator to navigate.

CO5: Evaluate the new navigation systems put into practice and their development process.

TEXT BOOKS:

1. R K Bali, "AIR NAVIGATION", 2nd Edition, 1 January 2017.
2. K.S. Ramakrishnan, "Air Navigation", Integrity Media; First edition (1 January 2009).
3. CAE Oxford Aviation Academy – General Navigation

REFERENCE BOOKS:

1. Trevor Thom, "Air Navigation", Airlife Pub Ltd (1 July 2002).
2. Keith Williams, "1000 Questions Answers & Explanations For JAR ATPL (A) & CPL (A) - General Navigation", The English Book Store (The Aviation People); 2016th edition (1 January 2016).

WEB LINKS:

1. https://answeringatpl.com/general_navigation/
2. https://youtu.be/gchRWHVyWZc
3. http://homepage.eircom.net/~eireanseo/nav.pdf
4. https://www.pilot18.com/atpl-air-navigation-materials/

AVIATION METEOROLOGY

Subject Code		IA Marks			40
Number of Lecture Hours/Week	4	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	4	4	0	0	4

COURSE OBJECTIVES:

To provide an understanding of the physical properties of the atmosphere and how they affect the weather, with an emphasis on the factors affecting aviation and Observation and reporting of weather for Aviation services.

UNIT I	**THE ATMOSPHERE**	**12 Hours**

The Atmosphere - Pressure (2 parts) - Density - Pressure Systems (3 parts) - Altimetry (3 parts) - Temperature (2 parts) - Humidity (2 parts).

UNIT II	**WINDS AND CLOUDS**	**12 Hours**

Adiabatic and Stability (2 parts) - Turbulence (2 parts) - Lower Winds (5 parts) - Upper Winds (2 parts) - Clouds and Precipitation (4 parts) - Thunderstorms (2 parts).

UNIT III	**CLIMATOLOGY**	**12 Hours**

Visibility (2 parts) - Aircraft Icing (2 parts) - Air Masses and Fronts (3 parts) - Depressions (2 parts) - Global Climatology (3 parts) - Area Climatology (3 parts).

UNIT IV	**AVIATION WEATHER FORECAST**	**12 Hours**

Remote Sensing (2 parts) - METARs (3 parts) - TAFs (2 parts) - Spot Wind Charts - Low Level Sig Wx Charts.

UNIT V	**AVIATION WEATHER BRIEFING CHARTS**	**12 Hours**

High Level Significant Weather Charts (2 parts) - The SIGMET - The AIRMET - In Flight Briefing - Met Office Services.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Examine the effect of weather elements on aircraft operation.

CO2: Predict the weather hazards and explain its effect on aircraft operation.

CO3: Classify different climate types.

CO4: Decode the METAR/ SPECI code for different weather conditions

CO5: Produce TREND forecasts in a centralized forecasting environment.

TEXT BOOKS:

3. IC joshi, "Ground Subjects CPL/ATPL Aviation Meteorology", Himalayan Books; Sixth Edition (1 January 2019).
4. Oxford ATPL, Jepessen ATPL, Ic Josh Indian Climatology.

REFERENCE BOOKS:

1. Om Prakash Agarwal, "Aviation meteorology for pilots", Blue Rose Publishers; 1st edition (5 January 2018).
2. Navale Pandharinath, "Aviation Meteorology", Bsp Books Pvt. Ltd. (1 August 2014).
3. Dennis W. Newton, Scott Crossfield, "Severe Weather Flying", Aviation Supplies & Academics Inc; 3rd edition (1 March 2003).
4. R.B. Underdown and John Standen, "Ground Studies for Pilots Meteorology", Wiley India Pvt Ltd; 3rd edition (5 March 2008).

WEB LINKS:

1. https://metnet.imd.gov.in/imdetp/lecture_notes/course10/LN_10_54_E-learning%20Aviation%20Meteorology.pdf
2. https://mausam.imd.gov.in/
3. https://mausam.imd.gov.in/imd_latest/contents/meteorological-services-civil-aviation.php

AIRCRAFT POWER PLANTS

Subject Code		IA Marks			40
Number of Lecture Hours/Week	5	Exam Marks			60
Total Number of Lecture Hours	75	L	T	P	C
Credits	4	4	1	0	4

COURSE OBJECTIVES:

1. To acquire the necessary theoretical knowledge of aircraft propulsion units.
2. To understand the workings of the main mechanical and electrical components and systems of an aircraft power plant.

UNIT I	**FUNDAMENTALS OF GAS TURBINE ENGINES**	**15 Hours**

Fundamentals Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle; The relationship between force, work, power, energy, velocity, acceleration; Constructional arrangement and operation of turbojet, turbofan, turbo shaft, turboprop. Engine Performance Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption; Engine efficiencies; By-pass ratio and engine pressure ratio; Pressure, temperature and velocity of the gas flow; Engine ratings, static thrust, influence of speed, altitude and hot climate, flat rating, limitations. Inlet Compressor inlet ducts; Effects of various inlet configurations; Ice protection Compressors Axial and centrifugal types; Constructional features and operating principles and applications; Fan balancing; Operation: Causes and effects of compressor stall and surge; Methods of air flow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades; Compressor ratio.

UNIT II	**COMBUSTION AND EXHAUST SECTION OF TURBINE ENGINE**	**15 Hours**

Combustion Section Constructional features and principles of operation Turbine Section Operation and characteristics of different turbine blade types; Blade to disk attachment; Nozzle guide vanes; Causes and effects of turbine blade stress and creep. Exhaust Constructional features and principles of operation; Convergent, divergent and variable area nozzles; Engine noise reduction; Thrust reversers. Bearings and Seals Constructional features and principles of operation and handling. Lubricants and Fuels Properties and specifications; Fuel additives; Safety precautions.

UNIT III	**AIRCRAFT FUEL SYSTEM**	**15 Hours**

Lubrication Systems - System operation/lay-out and components. Fuel Systems Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components. Air Systems Operation of engine air distribution and anti-ice control systems, including internal cooling,

sealing and external air services. Starting and Ignition Systems Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements. Engine Indication Systems Exhaust Gas Temperature/ Inter-stage Turbine Temperature; Engine Thrust Indication: Engine Pressure Ratio, engine turbine discharge pressure or jet pipe pressure systems; Oil pressure and temperature; Fuel pressure and flow; Engine speed, Propeller Speed; Vibration measurement and indication; Torque; Power.

UNIT IV	**TURBO-PROP AND TURBO-SHAFT ENGINES**	**15 Hours**

Power Augmentation Systems Operation and applications; Water injection, water methanol; Afterburner systems. Turbo-prop Engines Gas coupled/free turbine and gear coupled turbines; Reduction gears; Integrated engine and propeller controls; Over-speed safety devices. Turbo-shaft engines Arrangements, drive systems, reduction gearing, couplings, control systems. Auxiliary Power Units (APUs) Purpose, operation, protective systems.

UNIT V	**POWERPLANT INSTALLATION, ENGINE MONITORING AND INSPECTION OF ENGINES**	**15 Hours**

Powerplant Installation. Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains. Fire Protection Systems, Operation of detection and extinguishing systems. Engine Monitoring and Ground Operation Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Trend (including oil analysis, vibration and boroscope) monitoring; Inspection of engine and components to criteria, tolerances and data specified by engine manufacturer; Compressor washing/cleaning; Foreign Object Damage. Engine Storage and Preservation. Preservation and de preservation for the engine and accessories/ systems.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the principle of operation, basic design and construction of gas turbine engines.

CO2: Summarize the operation of a gas turbine engine combustion and Exhaust section.

CO3: Analyze the lubrication and ignition system of turbine engines.

CO4: Discuss the principle of operation, basic design and construction of turbo prop and turbo shaft Engines.

CO5: Illustrate the procedure for powerplant installation, engine monitoring and inspection of engines.

TEXT BOOKS:

1. Irwine Treager, “Aircraft Gas Turbine Technology by”, McGraw Hill Education; Third edition (1 July 2017).
2. The Jet Engine' by “ROLLS ROYCE”, Power plant Section Text book- (EA-ITP-P), Wiley; 5th

edition (14 August 2015).
3. Dale Crane, “Aviation Maintenance Technician Series” Aviation Supplies & Academics Inc; 3rd edition (17 January 2008).
4. Jack V. Casamassa and Ralph D. Bent, “Jet Aircraft Power Systems”, McGraw-Hill, 1965.

REFERENCE BOOKS:

1. Ralph D Bent and Mckinley James L, “Aircraft Power Plants”, McGraw-Hill; Revised Ed. edition (January 1, 1955).
2. Airframe and Power plant Mechanics (EA-AC 65- 12A) -Power Plant Hand FAA.
3. M.J.Kroes, T.W.Wild, R.D.Bent and J.L.McKinley, “Aircraft Power Plants” McGraw-Hill Education 2014.

WEB LINKS:

1. https://www.cfinotebook.net/notebook/operation-of-aircraft-systems/powerplant
2. http://www.bits.de/NRANEU/others/amd-us-archive/FM1-506%281990%29.pdf
3. https://nptel.ac.in/courses/112/103/112103281/

INTRODUCTION TO AIRLINE INDUSTRY

Subject Code		IA Marks			40
Number of Lecture Hours/Week	4	Exam Marks			60
Total Number of Lecture Hours	75	L	T	P	C
Credits	4	4	0	0	4

COURSE OBJECTIVES:

To understand the airline industry and its regulatory bodies, the characteristics of Airline Industry, the organizational structure of the airline industry, the security, navigation and traffic control and the importance of safety and security.

UNIT I	**GENERAL INTRODUCTION OF AVIATION**	**15 Hours**

Aviation – Introduction - Meaning & Genesis of Aviation - Aviation Terminology - Regulatory Bodies – DGCA, BCAS, ICAO, IATA - IATA Phonetics - Airport and Airline Codes - World Time Zone - Land side and Airside – Areas – Terminal Building – Apron – Runway.

UNIT II	**INTRODUCTION TO AIRCRAFT SCIENCE**	**15 Hours**

History of Aircraft-Difference between Aircraft and Airplane-List of Civil Aircraft Manufacturing Companies – Classification of Airplanes-Physical Description of an Aircraft- Basic Science behind the Flight-Mechanics of the Flight-Parts of an Aircraft with definitions.

UNIT III	**PASSENGER SERVICES AT TERMINAL BUILDING**	**15 Hours**

Reservation – Meaning – Procedures – Check in – Meaning – Seating Procedures of an Airline – Exit Row Seating Procedures -X-Ray Screening of Baggage Procedure – Types of Passengers and Handling Procedure – Expectant Mother Handling Procedures – Handling Procedure for Infant, Minor, Physically Incapacitated Person – Ambulatory Passenger – Non Ambulatory Passenger – Wheel Chair Passenger – Types of Wheel Chair Passengers – Disruptive Passenger Handling Procedure – Mentally Disabled Passenger Handling Procedure -Handling of CIP,VIP & VVIP-Co- ordination of Supporting Agencies /Departments. Boarding Gate – Procedure -– Arrival Terminal Procedure – Property Irregularity Report (PIR) – Meaning.

UNIT IV	**PASSENGER SERVICES AT RAMP**	**15 Hours**

Ramp Handling Procedure, –Baggage Make up Area – Meaning – Procedure – Passenger Reconciliation - Meaning, Baggage Reconciliation - Meaning, Gate Know Show (GNS)-Procedure, Flight Cancellation and Denied Boarding Compensation Procedures – Death During Flight – Handling Procedure – Handling Procedure for Blind Passenger – Annexure for Passenger Handling Arrival Ramp Procedure- Meaning.

UNIT V	RAMP SAFETY AND HANDLING PROCEDURES & CIVIL AVIATION REQUIREMENT (CAR)	15 Hours

Introduction – Meaning – Operating Service Doors and Panels – Securing the Aircraft - Ramp Officer Check sheet – Ramp Safety – Meaning – Handling Procedures - Types of Accidents at Ramp -Accident to Passengers – Accident to Personnel – Damage to Aircraft – Damage to Ground Equipment and Vehicle – (Beacon – Cones)- Personnel Protection on the Ramp – Propeller Safety – Thrust Reversers – Aerial and other Protrusions – Driving on the RAMP – Foreign Object Debris (FOD) – Ramp Markings – Service Roads – No Parking Areas – Equipment Parking Areas – Safety DO's and DON'T's – Aircraft Guiding Procedures – Baggage/Cargo Loading and Offloading Procedures – Catering Uplift Procedure – Aircraft Arrival Procedure – Aircraft Departure Procedure – Fuelling General Procedures and Precautions – Pushing and Towing of Aircraft – CAR – Meaning- Regulatory Authority– Compliance Requirement

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the aviation regulatory bodies and their roles and responsibilities.

CO2: List the different variants of aircraft available in the market & their operational ability.

CO3: Write the procedures and practices implemented in airport to manage passenger traffic in terminal.

CO4: Describe the culture of work in Ramp

CO5: Analyze the safety precautions implemented in RAMP.

TEXT BOOKS:

1. FlySky Aviation, "Airport and Airline Management", Latest Edition, 2020.
2. International Air Transport Association (IATA); 1st Edition (14 April 2011).
3. B.Young, "Airport planning and management" McGraw-Hill Education, 6th Edition, 2011.

REFERENCE BOOKS:

1. IATA books on airline customer service – 2020 edition.

WEB LINKS:

1. https://www.slideshare.net/vivianmeril/introduction-to-airline-industry.
2. https://www.iata.org/en/training/courses/airline-industry-introduction/talg50hlm/en/.

ATC COMMUNICATION AND ITS UNITS

Laboratory Code		IA Marks		40	
Number of Practical Hours/Week	4	Exam Marks		60	
Total Number of Practical Hours	45	L	T	P	C
Credits	2	0	0	4	2

COURSE OBJECTIVES:

Understand the Air Traffic control operations, their role in maintaining safety and easy flow of traffic, different units that work closely with ATC.

Exp no	EXPERIMENTS	Number of Hours
01	Functioning of ATS Reporting Office (ATC Briefing), booking of Flight Plan (FPL)/ Repetitive Flight Plan (RPL), Joint Regional Coordination Centre (JRCC), Non-scheduled Bill generation, NOTAM bulletin broadcasting.	4
02	Communication Briefing/ Meteorological Briefing	4
03	NOTAM office/ Aeronautical Information Service (AIS) office	4
04	Automation in ATC	4
05	Aerodrome Control Unit and its functioning (TOWER & GROUND controller)	4
06	Advanced Surface Movement and Guidance Control System (ASMGCS)	4
07	Approach Control Unit	4
08	Area Control Centre	4
09	Flight Information Centre (FIC)	4
10	Rescue And Coordination Centre (RCC)	4
11	Radar Control	4
12	Military Liaison Unit (MLU)	4
13	Oceanic Control Centre (OCC)	4

COURSE OUTCOMES:

On completion of the course students will be able to

CO1: Explain the different ATC units for communication

CO2: Demonstrate the functions of ground, tower, area and approach

CO3: Analyse the boundaries of FIR

CO4: Examine the functions of RCC

CO5: Decode meteorology briefing
REFERENCES:
1. https://www.skybrary.aero/index.php/ATC_Unit_Coordination 2. http://web.mit.edu/6.933/www/Fall2000/mode-s/atc.html 3. https://www.faa.gov/air_traffic/publications/atpubs/aim_html/chap4_section_2.html#:~:text=Radio%20communications%20are%20a%20critical%20link%20in%20the%20ATC%20system.&text=The%20single%2C%20most%20important%20thought,the%20appropriate%20aircraft%20call%20sign. 4. https://science.howstuffworks.com/transport/flight/modern/air-traffic-control.htm 5. https://www.aopa.org/training-and-safety/students/presolo/special/new-pilots-guide-to-atc-communication

AIR REGULATION II

Subject Code		IA Marks		50	
Number of Lecture Hours/Week	4	Exam Marks		50	
Total Number of Lecture Hours	75	L	T	P	C
Credits	03	0	0	0	3

COURSE OBJECTIVES:

The air regulation course aims to enable the students to understand Civil Aviation Administrations, Civil Aviation Authorities, Airports and Air Navigation Service Providers to support their organization in compliance with national and international air law, through application of appropriate knowledge and advocacy.

UNIT I	**REGULATORY FRAMEWORK, CAR-66 CERTIFYING STAFF – MAINTENANCE**	**15 Hours**

Role of International Civil Aviation Organization; The Aircraft Act and Rules made there under Role of the DGCA; Relationship between CAR-21, CAR-M, CAR-145, CAR-66, CAR 147 The Aircraft Rules (Applicable to Aircraft Maintenance and Release) Aeronautical Information Circulars (Applicable to Aircraft Maintenance and Release), CAR Sections 1 and 2, Detailed understanding of CAR-66.

UNIT II	**AIRCRAFT OPERATIONS AND CAR-145 — Approved Maintenance Organizations**	**15 Hours**

Commercial Air Transport/Commercial Operations, Air Operators Certificates; Operators Responsibilities, in particular regarding continuing airworthiness and maintenance; Documents to be carried on board; Aircraft Placarding (Markings), Detailed understanding of CAR-145 and CAR M Subpart F.

UNIT III	**AIRCRAFT CERTIFICATION AND CAR M**	**15 Hours**

General Certification rules: such as FAA & EACS 23/25/27/29; Type Certification; Supplemental Type Certification; CAR-21 Design/Production Organization Approvals. Aircraft Modifications and repairs approval and certification Permit to fly requirements, Documents - Certificate of Airworthiness; Certificate of Registration; Noise Certificate; Weight Schedule; Radio Station License and Approval. Detail understanding of CAR M provisions related to Continuing Airworthiness. Detailed understanding of CAR-M.

UNIT IV	**NATIONAL AND INTERNATIONAL REQUIREMENTS**	**15 Hours**

Maintenance Programme, Maintenance checks and inspections; Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists; Airworthiness Directives; Service Bulletins, manufacturers service information; Modifications and repairs; Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.;

Continuing airworthiness; Test flights; ETOPS /EDTO, maintenance and dispatch requirements; RVSM, maintenance and dispatch requirements RNP, MNPS Operations All Weather Operations, Category 2/3 operations and minimum equipment requirements.

UNIT V	**SAFETY MANAGEMENT SYSTEM, FUEL TANK SAFETY**	**15 Hours**

State Safety Programme, Basic Safety Concepts, Hazards & Safety Risks, SMS Operation, SMS Safety performance, Safety Assurance, Special Federal Aviation Regulations (SFARs) from 14 CFR SFAR 88 of the FAA and of JAA TGL 47, Concept of CDCCL, Airworthiness Limitations Items (ALI).

COURSE OUTCOMES:

Upon completion of the course, participants will be able to accomplish the following:

CO1: Analyze about CAR-66 certifying staff – maintenance.

CO2: Examine about aircraft operations and CAR-145 — Approved Maintenance Organizations.

CO3: Explain about aircraft certification and CAR M.

CO4: Write about national and international requirements for Maintenance Programme.

CO5: Describe about safety management system, fuel tank safety

TEXT BOOKS:

1. The Aircraft Act, 1934
2. The Aircraft Rules, 1937 VOL 1
3. The Aircraft Rules, 1937 VOL 3
4. ICAO Annex – 8 to the convention on international civil aviation
5. International standards and recommended practices

REFERENCE BOOKS:

1. Airlaw Airworthiness (DGCA)
2. Aeronautical Information Circular
3. CAR - Section - 1, 2, & 8 SMS
4. CAR - 21, M, 145, 66 & 147
5. Special Federal Aviation Regulations (SFARs) - 14 CFR, SFAR 88 & JAA TGL 47

WEBLINKS

1. **http://164.100.60.133/misc/draft%20cars/CAR%2066_Draft(Dec2015).pdf**
2. **https://soaneemrana.org/onewebmedia/CAR%20145.pdf**
3. **http://164.100.60.133/ftppub/CAR_M.pdf**
4. **https://www.easa.europa.eu/sites/default/files/dfu/ws_prod-g-doc-Agency_Mesures-Agency_Decisions-2007-R-2007-002-R-Fuel-Tank-Safety-Part-145.pdf**

RADIO AIDS

Subject Code		IA Marks			40
Number of Lecture Hours/Week	3	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	3	3	0	0	3

COURSE OBJECTIVES:

Understand the functioning of various Nav aids that are made available inflight, on ground, principle behind their operation.

UNIT I	**RADIO INSTRUMENTS**	**12 Hours**

Ground D/F (including classification of bearings) – principles - presentation and interpretation – coverage - range - errors and accuracy - factors affecting range and accuracy. ADF (including associated beacons and use of the radio magnetic indicator) – principles - presentation and interpretation – coverage – range - errors and accuracy - factors affecting range and accuracy. VOR and Doppler – VOR (including the use of the radio magnetic indicator) – principles - presentation and interpretation – coverage - range - errors and accuracy - factors affecting range and accuracy. DME (distance measuring equipment) - principles - presentation and interpretation - coverage - range - errors and accuracy - factors affecting range and accuracy. ILS (Instrument Landing System) - principles - presentation and interpretation coverage - range - errors and accuracy - factors affecting range and accuracy.

UNIT II	**BASIC RADAR**	**12 Hours**

Pulse techniques and associated terms – latitude and longitude - Ground Radar - principles - presentation and interpretation - coverage - range - errors and accuracy - factors affecting range and accuracy - Airborne weather radar - principles - presentation and interpretation - coverage - range - errors and accuracy - factors affecting range and accuracy - application for navigation - SSR secondary surveillance radar and transponder - principles - presentation and interpretation - modes and codes, including mode S - Use of radar observations and application to in-flight navigation.

UNIT III	**AREA NAVIGATION SYSTEM**	**12 Hours**

General philosophy - use of radio navigation systems or an inertial navigation system - Typical flight deck equipment and operation - means of entering and selecting waypoints and desired course information (keyboard entry system) means of selecting, tuning and identifying ground stations - instrumentation for en-route course guidance - for some types of systems, instrumentation for presenting distance traveled, distance

to go and, if necessary, ground speed information - instrumentation for presenting current position data - flight detector and autopilot coupling - Instrument indications - Types of area navigation system inputs - self-contained on-board systems (IRS/IRS systems) - external sensor systems (VOR/DME, GPS) - air data inputs (true airspeed, altitude, magnetic heading) - VOR/DME area navigation (RNAV) - principle of operation - advantages and disadvantages - accuracy, reliability, coverage - flight deck equipment - Flight director and autopilot coupling.

UNIT IV	**SELF-CONTAINED AND EXTERNAL-REFERRED NAVIGATION SYSTEMS**	**12 Hours**

Satellite assisted navigation: GPS/GLONASS - principle of operation - advantages and disadvantages

UNIT V	**INERTIAL NAVIGATION/REFERENCE SYSTEM (INS/IRS)**	**12 Hours**

- Principles and practical application - gyroscopic principles - platform mounting - accelerometer principles - integrator principles - shuller-tuned platform - navigation computer - strap down system. - Alignment procedures - gyrocompassing - leveling - Accuracy, reliability, errors and coverage - Flight Check equipment and operation - mode selector unit (MSU) - control display unit (CDU) - horizontal situation indicator (HIS) - INS operation - Normal flight, position and waypoint entries - Flight Plan changes - Bypassing waypoint - Change of waypoint data - system check and updating.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the principle of operation of Radio Instruments for Navigation.

CO2: Summarize the Basic operation of RADAR.

CO3: Analyze about the Area Navigation System.

CO4: Discuss about self-contained and external referred navigation system.

CO5: Explain about inertial navigation/reference system (INS/IRS)

TEXT BOOKS:

1. R. B. Underdown, David Cockburn, “Ground Studies for Pilots: Radio Aids”, Wiley-Blackwell; 6th edition (20 April 2001).
2. Trevor Thom, “Radio Navigation and Instrument Flying: Air Pilot's Manual”, Airlife Pub Ltd (1 July 2002).

REFERENCE BOOKS:

1. Keith Williams, “Radio Navigation 1000 questions and answers with explanation”, The English Book Store (The Aviation People) (1 January 2013).

2. Alan E. Bramson, Neville Birch and Alan Branson, “Radio Navigation for Pilots”, Gardners Books; 3rd edition (June 30, 1996).

WEB LINKS:

1. https://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/gps/howitworks/
2. https://nptel.ac.in/courses/101/108/101108056/
3. https://www.scribd.com/document/471477197/ATPL-Notes-Rad-Nav

PISTON ENGINE AND PROPELLERS

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	4	Exam Marks		60	
Total Number of Lecture Hours	60	L	T	P	C
Credits	04	4	1	0	4

COURSE OBJECTIVES:

Understand Basic working of piston engines and propellers, effects on performance.

UNIT I	**PISTON ENGINE**	**12 Hours**

Fundamentals, Mechanical, thermal and volumetric efficiencies operating principles – 2 stroke, 4 stroke, Otto and Diesel, Piston displacement and Compression ratio, Engine configuration and firing order.

UNIT II	**ENGINE CONSTRUCTION AND PERFORMANCE**	**12 Hours**

Crank case, Crank shaft, Cam shafts, Sumps, Accessory gearbox, cylinder and piston assemblies, connecting rods, inlet and exhaust manifolds, valve mechanism, power calculation measurement, factors affecting engine power , mixture rich-lean, pre-ignition.

UNIT III	**SUPERCHARGING AND TURBO CHARGING**	**12 Hours**

Principle and purpose of supercharging and its effects on engine parameters, construction and operation of supercharging / turbo charging systems terminology, control system, system protection.

UNIT IV	**LUBRICANTS AND FUEL AND POWERPLANT INSTALLATION**	**12 Hours**

Properties and Specifications, fuel additives, safety precautions, Configuration of firewalls, cowlings , acoustic panels , engine mounts , anti-vibration mounts , hoses, pipes , feeders, connectors , wiring looms, control cables and rods, lifting points and drains.

UNIT V	**PROPELLER**	**12 Hours**

Fundamentals, blade element theory, high-low blade angels, reverse angel , angle of attack , rotational speed, propeller slip, aerodynamic, centrifugal and thrust forces, torque, relative airflow on blade angle of attack , vibrations and resonance, Propeller construction methods and materials used in wooden, composite and metal propellers, blade station, blade phase, blade shank, blade back and hub assembly, fixed pitch control pitch, constant speeding propeller, Propeller pitch control, propeller ice protection

COURSE OUTCOMES:

CO1: Explain the working principle of piston engine.

CO2: Analyze the piston engine construction and performance.

CO3: Explain about the Supercharging and Turbo charging.

CO4: Write the procedure for installation of lubricants, fuel and powerplant systems.

CO5: Explain the design construction and working of propellers.

TEXT BOOKS:

1. Herschel Smith, "Aircraft Piston Engines", McGraw Hill Higher Education (1 July 1981).
2. Ralph D Bent and Mckinley James L, "Aircraft Power Plants", McGraw-Hill; Revised Ed. edition (January 1, 1955).
3. Airframe and Power plant Mechanics (EA-AC 65- 12A) -Power Plant Hand FAA.

REFERENCE BOOKS:

1. Aircraft Piston Engines : For Professional and Private Pilots by Oxford Aviation Academy Limited, 2005.
2. Graham White, "Allied Aircraft Piston Engines of World War II", SAE, 1995.

WEB LINKS:

1. http://learntoflyblog.com/2015/10/22/cfi-brief-four-stroke-piston-engine/
2. https://www.skybrary.aero/index.php/Piston_Engine#:~:text=An%20aircraft%20piston%20engine%2C%20also,engines%20found%20in%20most%20automobiles.
3. https://nptel.ac.in/content/storage2/courses/101101001/downloads/Intro-Propulsion-Lect-25.pdf

HUMAN FACTORS

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	4	Exam Marks		60	
Total Number of Lecture Hours	60	L	T	P	C
Credits	04	3	1	0	4

COURSE OBJECTIVES:

To provide basic understanding to the students about the concept and significance of Human Factors in Airlines and Maintenance organizations.

UNIT I	**HUMAN PERFORMANCE LIMITATION AND SOCIAL PSYCHOLOGY**	**12 Hours**

The need to take human factors into account; Incidents attributable to human factors/human error; 'Murphy's' law. **Human Performance and Limitations:** Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access.

Social Psychology: Responsibility: individual and group; Motivation and de-motivation; Peer pressure; 'Culture' issues; Team working; Management, supervision and leadership.

UNIT II	**FACTORS AFFECTING PERFORMANCE**	**12 Hours**

Fitness/health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and under-load; Sleep and fatigue, shiftwork; Alcohol, medication, drug abuse. Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment. Physical work; Repetitive tasks; Visual inspection; Complex systems.

UNIT III	**HUMAN ERROR AND HAZARDS IN THE WORKPLACE**	**12 Hours**

Within and between teams; Work logging and recording; Keeping up to date, currency; Dissemination of information. Error models and theories; Types of error in maintenance tasks; Implications of errors (i.e. accidents); Avoiding and managing errors. Recognizing and avoiding hazards; Dealing with emergencies.

UNIT IV	**HUMAN FACTORS IN AIRCRAFT MAINTENANCE AND INSPECTION**	**12 Hours**

Human Factors — Aircraft Maintenance and Inspection; Contemporary Maintenance Problems; the SHEL Model; the Reason Model; Human Error. Human Error in Aircraft Maintenance and Inspection (an organizational perspective). Human Factors Issues Affecting Aircraft Maintenance and Dirty

Dozen; Information Exchange and Communication; Training; Aircraft Maintenance Technician Facilities and Work Environment.

UNIT V	TEAMS AND ORGANIZATIONAL ISSUES IN WORKING PLACE	12 Hours

Team Work; Job Design; Reward Systems; Selection and Staffing; Training, Automation and Computerization; Advanced Job Aid Tools, Error Prevention, Considerations and Strategies.

COURSE OUTCOMES:

CO1: Apply the knowledge of human performance limitation and social psychology in workplace.

CO2: Apply the basic knowledge of effect of factors like visual, auditory and cognitive on performance to design suitable work systems.

CO3: Identify the human error and hazardous in the work place.

CO4: Illustrate the roll of human factors in aircraft maintenance and inspection.

CO5: Use the techniques, skills, and modern human factors and workplace ergonomics tools necessary for Aircraft maintenance practice.

TEXT BOOKS:

1. CAP 715 - An Introduction to Aircraft Maintenance Engineering Human Factors for JAR 66, Civil Aviation Authority, UK.
2. CAP 718 - Human Factors in Aircraft Maintenance and Inspection, Civil Aviation Authority, UK.
3. FAA-H-8083-30 - Aircraft Maintenance Technician Handbook - General, US.
4. Department of Transportation, Federal Aviation Administration ICAO Doc 9806.

REFERENCE BOOKS:

1. Eduardo Salas, Dan Maurino Captain, “Human Factors in Aviation”, Academic Press; 2nd edition (26 March 2010).
2. Demetris Yiannakides, Charalampos Sergiou, “Human Factors in Aircraft Maintenance”, CRC Press, 2019.
3. John A. Wise, V. David Hopkin, Daniel J. Garland, “Handbook of Aviation Human Factors”, 2nd Edition, CRC Press, 2010.
4. Monica Martinussen, David R. Hunter, “Aviation Psychology and Human Factors”, 2nd Edition, CRC Press, 2017.

WEB LINKS:

1. https://www.faasafety.gov/files/gslac/courses/content/258/1097/AMT_Handbook_Addendum_Human_Factors.pdf
2. https://soaneemrana.org/onewebmedia/HUMAN%20FACTOR.pdf
3. https://www.faa.gov/about/initiatives/maintenance_hf/library/documents/media/human_factors_maintenance/hf_ops_manual_2014.pdf
4. HumanFactorsInt_2ndrun.qxd (aviationlearning.net)
5. https://youtu.be/wrJstFphalk
6. https://www.slideshare.net/wmughni/human-factors-in-aviation-62599359

AIRCRAFT INSTRUMENTS

Subject Code		IA Marks			40
Number of Lecture Hours/Week	3	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	3	3	0	0	3

COURSE OBJECTIVES:

1. To inculcate the students with the basic knowledge and understanding of various aircraft systems, instruments and their applications.
2. To educate students with the safety precautions and methodology of handling aircraft systems.

UNIT I	**PRESSURE INSTRUMENTS**	**12 Hours**

Pressure altimeter, simple altimeter, sensitive altimeter, servo-assisted altimeter- its principle, working, altimeter errors, and altimeter tolerance, Characteristics and general definitions, Pressure heads, Air temperature measurement, The airspeed indicator, The pressure altimeter, The vertical speed indicator, The machmeter, Airspeed Indicators, Vertical speed indicator.

UNIT II	**MAGNETISM AND GYROSCOPE**	**12 Hours**

Properties, fundamentals, types of gyros, drift and topple, gyro drives, Working, Horizontality, sensitivity, aperiodicity, turning error, acceleration error, variation and deviation. Terrestrial magnetism, the direct indicating compass, Gyroscopes, Directional gyro indicator (DGI), The artificial horizon, The turn and slip indicator, The turn coordinator, Aircraft magnetism.

UNIT III	**ADVANCE GYROSCOPIC INSTRUMENT**	**12 Hours**

Remote Indicating Magnetic Compass, Inertial Navigation System, Inertial Reference System, Air Data Computer, Radio Altimeter, Flight Management System. Directional gyro-Principle of operation, adjustment procedure, erection system, gimbal error, Drift calculation, Drift compensation Attitude Indicator- Principle and construction, erection mechanism, acceleration errors, turning errors, electrically driven attitude indicator and its errors Turn and bank Indicator- Principle and construction, bank indication, turn coordinator.

UNIT IV	**ADVANCE NAVIGATION SYSTEM**	**12 Hours**

Electronic Flight Information System (EFIS), Head-Up display, Basic Computers, Communications and The Future Air Navigation Systems, Flight Director Systems, Autopilot, Autoland, Auto throttle, Yaw Dampers, Control Laws.

UNIT V	WARNING DEVICES	12 Hours

Flight Warning System, Aerodynamic Warnings, Ground Proximity Warning System (GPWS), Airborne Collision and Avoidance System (ACAS), Flight Data Recorder, Cockpit voice recorder, Engine instrumentation and electronic instrumentation.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Describe the working principles of pressure instruments in an aircraft.

CO2: Summarize the operations of Gyroscopic Instruments in an aircraft.

CO3: Illustrate the concepts of advanced Gyroscopic instruments in an aircraft.

CO4: Discuss the ideas of Advanced navigation systems.

CO5: Explain the technical aspects of aircraft warning devices and their working principle.

TEXT BOOKS:

1. Pallet, E.H.J., "Aircraft Instruments & Principles", Pitman & Co., 1993.
2. Nordian, "Airframe and Systems", KLM flight academy, 2018.
3. CAA, "CAP 459 Part-I & II Civil Aircraft Inspection Procedures", Sterling Book House, 2006.
4. Jeppesesn, "A&p Technician Airframe", Jeppesen Sanderson; Illustrated edition (30 May 2003).
5. Larry Reithmaier, Ron Sterkenburg, "Standard Aircraft Handbook for Mechanics and Technicians", McGraw-Hill Education; 7th edition (16 September 2013).

REFERENCE BOOKS:

1. Dale Ph.D. De Remer, "Aircraft Systems for Pilots", Aviation Supplies & Academics Inc, 4th Edition, (30 January 2018).
2. Chris Binns, "Aircraft Systems", Wiley-IEEE Press; 1st edition (28 December 2018).
3. David Harris, "Ground Studies for Pilots - Flight Instruments and Automatic Flight Control Systems", Wiley India Pvt Ltd; Sixth edition (7 July 2008).

WEB LINKS:

1. https://www.faa.gov/documentlibrary/media/advisory_circular/150-5210-15a/150_5210_15a.pdf
2. https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/
3. https://soaneemrana.org/onewebmedia/5AN3%20AIRCRAFT%20SYSTEMS%20UNIT%20I%20to%20V%20%20NOTES.pdf

FLYING SYNTHETIC

Laboratory Code		IA Marks			40
Number of Practical Hours/Week	4	Exam Marks			60
Total Number of Practical Hours	36	L	T	P	C
Credits	2	0	0	4	2

COURSE OBJECTIVES:

It aims to understand how aircraft fly, how the trainee react to applications of flight controls, the effects of other aircraft systems, and how the aircraft reacts to external factors such as air density, turbulence, wind shear, cloud, precipitation, etc. with the help of Flight simulation

Exp no	EXPERIMENTS	Number of Hours
1	Starting procedure	6
2	Taxing	6
3	Take Off	6
4	Landing	6
5	Instrument Identification	6
6	Understanding the synthetic procedures	6

COURSE OUTCOMES:

On completion of the course students will be able to

CO1: Explain the correct starting procedure.

CO2: List the hazards possible when correct starting procedure is not followed.

CO3: Illustrate the essential instrument in cockpit.

CO4: Differentiate between synthetic flying and actual flying.

CO5: Perform take offs and Landings.

REFERENCES:

1. https://www.youtube.com/watch?v=Nl8fw6N_Uyo
2. https://www.youtube.com/watch?v=9DM_8OW9Z3E
3. https://www.youtube.com/watch?v=YzNSBTxH_Cs
4. https://www.youtube.com/watch?v=UvKeDcga9zo
5. https://www.youtube.com/watch?v=5Miei8UHiYg

AERO ENGINE LAB

Laboratory Code		IA Marks			40
Number of Practical Hours/Week	3	Exam Marks			60
Total Number of Practical Hours	50	L	T	P	C
Credits	2	0	0	4	2

COURSE OBJECTIVES:

- To develop the basic knowledge of the students in gas turbine engine and its assembly and dismantling.
- To develop the basic knowledge of the students in piston engine and its assembly and dismantling.
- To evaluate calorific value of the fuels.

Exp no	EXPERIMENTS	Number of Hours
1	Study of aircraft piston engines and jet engines and its components	6
2	Study of forced convective heat transfers	6
3	Study of free convective heat transfers	6
4	cascade testing of axial compressor blade row	3
5	Determination of heat of combustion of fuel	6
6	Combustion performance studies in jet engine combustion chamber	6
7	Study of free jet	6
8	Study of wall jet	6

COURSE OUTCOMES:

On completion of the course students will be able to

CO1: Illustrate the concept of piston engine and gas turbine engine.

CO2: Exhibit the concept of jet characteristics.

CO3: Estimate heat transfer coefficient the free and forced convection heat transfer.

CO4: Perceive the calorific value of a various fuels.

CO5: Manipulate the performance of propeller.

REFERENCES:

1. Jack D. Mattingly , “Elements of Propulsion: Gas Turbines and Rockets”, American Institute of Aeronautics & Astronautics, 15 September 2016.

2. https://nptel.ac.in/content/storage2/courses/101101001/downloads/Intro-Propulsion-Lect-25.pdf
3. J.B.Will, N.P.Kruyt, C.H.Venner, An experimental study of forced convective heat transfer from smooth, solid spheres", International Journal of Heat and Mass Transfer Volume 109, June 2017, Pages 1059-1067.
4. http://courseware.cutm.ac.in/courses/jet-propulsion/
5. https://uta.pressbooks.pub/appliedfluidmechanics/chapter/experiment-5/
6. https://uta.pressbooks.pub/appliedfluidmechanics/chapter/experiment-6/
7. https://www.youtube.com/watch?v=uXW_yvfnmm8&ab_channel=AnkitJainEducation
8. https://www.youtube.com/watch?v=_C1Y8fvXlQQ&ab_channel=AshishUtage
9. https://chem.libretexts.org/Bookshelves/Introductory_Chemistry/Book%3A_Introductory_Chemistry_(CK-12)/17%3A_Thermochemistry/17.14%3A_Heat_of_Combustion

AIRCRAFT SYSTEMS

Subject Code		IA Marks			40
Number of Lecture Hours/Week	3	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	3	3	0	0	3

COURSE OBJECTIVES:

To obtain a basic understanding on the various aircraft systems, the components used in that system.

UNIT I	**AIR CONDITIONING AND CABIN PRESSURIZATION**	**12 Hours**

Air Supply-sources of air supply including engine bleed, APU and ground cart; Air conditioning systems; Air cycle and vapor cycle machines distribution systems; Flow, temperature and humidity control system. Pressurization- Pressurization systems; control and indication including control and safety valves; cabin pressure controllers, safety and warning devices; protection and warning devices

UNIT II	**PNEUMATIC/VACUUM**	**12 Hours**

System lay-out; sources: engine/APU, compressors, reservoirs, ground supply, pressure control; distribution, indications and warnings, interface with other systems.

UNIT III	**FUEL SYSTEMS**	**12 Hours**

System lay-out, fuel tanks, supply systems, dumping, venting and draining, cross-feed and transfer, indications and warnings, refueling and defueling, longitudinal balance fuel systems.

UNIT IV	**LANDING GEAR**	**12 Hours**

Construction, shock absorbing, extension and retraction systems, normal and emergency, Indications and warning, wheels, brakes, antiskid and auto braking, tyres , steering, air-ground sensing, skids, floats.

UNIT V	**ENGINE FUEL SYSTEMS**	**12 Hours**

Carburetor types, construction and principles of operation, icing and heating, Types of fuel system, construction and principle of operation, Starting systems, pre-heat systems, Magneto types, construction and principles of operation, ignition harness, spark plugs, low and high tension systems. Out and components.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain about the Air Conditioning and Cabin Pressurization.

CO2: Summarize the operations of pneumatic system in an aircraft.

CO3: Analyze about the fuel system in an aircraft.

CO4: Discuss the construction and working of landing gear.

CO5: Explain about the engine fuel system.

TEXT BOOKS:

1. David A. Lombardo, "Aircraft Systems", McGraw-Hill Education, 1999.
2. Dale Ph.D. De Remer, "Aircraft Systems for Pilots", Aviation Supplies & Academics Inc, 4th Edition, (30 January 2018).

REFERENCE BOOKS:

1. Chris Binns, "Aircraft Systems", Wiley-IEEE Press; 1st edition (28 December 2018).
2. David Harris, "Ground Studies for Pilots - Flight Instruments and Automatic Flight Control Systems", Wiley India Pvt Ltd; Sixth edition (7 July 2008).

WEB LINKS:

1. https://www.faa.gov/documentlibrary/media/advisory_circular/150-5210-15a/150_5210_15a.pdf
2. https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/
3. https://soaneemrana.org/onewebmedia/5AN3%20AIRCRAFT%20SYSTEMS%20UNIT%20I%20to%20V%20%20NOTES.pdf

DISCIPLINE SPECIFIC ELECTIVES

CIVIL AVIATION REQUIREMENTS (CAR) AND SAFETY MANAGEMENT SYSTEMS

Subject Code		IA Marks			40
Number of Lecture Hours/Week	3	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	3	3	0	0	3

COURSE OBJECTIVES:

Understanding the various laws and regulations pertaining to aviation safety and standards.

UNIT I	**INTRODUCTION**	**12 Hours**

Purpose of CAR, purpose of safety management systems, applications, circulars, sections pertaining to various operations.

UNIT II	**AVIATION ENVIRONMENTAL PROTECTION**	**12 Hours**

Noise management of aircraft, aircraft operations at airport, climate change initiatives and local air quality monitoring in civil aviation.

UNIT III	**CIVIL AVIATION REQUIREMENTS (CAR)**	**12 Hours**

Section 1 to Section 11

UNIT IV	**SAFETY MANAGEMENT SYSTEM (SMS)**	**12 Hours**

Indian safety policy, Indian safety plan, SMS, SSP, ICAO ANNEX 19- Safety management, establishment of safety management system, applicability of SMS, safety policy and objective, coordination of emergency response planning, documentation, safety management system manual, safety risk management, safety assurance, safety promotions, quality policy.

UNIT V	**CASE STUDIES**	**12 Hours**

Description, error, cause and solution for different case studies.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: List the purpose of CAR related to aviation filed.

CO2: Analyze the importance of aviation environmental production.

CO3: Analyze the CAR section 1 to 11.

CO4: Discuss accident causation models and concepts, including multiple causation factors and known precedent.

CO5: Investigate the safety issues at airports with suitable case study.

TEXT BOOKS:

1. DGCA Circulars for latest CAR updates.
2. Michael Ferguson, Sean Nelson, "Aviation Safety: A Balanced Industry Approach", Delmar Cengage Learning; New edition (11 January 2013).
3. Stephen K Cusick, Antonio I Cortes and Clarence Rodrigues, "Commercial Aviation Safety", McGraw Hill Education, 6th edition, 2017.

REFERENCE BOOKS:

1. Alan J. Stolzer, "Safety management systems in aviation", Ashgate Publishing, Ltd., 2008.
2. Shari Stamford Krause, "Aircraft Safety: Accident Investigations, Analyses, & Applications", McGraw-Hill Education, 13-Aug-2003.

WEB LINKS:

1. https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=23035
2. https://www.icao.int/safety/Pages/default.aspx
3. https://www.aai.aero/en/content/aviation-safety-0
4. https://www.civilaviation.gov.in/
5. https://www.dgca.gov.in/digigov-portal/

FLIGHT PERFORMANCE AND PLANNING

Subject Code		IA Marks			40
Number of Lecture Hours/Week	4	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	3	3	1	0	3

COURSE OBJECTIVES:

To understand, infer and interpret performance charts, weight and balance restrictions and its effects.

UNIT I	**TAKE-OFF PERFORMANCE**	**12 Hours**

Using performance data, effects of weight and altitude, Take- Off performance, wind factors, Take- Off flap setting, factors affecting take-off performance, recommended safety factor for take-off, using take- off performance charts.

UNIT II	**LANDING PERFORMANCE**	**12 Hours**

Landing performance data, factors affecting landing performance, effects of weight and altitude, wind factors, runway surface, runway slope, flap setting, recommended safety factors for landing, using landing performance charts, approach speeds, performance considerations.

UNIT III	**RUNWAY CHARACTERISTICS**	**12 Hours**

Take-off distance available (TODA), Take-Off run available (TORA), clearway, rejected Take-Offs, emergency distance, stop way, landing distance available (LDA).

UNIT IV	**EN ROUTE PERFORMANCE**	**12 Hours**

Power required and power available curves, range and endurance, best -range speed, maximum- range speed, best endurance speed, en route performance charts.

UNIT V	**WEIGHT AND BALANCE**	**12 Hours**

Definitions, types of weight, weight of fuel, weight restrictions, effect of CG position on airplane handling, movement of CG position, mathematical approaches to weight and balance, graphical approach to weight and balance, dangerous goods, baggage and cargo restraint.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Analyze the different data to perform efficient take-off.

CO2: Explain about different factors and performance data for safe landing

CO3: Describe the importance of runway length and its availability for different performance.

CO4: Discuss about en route performance planning.

CO5: Explain the fundamental concepts of mass and balance.

TEXT BOOKS:

1. Trevor Thom, "The Aeroplane – Technical", Air Pilot Publisher Ltd; 4th edition (28 May 2003).
2. Aeronautical Information Publication - AIP

REFERENCE BOOKS:

1. JAA ATPL Theoretical Training Manual: Flight Performance and Planning, Transair (UK) Ltd; 7th Revised edition (1 June 2004).
2. David Cockburn, "Flight Performance and Planning", Air Pilot Publisher Ltd (1 January 2006).
3. Oxford Aviation Academy Atpl Book Mass and Balance, Performance, 2014.

WEB LINKS:

1. https://ppltutor.com/exams/flight-performance/
2. https://fly-ga.co.uk/flight-performance-planning-private-pilot-licence-ppl/
3. https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-687-private-pilot-ground-school-january-iap-2019/class-videos/lecture-15-flight-planning/
4. https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-687-private-pilot-ground-school-january-iap-2019/class-videos/lecture-12-aircraft-performance/

DANGEROUS GOODS AND CARGO

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	03	Exam Marks		60	
Total Number of Lecture Hours	60	L	T	P	C
Credits	03	3	0	0	3

COURSE OBJECTIVES:

To ensure that the students have the necessary skills to accept, handle and process shipments containing DGR goods.

UNIT I	**TRANSPORT OF DGR GOODS**	**12 Hours**

Transport of DGR Goods: Approval for the transport of DGR GOODS and its legal background, Terminology, Marking and Labelling of the packages, segregation of DGR goods, Loading and stowage of DGR goods.

UNIT II	**RADIOACTIVE MATERIALS**	**12 Hours**

Radioactive materials, Dry Ice, Polymeric breads, Magnetized materials, Battery driven wheel chairs.

UNIT III	**NOTOC**	**12 Hours**

NOTOC: Inspection for Damage, Leakage or Contamination of Dangerous Goods

UNIT IV	**DANGEROUS GOOD RECORDS**	**12 Hours**

Retention of Dangerous goods records

UNIT V	**TRANSPORT OF WEAPONS AND AMMUNITION**	**12 Hours**

Procedure for transport of weapons and Ammunition

COURSE OUTCOMES:

CO1: Apply the correct DGR and cargo regulations

CO2: Identify dangerous goods which are forbidden for air transport

CO3: Identify the nine classes of DGR by their principle criteria

CO4: Read the alphabetical list of DGR and apply the list of information it contains

CO5: Apply the general packing requirements and specific packing instructions

TEXT BOOKS:

1. IATA Dangerous Goods Regulations (DGR), 2021 62rd edition
2. ICAO Technical Instructions (TI).

REFERENCE BOOKS:

1. Babu P, “Introduction to Air Cargo Management”, 12 November 2020.
2. Cooperative Research for Hazardous Materials Transportation: Defining the Need, Converging on Solutions -- Special Report 283.

WEB LINKS:

1. https://skybrary.aero/bookshelf/books/1178.pdf
2. https://www.youtube.com/watch?v=kpLLWngavFI
3. https://www.youtube.com/user/IATAtv/search?query=DANGEROUS%20

AIRPORT AND AIRLINE PASSENGER MANAGEMENT

Subject Code		IA Marks			40
Number of Lecture Hours/Week	3	Exam Marks			60
Total Number of Lecture Hours	45	L	T	P	C
Credits	3	3	0	0	3

COURSE OBJECTIVES:

To educate the students with a broad overview of the airline industry and creates awareness of the underlying factors influencing airport and airline management.

UNIT I	**AIRPORT MANAGEMENT**	**9 Hours**

Airport Management: Introduction to airport management, Ramp Ops, Air side and Land side, Departments of Airport ops.

UNIT II	**AIRLINE MANAGEMENT**	**9 Hours**

Airline Management: Computer Reservations (CRS) and Departure Control Systems (DCS) functions, passenger and Baggage check-in procedures airport and off-site, Conditions of passenger and baggage carriage, boarding procedures and flight close-out messaging Managing passenger interactions, Enhanced passenger facilitation, latest innovations and career opportunities.

UNIT III	**GENERAL AND AIRCRAFT SECURITY CHECKS**	**9 Hours**

General and Aircraft security checks- Definitions, Organization of Aviation Security, Government Responsibilities, Security Policy, Responsibilities of Security Department, Responsibilities of Crew Members, Identification Cards, Crew Baggage Security, Hand of Crew Shipments, Before take-off, At transfer stations, Post-flight checks, Airline Checks - Minimum Standards, Type A Security Search Checklist, Type B Security Check Checklist, Flight Deck Check, Searches of Aircraft Subject to Specific Threats or High Risk Flights, Discovery of a Suspect Item, Aircraft Exterior Checks, Crew Security,, Forms : Security Search Checklist.

UNIT IV	**SECURITY MEASURES AND PROCEDURES**	**9 Hours**

Security measures and procedures: Security Protection Categories, Application of Security Categories, General, Awareness, Standard Security Measures, Enhanced Security Measures, High Risk Security Measures. List of Prohibited Articles, Passengers Screening, Missing Passengers, Rush / Expedite Baggage, Stowaways, Security of In-flight Catering and Stores, Security of Aircraft Cleaning Supplies.

UNIT V	PREVENTIVE SECURITY MEASURES	9 Hours

Unruly passengers, Hijack and passenger restraining Devices, BOMB OR SABOTAGE THREATS, PREVENTIVE SECURITY MEASURES.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Analyze the administration of airport and airlines.

CO2: Illustrate the commercial operations and different strategies used in the airline.

CO3: Discuss the various responsibilities that adhere to the aircraft security.

CO4: explain the security measures and procedures of airport and airline industry.

CO5: Describe about the unruly passengers.

TEXT BOOKS:

1. IATA Ground Operations Manual.
2. Colin C. Law, Mary R. Doerflein, "Introduction to Airline Ground Service", Cengage Learning Asia; 1st edition (30 September 2013).

REFERENCE BOOKS:

1. Norman E. L. Shanks, Alexandre L. W. Bradley, "Handbook of Checked Baggage Screening: Advanced Airport Security Operation", Willey Publication, 2005.
2. Dr. Sumeet Suseelan, "Airline Airport & Tourism management: Aviation Manual", Notion Press; 1st edition (14 August 2019).
3. Edissa Uwayo, "Airline and Airport Operations", Notion Press; 1st edition (23 September 2016).

WEB LINKS:

1. https://www.iata.org/en/training/courses/flight-operations-management/talp03/en/
2. https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_APO_LECTURE_NOTES_0.pdf
3. https://www.slideshare.net/Padrino80/airport-management-11

LOAD AND TRIM

Subject Code		IA Marks			40
Number of Lecture Hours/Week	3	Exam Marks			60
Total Number of Lecture Hours	45	L	T	P	C
Credits	3	3	0	0	3

COURSE OBJECTIVES:

This course provides students with the detailed knowledge and skills required to plan, calculate and finalize weight and balance documentation. And also covers the basic theories of flight and balance, an overview of standard Load Planning & Load Control process and the required documentation.

UNIT I	**INTRODUCTION TO LOAD & TRIM**	**09 Hours**

Description - Importance of Load & Trim Sheets - Regulatory Requirements

UNIT II	**BASIC THEORY OF FLIGHT**	**09 Hours**

General Description of Aircraft - DCS (Departure Control system)

UNIT III	**THEORY OF BALANCE**	**09 Hours**

Weight & Balancing - Center of Gravity - Center of pressure - Preparation & Approval of weight schedule - standard weight of flight crew and passengers.

UNIT IV	**LOAD & TRIM SHEETS**	**09 Hours**

Procedure for preparing load & Trim sheets - Imp features of L& T sheets - Adjustment of the Last Minute Changes (LMC) - Qualifications-Duties & Responsibilities of L&T officer.

UNIT V	**LOADING & UNLOADING IN AIRCRAFT**	**09 Hours**

Instructions for safe loading - procedure of loading & unloading of passengers, baggage and cargo.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Analyze, understand and apply the safety and punctuality aspects of loading operations.

CO2: Describe the functions of DCS (Departure Control System).

CO3: Calculate the Center of Gravity.

CO4: Prepare load and trim sheet.

CO5: Manage the off-loading/ loading procedures of aircraft.

TEXT BOOKS:

1. Nordian, “Mass & Balance: Flight Performance & Planning”, streling book house, 2017.
2. Jeppesen, “EASA ATPL Training Mass & Balance”, Jeppesen Gmbh (1 January 2014).

REFERENCE BOOKS:

1. Oxford Aviation Academy Atpl Book Mass and Balance, Performance, 2014.
2. U. S. Department of Transportation, Federal Aviation Administration, “Aircraft Weight and Balance Handbook”, Createspace Independent Pub (11 June 2013).
3. Keith Williams, “1000 Questions Answers & Explanations for JAR ATPL (A) & CPL (A) Mass & Balance”, 1 January 2011.
4. Airlines L&T Manuals.

WEB LINKS:

1. https://www.skybrary.aero/index.php/Aircraft_Load_and_Trim
2. https://www.skybrary.aero/index.php/Mass_and_Balance
3. https://www.pilot18.com/wp-content/uploads/2018/01/atpl-mass-and-balance.pdf
4. https://www.youtube.com/watch?v=LJhRooA22Jo
5. https://www.youtube.com/watch?v=HcyCNPH-NPM

AIR ROUTE PLANNING AND FLEET PLANNING

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	4	Exam Marks		60	
Total Number of Lecture Hours	60	L	T	P	C
Credits	04	4	0	0	4

COURSE OBJECTIVES:

This subject will provide students with a comprehensive overview of airline scheduling processes and operations and develop the ability to understand the procedure of building a long, medium, and short-term airline scheduling. Understand the process and principles of assigning aircraft to flights; learn the calculation of airline revenues and airline costing through the fleet assignment and fleet profitability.

UNIT I	**AIRLINE PLANNING**	**12 Hours**

Airline economics, airline demand analysis, airline demand forecasting; factors and concerns in airline scheduling and revenue.

UNIT II	**FLEET ASSIGNMENT**	**12 Hours**

Aircraft revenue management; spill cost calculation; airline fleet planning; airline fleet scheduling.

UNIT III	**AIRCRAFT ROTATION PLANNING**	**12 Hours**

Introduction to aircraft checking and maintenance; airline fleet assignment; aircraft routing calculation.

UNIT IV	**FLIGHT PLANNING**	**12 Hours**

Describe the overall procedure of airline operation; introduction to flight plan; managing flight delay/cancellation.

UNIT V	**AIRLINE CREW ASSIGNMENT**	**12 Hours**

Airline crew regulation, airline crew structure; airline crew scheduling techniques, reliability of crew pairing, robust crew pairing, reserve crew assignment. Operations Management Airline operations management; operation control center. Legal Issues Relevant legal issues, notably law of agency, arbitration and insurance.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain airline management and how organizations operate

CO2: Illustrate economical fleet planning

CO3: Explain the principles of airlines scheduling

CO4: Exhibit reliability of aircraft and extended operational life of aircraft

CO4: A brief explanation of aircraft maintenance technology

TEXT BOOKS:

1. Massoud Bazargan, "Airline Operations and Scheduling", Routledge, 2nd Edition, 28 August, 2010.
2. Gerald N. Cook, Bruce Billig, "Airline Operations and Management", Routledge; 1st edition (15 February 2017).
3. Ahmed Abdelghany, Khaled Abdelghany, "Airline Network Planning and Scheduling", John Wiley & Sons, Inc., 13 November 2018.

REFERENCE BOOKS:

1. Paul Clark, "Buying the Big Jets Fleet Planning for Airlines", Taylor & Francis, 18 January 2018.
2. Amedeo Odoni, Cynthia Barnhart, "The Global Airline Industry", Wiley, 6 July 2015.
3. Peter J. Bruce, "Understanding Decision-making Processes in Airline Operations Control", Routledge; 1st edition (September 8, 2016).

WEB LINKS:

1. https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-75j-airline-management-spring-2006/lecture-notes/lect11.pdf
2. https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-75j-airline-management-spring-2006/lecture-notes/lect16.pdf
3. https://youtu.be/r7C8pazlbAc
4. https://youtu.be/JfiPAPibWYw
5. https://www.researchgate.net/publication/318596603_Airline_Schedules_Planning_and_Route_Development/link/5bacacb4a6fdccd3cb76dea0/download

AIRLINE AND AIRPORT OPERATIONS

Subject Code		IA Marks			40
Number of Lecture Hours/Week	4	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	4	4	0	0	4

COURSE OBJECTIVES:

The objective of this module is to provide the participants with a good knowledge on Airport and Airline Operations and its services.

UNIT I	**HISTORY OF AVIATION**	**12 Hours**

History of Aviation- Development of Air transportation in India-Major players in Airline Industry-Swot analysis in Airline Industry-Market potential of Indian Airline Industry—Current challenges in Airline Industry-Completion in Airline Industry-IATA & ICAO.

UNIT II	**AIRPORT PLANNING**	**12 Hours**

Airport planning-Operational area and Terminal planning, design, and operation-Airport operations-Airport functions-Organization structure of Airline and Airports sectors-Airport authorities-Global and Indian scenario of Airport management – DGCA –AAI.

UNIT III	**INTERNATIONAL TREND IN AVIATION**	**12 Hours**

International trends-Emerging Indian scenario-PPP- Public Private Participation in Indian Airports-Environmental regulations-Private participation in International developments- Environment regulations-Regulatory issues-Meteorological services for Aviation-Airport fees, rates, and charges.

UNIT IV	**AIRLINE TERMINAL MANAGEMENT**	**12 Hours**

Airline Terminal Management-Flight Information Counter/Reservation and Ticketing-Check In/Issue of Boarding pass-Customs and Immigration formalities-Co-ordination-Security Clearance-Baggage and -Handling of Unaccompanied minors and Disabled Passengers- Handling of Stretcher Passengers and Human Remains-Handling of CIP,VIP & VVIP-Co- ordination of Supporting Agencies /Departments.

UNIT V	**CONCEPT OF LOGISTICS**	**12 Hours**

Concept of Logistics- Role of Ware Housing-trend in material handling-Global Supply Chain- Quality concept and Total Quality Management-improving Logistic performance-Air Cargo Concept- Cargo Handling-Booking of Perishable Cargo and Live Animals- Industry Relation- Type of Air Cargo-Air Cargo Tariff, ratios and Charges-Airway Bill, Function, Purpose, Validation.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain about the aviation history and developments in aviation industry.

CO2: Examine the importance of airport planning.

CO3: Analyze the international trend in the Aviation industry.

CO4: Discuss about airline terminal management.

CO5: Explain the fundamental concepts of logistics.

TEXT BOOKS:

1. Graham.A, "Managing Airport an International Perspective" , Butterworth Heinemann, Oxford- 2001.
2. Wells.A, "Airport Planning and Management", 4th Edition-McGraw-hill, London-2000.
3. Doganis.R., "The Airport Business" , Routledge, London-1992.
4. Alexander T.Well, Seth Young, "Principles of Airport Management", McGraw Hill, 2003.
5. P.S.Senguttuvan, "Principles of Airport Economics", Excel Books, 2007.

REFERENCE BOOKS:

1. Richard De Neufville, "Airport Systems: Planning, Design, and Management" , McGraw-Hill, London-2007.
2. Kent Gouiden, "Global Logistics Management", wiley Black Well, 2002.
3. Lambert, "Strategic Logistic Management", Academic Intl Publishers, 2000
4. Paul R.Murphy,JR and Donal &F.Wood, "Contemporary Logistics" , Prentie Hall, 9 thEdn.2008.

WEB LINKS:

1. https://slideplayer.com/slide/4320121/
2. https://www.powershow.com/viewht/cdea9-ZDc1Z/Airport_Operations_and_Management_powerpoint_ppt_presentation
3. https://www.slideshare.net/AiDY/overview-on-airport-operation-presentation
4. https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_APO_LECTURE_NOTES_0.pdf

AIRCRAFT STRUCTURES

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	4	Exam Marks		60	
Total Number of Lecture Hours	60	L	T	P	C
Credits	04	4	1	0	4

COURSE OBJECTIVES:

Students undergoing this course are expected:

1. To understand the general term and vocabulary in aeronautical science, structural behavior of different types of structural components, fasteners used on aircraft and structural assembly of aircraft.
2. To provide the knowledge of various failure theories.

UNIT I	**INTRODUCTION TO GENERAL TERM AND VOCABULARY IN AERONAUTICAL SCIENCE**	**12 Hours**

Introduction to aircraft technical literature. Introduction to ATA system. Introduction to aircraft, major aircraft components, aircraft systems and their functions, reference lines, station and zone identification systems

UNIT II	**AIRFRAME STRUCTURES — GENERAL CONCEPTS**	**12 Hours**

Airworthiness requirements for structural strength; Structural classification, primary, secondary and tertiary; Fail safe, safe life, damage tolerance concepts; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Lightning strike protection provision. Drains and ventilation provisions, System installation provisions Aircraft bonding and continuity. Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning, anti-corrosive protection, wing, empennage and engine attachments; Describe current practice in aircraft design related to load transfer, load path continuity and reduction of stress raisers in pressurized fuselages.

UNIT III	**FASTENERS USED ON AIRCRAFT**	**12 Hours**

Fasteners, Screw threads Screw nomenclature; Thread forms, dimensions and tolerances for standard threads used in aircraft; measuring screw threads; Bolts, studs and screws Bolt types: specification,

identification and marking of aircraft bolts, international standards; Nuts: self-locking, anchor, standard types; Machine screws: aircraft specifications; Studs: types and uses, insertion and removal; Self tapping screws, dowels. Aircraft rivets Types of solid and blind rivets: specifications and identification, heat treatment. Riveting Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints.

UNIT IV	**STRUCTURAL ASSEMBLY AND AIRFRAME STRUCTURES — AEROPLANE**	**12 Hours**

Structural assembly techniques: riveting, bolting, bonding methods of surface protection, such as chromating, anodizing, painting; Surface cleaning. Airframe symmetry: methods of alignment and symmetry checks. Complete airframe for symmetry fuselage for twist and bending, vertical stabilizer for alignment wings and horizontal stabilizers for dihedral and incidence, Fuselage (ATA 52/53/56): Construction and pressurization sealing; Wing, stabilizer, pylon and undercarriage attachments; Seat installation and cargo loading system; Doors and emergency exits: construction, mechanisms, operation and safety devices; Windows and windscreen construction and mechanisms.

UNIT V	**WINGS (ATA 57), FLIGHT CONTROL SURFACES (ATA 55/57) AND NACELLES/PYLONS (ATA 54)**	**12 Hours**

Anhedral, dihedral incidence angle interplane struts longitudinal dihedral rigging position, stagger, wash in, washout Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments. Stabilizers, Construction; Control surface attachment. Flight Control Surfaces (ATA 55/57), Construction and attachment; Balancing — mass and aerodynamic. Nacelles/Pylons (ATA 54) Construction; Firewalls; Engine mounts.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the general term and vocabulary in aeronautical science.

CO2: Explain the Airworthiness requirements for airframe structures.

CO3: Identify different fasteners used on aircraft

CO4: Explain the structural assembly techniques and airframe for aeroplane.

CO5: Examine the Anhedral, dihedral incidence angle, flight Control Surfaces construction and attachment, Firewalls and engine mounts.

TEXT BOOKS:

1. Dale Crane, “Dictionary of Aeronautical Terms”, Aviation Book Co (1 June 1989).
2. Joe Christy, “Aircraft Construction, Repair, and Inspection”, Tab Books; 1st edition (March 1, 1984).
3. Federal Aviation Administration (FAA)/Aviation Supplies & Academics (ASA), “Aviation Maintenance Technician Handbook – General: FAA-H-8083-30 (FAA Handbooks)”, Aviation Supplies & Academics Inc; 2013th edition (21 March 2013).
4. Ralph D. Bent, “Aircraft Maintenance and Repair (Aviation Technology Series)”, McGraw-Hill Inc.,US; 5th edition (1 January 1987).

REFERENCE BOOKS:

1. Aircraft handbook FAA (AC 65-15 A).
2. Aircraft structure Ch. 01 (FAA)
3. AC 43.13-1B - Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair
4. EASA-part-66-module-13, Aircraft tech book co.
5. T. H. G. Megson, “Aircraft structures for engineering students”, Butterworth Heinemann, 2011.

WEB LINKS:

1. https://youtu.be/eYRRTJsKbhU
2. https://youtu.be/ZL3PRvqJZ1M
3. https://www.cfinotebook.net/notebook/aerodynamics-and-performance/aircraft-components-and-structure

AIRCRAFT DESIGN

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	3	Exam Marks		60	
Total Number of Lecture Hours	60	L	T	P	C
Credits	03	3	0	0	3

COURSE OBJECTIVES:

Student undergoing this course are expected to describe the fundamental concepts of aircraft design and the factors affecting aircraft performance.

UNIT I	**TYPES OF AIRCRAFT DESIGN LAYOUTS**	**12 Hours**

Review of developments in aviation categories and types of aircraft specifications-various configurations- layouts and their relative merits-strength, stiffness, fail safe and fatigue requirements maneuvering load factors-gust and maneuverability envelopes-balancing and maneuvering loads on tail planes.

UNIT II	**POWER PLANT TYPES AND CHARACTERISTICS**	**12 Hours**

Characteristics of different types of power plants-propeller characteristics and selection-relative merits of location of power plant.

UNIT III	**PRELIMINARY DESIGN**	**12 Hours**

Preliminary design selection of geometric and aerodynamic parameters-weight estimation and balance diagram- drag estimation of complete aircraft-level flight, Climb, Take- Off and landing calculations-range and endurance- static and dynamic stability estimates-control requirements.

UNIT IV	**OPTIMIZATION**	**12 Hours**

Special problems layout peculiarities of subsonic and supersonic aircraft-optimization-of wing loading to achieve desired performance-loads on undercarriages and design requirements.

UNIT V	**STRUCTURAL DESIGN**	**12 Hours**

Estimation of loads on complete aircraft and components-structural design of fuselage, wings and undercarriages, control, connections and joints. materials for modern aircraft-methods of analysis, testing and fabrication.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Describe the types of aircraft specifications

CO2: Discuss the powerplant type and characteristics

CO3: Examine preliminary design

CO4: Examine special problems

CO5: Design conceptual aircraft

TEXT BOOKS:

1. G. Corning, "Supersonic & Subsonic Airplane Design", ii Edition, Edwards Brothers Inc., Michigan, 1953.
2. H.E.F.Bruhn, "Analysis and Design of Flight Vehicle Structures", Tristate Offset Co., U.S.A.,1980.
3. A.A. Lebedenski, "Notes on airplane design'', Part-I, I.I.Sc., Bangalore, 1971.

REFERENCE BOOKS:

1. E. Torenbeek, "Synthesis of Subsonic Airplane Design", DelftUniversity Press, London, 1976.
2. D.P.Raymer," Aircraft conceptual design", AIAA Series, 1988.
3. H.N.Kota, "Integrated design approach to Design fly by wire" Lecture Notes Interline Pub. Bangalore, 1992.
4. S.c.keshu & k.k.Ganapathi "Aircraft Production Techniques and Management ", 1995.

WEB LINKS:

1. http://www.aircraftdesign.com/
2. https://en.wikipedia.org/wiki/Aircraft_design_process
3. https://www.researchgate.net/publication/326798586_Aircraft_Design_A_Conceptual_Approach_Sixth_Edition
4. https://nptel.ac.in/courses/101/106/101106035/

NON-DESTRUCTIVE TESTING

Subject Code		IA Marks			40
Number of Lecture Hours/Week	3	Exam Marks			60
Total Number of Lecture Hours	45	L	T	P	C
Credits	3	3	0	0	3

COURSE OBJECTIVES:

To study and understand the various Non-Destructive Evaluation and Testing methods, theory and their industrial applications.

UNIT I	**OVERVIEW OF NDT**	**09 Hours**

NDT Versus Mechanical testing, Overview of the Non-Destructive Testing Methods for the detection of manufacturing defects as well as material characterization. Relative merits and limitations, Various physical characteristics of materials and their applications in NDT., Visual inspection – Unaided and aided.

UNIT II	**SURFACE NDE METHODS**	**09 Hours**

Liquid Penetrant Testing - Principles, types and properties of liquid penetrants, developers, advantages and limitations of various methods, Testing Procedure, Interpretation of results. Magnetic Particle Testing- Theory of magnetism, inspection materials Magnetisation methods, Interpretation and evaluation of test indications, Principles and methods of demagnetization, Residual magnetism.

UNIT III	**THERMOGRAPHY AND EDDY CURRENT TESTING (ET)**	**09 Hours**

Thermography- Principles, Contact and non-contact inspection methods, Techniques for applying liquid crystals, Advantages and limitation - infrared radiation and infrared detectors, Instrumentations and methods, applications. Eddy Current Testing-Generation of eddy currents, Properties of eddy currents, Eddy current sensing elements, Probes, Instrumentation, Types of arrangement, Applications, advantages, Limitations, Interpretation/Evaluation.

UNIT IV	**ULTRASONIC TESTING (UT) AND ACOUSTIC EMISSION (AE)**	**09 Hours**

Ultrasonic Testing-Principle, Transducers, transmission and pulse-echo method, straight beam and angle beam, instrumentation, data representation, A/Scan, B-scan, C-scan. Phased Array Ultrasound, Time of Flight Diffraction. Acoustic Emission Technique – Principle, AE parameters, Applications.

UNIT V	RADIOGRAPHY (RT)	09 Hours

Principle, interaction of X-Ray with matter, imaging, film and film less techniques, types and use of filters and screens, geometric factors, Inverse square, law, characteristics of films - graininess, density, speed, contrast, characteristic curves, Penetrameters, Exposure charts, Radiographic equivalence. Fluoroscopy-Xero-Radiography, Computed Radiography, Computed Tomography

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the fundamental concepts of NDT

CO2: Discuss the different methods of NDE

CO3: Explain the concept of Thermography and Eddy current testing

CO4: Explain the concept of Ultrasonic Testing and Acoustic Emission

CO5: Explain the concept of Radiography

TEXT BOOKS:

1. Baldev Raj, T.Jayakumar, M.Thavasimuthu "Practical Non-Destructive Testing", Narosa Publishing House, 2014.
2. Ravi Prakash, "Non-Destructive Testing Techniques", 1st revised edition, New Age International Publishers, 2010.

REFERENCE BOOKS:

1. ASM Metals Handbook," Non-Destructive Evaluation and Quality Control", American Society of Metals, Metals Park, Ohio, USA, 200, Volume-17.
2. ASNT, American Society for Non Destructive Testing, Columbus, Ohio, NDT Handbook,Vol. 1, Leak Testing, Vol. 2, Liquid Penetrant Testing, Vol. 3, Infrared and Thermal Testing Vol. 4, Radiographic Testing, Vol. 5, Electromagnetic Testing, Vol. 6, Acoustic Emission Testing, Vol. Ultrasonic Testing.
3. Charles, J. Hellier, "Handbook of Nondestructive evaluation", McGraw Hill, New York 2001.
4. Paul E Mix, "Introduction to Non-destructive testing: a training guide", Wiley, 2nd Edition NewM Jersey, 2005.

WEB LINKS:

1. https://nptel.ac.in/courses/113/106/113106070/
2. https://onlinecourses.nptel.ac.in/noc20_mm07/preview
3. https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_NDT_LECTURE_NOTES.pdf

AIRLINE OPERATIONS CONTROL CENTRE (AOCC)

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	5	Exam Marks		60	
Total Number of Lecture Hours	60	L	T	P	C
Credits	04	4	1	0	4

COURSE OBJECTIVES:

This course enables the students to appreciate the fundamental role of the AOCC and to acquire the necessary knowledge and skills to function effectively as part of a very dynamic and highly responsive team.

UNIT I	**FLIGHT PREPARATION INSTRUCTIONS**	**12 Hours**

Flight Preparation Instructions Minimum Flight Altitudes, Criteria For Determining The Usability Of Aerodromes, Methods For The Determination Of Aerodrome Operating Minima, En-Route Operating Minima For VFR Flights Or VFR Portions Of A Flight, Presentation And Application Of Aerodrome And EN-Route Operating Minima, Interpretation Of Meteorological Information, Operational Practices For Interpretation Of Meteorological Information, Determination Of The Quantities Of Fuel And Oil To Be Carried, Mass And Centre Of Gravity, Standard Weight Values, Last Minute Change Procedures, Ats Flight Plan, Time Slot's - Calculated Take-Off Time, ATC Clearance, Operational Flight Plan, Aircraft Technical Log System, Cabin Defect Log, Flight Crew Certification Authorization, Dispatch Without An Authorized Engineer.

UNIT II	**FLIGHT PROCEDURES**	**12 Hours**

General Rules Of Flight Procedures, Navigation Procedures, Policy On Manual Flying, Policy And Procedures For In-Flight Fuel Management, Altimeter Setting Procedures, Altitude Alerting System Procedures, Policy And Procedures For Preventing Altitude Deviations / Level Busts, GPWS / EGPWS Procedures, Policy And Procedures For The Use Of TCAS / ACAS, Adverse And Potentially Hazardous Atmospheric Conditions., Wake Turbulence, Crew Members At Their Stations, Use Of Safety Belts For Crew And Passengers.

UNIT III	**STANDARD OPERATING PROCEDURES**	**12 Hours**

Fuel Efficiency Ops, Flight Preparation, Safety Exterior Inspection, Cockpit Preparation, Before Push Back, Push Back, Taxi, Take Off, Landing. Go Around and Missed Approach.

UNIT IV	**NON – NORMAL AIRLINE OPERATIONS**	**12 Hours**

All Weather Operations, Non-Normal Ops, Overweight and Hard Landing, Incapacitation of Crew Members,

Cabin Decompression, Bird Strike, Medical Conditions in Flight, LVTO, Approach Prep, Approach Procedures, Failures and Associated Actions, ETOPS.

UNIT V	**EFFECT OF DELAYED DECISION IN AIRLINE OPERATIONS**	**12 Hours**

Oxygen Requirements and Punctuality Delayed Fuel Decision, Hypoxia and Oxygen Equipment.

COURSE OUTCOMES:

CO1: Examine the critical role of AOCC in modern airline and airports.

CO2: Illustrate the general rules of flight Procedures and Navigation Procedures.

CO3: Examine the standard airline operating procedure.

CO4: Analyze the Non-Normal Airline operations.

CO5: Explain the effect of delayed decision in airline operations.

TEXT BOOKS:

1. Airline OM-A chapter 8.
2. Edissa Uwayo, "Airline and Airport Operations", Notion Press; 1st edition (23 September 2016).
3. Peter J. Bruce, Chris Mulholland, "Airline Operations Control", Routledge; 1st edition (29 December 2020).

REFERENCE BOOKS:

1. Gerald N. Cook , Bruce Billig, "Airline Operations and Management", Routledge; 1st edition (3 February 2017).
2. Peter J. Bruce, Yi Gao, John M. C. King, "Airline Operations: A Practical Guide", Routledge, 2017.

WEB LINKS:

1. https://link.springer.com/chapter/10.1007/978-3-662-43373-7_4
2. https://www.researchgate.net/profile/Antonio-J-M-Castro/publication/277046924_Airline_Operations_Control_A_New_Concept_for_Operations_Recovery/links/55a76ca108ae410caa75320d/Airline-Operations-Control-A-New-Concept-for-Operations-Recovery.pdf?origin=publication_detail
3. https://core.ac.uk/download/pdf/4432416.pdf

AVIONICS

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	4	Exam Marks		60	
Total Number of Lecture Hours	60	L	T	P	C
Credits	04	4	0	0	4

COURSE OBJECTIVES:

The students are able to maintain avionics equipment and systems, and to solve design tasks of avionics equipment and systems.

UNIT I	**INTRODUCTION TO AVIONICS**	**12 Hours**

Need for avionics in civil and military aircraft and space systems – integrated avionics and weapon systems – typical avionics subsystems, design, technologies – Introduction to digital computer and memories.

UNIT II	**DIGITAL AVIONICS ARCHITECTURE**	**12 Hours**

Avionics system architecture – data buses – MIL-STD-1553B – ARINC – 420 – ARINC – 629.

UNIT III	**FLIGHT DECKS AND COCKPITS**	**12 Hours**

Control and display technologies: CRT, LED, LCD, EL and plasma panel – Touch screen – Direct voice input (DVI) – Civil and Military Cockpits: MFDS, HUD, MFK, HOTAS.

UNIT IV	**INTRODUCTION TO NAVIGATION SYSTEMS**	**12 Hours**

Radio navigation – ADF, DME, VOR, LORAN, DECCA, OMEGA, ILS, MLS – Inertial Navigation Systems (INS) – Inertial sensors, INS block diagram – Satellite navigation systems – GPS.

UNIT V	**AIR DATA SYSTEMS AND AUTO PILOT**	**12 Hours**

Air data quantities – Altitude, Air speed, Vertical speed, Mach Number, Total air temperature, Mach warning, Altitude warning – Auto pilot – Basic principles, Longitudinal and lateral auto pilot.

COURSE OUTCOMES:

CO1: Built Digital avionics architecture

CO2: Design Navigation system

CO3: Design and perform analysis on air system.

CO4: Explain the satellite Navigation System.

CO5: Explain about the Auto pilot system.

TEXT BOOKS:

1. Albert Helfrick.D., "Principles of Avionics", Avionics Communications Inc., 2004.
2. Collinson.R.P.G. "Introduction to Avionics", Chapman and Hall, 1996.

REFERENCE BOOKS:

1. Middleton, D.H., Ed., "Avionics systems, Longman Scientific and Technical", Longman Group UK Ltd., England, 1989.
2. Spitzer, C.R. "Digital Avionics Systems", Prentice-Hall, Englewood Cliffs, N.J., U.S.A. 1993.
3. Spitzer. C.R. "The Avionics Hand Book", CRC Press, 2000.
4. Pallet.E.H.J., "Aircraft Instruments and Integrated Systems", Longman Scientific

WEB LINKS

1. https://youtu.be/dIQi8ulQfXY
2. https://en.wikipedia.org/wiki/Avionics
3. https://www.avionics.bike/

AIR TRAFFIC MANAGEMENT/ RTR

Subject Code		IA Marks			40
Number of Lecture Hours/Week	5	Exam Marks			60
Total Number of Lecture Hours	60	L	T	P	C
Credits	4	4	1	0	4

COURSE OBJECTIVES:

To develop the knowledge, skills and attitudes required to enable the students to provide a support service to the air traffic management.

UNIT I	**AIR SPACES**	**12 Hours**

Definitions-Classification of airspaces-Establishment and identification of ATS Routes-Coordination between the operator and the air traffic services-Aeronautical Data-Minimum flight altitudes-In flight contingencies.

UNIT II	**AIR TRAFFIC CONTROL SERVICE**	**12 Hours**

Air Traffic control service-Separation Minima-Provision of radar-Flight information service.

UNIT III	**ALERTING SERVICE**	**12 Hours**

Alerting service-Information to the operator.

UNIT IV	**ATS COMMUNICATIONS**	**12 Hours**

Air traffic services requirements for communications.

UNIT V	**ATS INFORMATIONS**	**12 Hours**

Air traffic services requirements for information.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Analyze air traffic control information management theory and procedures.

CO2: Compile air traffic service messages with minimum error

CO3: Describe the alerting service

CO4: Discuss the air traffic services requirements for communications

CO5: Make use of navigation principles and practices to conduct air traffic management information services.

TEXT BOOKS:

1. ICAO ANNEX 11 2018 EDITION
2. Margaret Arblaster, "Air Traffic Management", Elsevier, 6th February 2018.

REFERENCE BOOKS:

1. Learningexpress LLC, "Air Traffic Control Test Prep", 15 April 2009.
2. Michael S Nolan, "Fundamentals of Air Traffic Control", Thomson Delmar Learning, Division of Thomson Learning; 5th Revised ed. edition (28 January 2010).
3. Dieudonne Ndayizera, "Understanding Air Traffic Control", Notion Press, 1st Edition, 2016.

WEB LINKS:

1. https://en.wikipedia.org/wiki/Air_traffic_management
2. https://slideplayer.com/amp/1705721/
3. https://www.icao.int/safety/Pages/atm.aspx

MASS AND BALANCE - AEROPLANES

Subject Code		IA Marks			40
Number of Lecture Hours/Week	3	Exam Marks			60
Total Number of Lecture Hours	45	L	T	P	C
Credits	3	3	0	0	3

COURSE OBJECTIVES:

This course aims the students to Understand and perform weight and balance measurements on large and small aircraft. This course provides familiarization with the proper procedure to prepare position, weigh, determine moment, arms, and to perform the simple mathematics required to compute the precise CG location in various loading configurations and fuel levels.

UNIT I	**INTRODUCTION TO MASS AND BALANCE**	**09 Hours**

Centre of gravity (cg): Definition, importance in regard to aircraft stability (Aeroplane), Mass and balance consult aeroplane flight manual for: cg limits for take-off, landing, cruise configurations - maximum floor load - maximum ramp and taxi mass (Aeroplane).

UNIT II	**FACTORS DETERMINING MAXIMUM PERMISSIBLE MASS AND CG LIMITS**	**09 Hours**

factors determining maximum permissible mass: structural limitations, performance limitations such as – runway available for take-off and landing, weather conditions (temperature, pressure, wind, precipitation); rate-of-climb and altitude requirements for obstacle clearance; engine-out performance requirements. Factors determining cg limits: aircraft stability, ability of flight controls and surfaces to overcome mass and lift pitching moments under all flight conditions, changes in cg location during flight due to consumption of fuel, raising and lowering of undercarriage, and intentional relocation of passengers or cargo, transfer of fuel, movement of centre of lift because of changes in position of wing flaps.

UNIT III	**LOADING**	**09 Hours**

Terminology: empty mass, dry operating mass (empty mass + crew + operating items + unusable fuel), zero fuel mass, standard mass – crew, passengers and baggage, fuel, oil water (volume/mass conversion factors), carry-on luggage, useful load (traffic load + usable fuel. Effects of overloading: high take-off and safety speeds, longer take-off and landing distances, lower rate-of-climb, influence on range and endurance,

decreased engine-out performance, possible structural damage in extreme cases.		
UNIT IV	**CENTRE OF GRAVITY (CG)**	**09 Hours**
Basic of CG calculations (load and balance documentation) - Datum – explanation of term, location, use in cg calculation - Moment arm – explanation of term, determination of algebric signs, use - Moment – explanation, moment = mass x moment arm - Expression in percentage of mean aerodynamic chord (% MAC) Effect of load-shift - movement of cg. Possible out of limits - possible damage due to inertia of a moving load - effect of acceleration of the aircraft load.		
UNIT V	**LOAD SHEET**	**09 Hours**
Aircraft weighing procedure, Aircraft weight and balance report		

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the fundamental concepts of mass and balance.

CO2: Discuss the factors determining max. Permissible mass and CG Limits.

CO3: List the effect of overloading during take - off

CO4: Calculate the CG and effect of load.

CO5: Perform weight and balance procedure

TEXT BOOKS:

1. Nordian, "Mass & Balance: Flight Performance & Planning", streling book house, 2017.
2. Jeppesen, "EASA ATPL Training Mass & Balance", Jeppesen Gmbh (1 January 2014).

REFERENCE BOOKS:

1. Oxford Aviation Academy Atpl Book Mass and Balance, Performance, 2014.
2. U. S. Department of Transportation, Federal Aviation Administration, "Aircraft Weight and Balance Handbook", Createspace Independent Pub (11 June 2013).
3. Keith Williams, "1000 Questions Answers & Explanations for JAR ATPL (A) & CPL (A) Mass & Balance", 1 January 2011.

WEB LINKS:

1. https://www.skybrary.aero/index.php/Mass_and_Balance

2. https://www.pilot18.com/wp-content/uploads/2018/01/atpl-mass-and-balance.pdf
3. https://www.youtube.com/watch?v=LJhRooA22Jo
4. https://www.youtube.com/watch?v=HcyCNPH-NPM

AIRCRAFT ELECTRICAL FUNDAMENTALS

Subject Code		IA Marks			40
Number of Lecture Hours/Week	4	Exam Marks			60
Total Number of Lecture Hours	75	L	T	P	C
Credits	4	4	0	0	4

COURSE OBJECTIVES:

To understand the fundamental principles of electricity and concept of Aircraft electrical system.

UNIT I	**ELECTRON THEORY, STATIC ELECTRICITY AND CONDUCTION AND DC CIRCUITS**	**15 Hours**

Structure and distribution of electrical charges within: An atom, molecules, ions, compound's Molecular structure of conductors, semiconductors and insulators. 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. 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. DC Circuits Ohms Law, Kirchhoff'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 II	**RESISTANCE/RESISTOR, CAPACITANCE/CAPACITOR**	**15 Hours**

Resistance and affecting factors; Specific resistance; Resistor colour code, values and tolerances, preferred values, wattage ratings; Resistors in series and parallel; Calculation of total resistance using series, parallel and series parallel combinations; Operation and use of potentiometers and rheostats; Operation of Wheatstone Bridge. (b) Positive and negative temperature coefficient conductance; Fixed resistors, stability, tolerance and limitations, methods of construction; Variable resistors, thermostats, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge; Capacitance/Capacitor Operation and function of a capacitor; Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric constant, working voltage, voltage rating; Capacitor types, construction and function; Capacitor color coding; Calculations of capacitance and voltage in series and parallel circuits; Exponential charge and discharge of a capacitor, time constants; Testing of capacitors.

UNIT III	MAGNETISM, INDUCTANCE/INDUCTOR	15 Hours
Magnetism: Theory of magnetism; Properties of a magnet Action of a magnet suspended in the Earth's magnetic field; Magnetization and demagnetization; Magnetic shielding; Various types of magnetic material; Electromagnet's construction and principles of operation; Hand clasp rules to determine: magnetic field around current carrying conductor. Magneto motive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents; Precautions for care and storage of magnets. Inductance/Inductor: Faraday's Law; Action of inducing a voltage in a conductor moving in a magnetic field; Induction principles; Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductor turns; Mutual induction; The effect the rate of change of primary current and mutual inductance has on induced voltage; Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other; Lenz's Law and polarity determining rules; Back emf, self-induction; Saturation point; Principle uses of inductors.		
UNIT IV	**AC THEORY, RESISTIVE (R), CAPACITIVE (C) AND INDUCTIVE (L) CIRCUITS**	**15 Hours**
AC Theory Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power Triangular/Square waves; Single/3 phase principles. Resistive (R), Capacitive (C) and Inductive (L) Circuits Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel; Power dissipation in L, C and R circuits; Impedance, phase angle, power factor and current calculations; True power, apparent power and reactive power calculations.		
UNIT V	**TRANSFORMERS, FILTERS**	**15 Hours**
Transformers: Transformer construction principles and operation; Transformer losses and methods for overcoming them; Transformer action under load and no-load conditions; Power transfer, efficiency, polarity markings; Calculation of line and phase voltages and currents; Calculation of power in a three-phase system; Primary and Secondary current, voltage, turns ratio, power, efficiency; Auto transformers. Filters: Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.		
COURSE OUTCOMES:		

After the course the students are expected to be able to

CO1: Explain the electron theory, electrical terminology and DC circuits.

CO2: Analyze the characteristics of resistor and capacitor.

CO3: Comprehend the characteristics & properties of magnetism and interrelation with electricity.

CO4: Design the AC circuits, comprehend the characteristics and the principle of each component.

CO5: Analyze the working of Transformers and Filters in electrical system.

TEXT BOOKS:

1. B L Theraja and AK Theraja, "A Textbook of Electrical Technology - Vol I", S Chand; Twenty Third edition, 1959.
2. E. H. J. Pallett, "Aircraft electrical systems", Pearson Education, Third Edition, 2006.

REFERENCE BOOKS:

1. Aircraft Technical Book Company LLC, "EASA Electrical Fundamentals Aviation Maintenance Technician Certification Series, Module 03", 2016.
2. David Wyatt and Mike Tooley, "Aircraft Electrical and Electronic Systems", Routledge; 2nd edition (29 May 2018).
3. Hughes, "Hughes Electrical and Electronic Technology", Pearson Education India; 10th edition (1 January 2010).

WEB LINKS:

1. https://soaneemrana.org/onewebmedia/COMPLETE%20MODULE%203%201.pdf
2. http://eng.sut.ac.th/me/box/1_54/437306/ebooksclub.pdf
3. https://www.ksu.lt/wp-content/uploads/2017/04/KSU-M3-Selected-pages.pdf

HANGAR WORKSHOP

Laboratory Code		IA Marks			40
Number of Practical Hours/Week	3	Exam Marks			60
Total Number of Practical Hours	50	L	T	P	C
Credits	2	0	0	4	2

COURSE OBJECTIVES:

To Familiarize with the aircraft and their systems.

Exp no	EXPERIMENTS	Number of Hours
1	Familiarization of general hand tools	6
2	Fire Training. 1. Different Types & class of fire. 2. Different types of fire-extinguishers. 3. Procedure of use of fire extinguishers, fire-alarm bell.	6
3	Familiarization of Airframe	6
4	Familiarization of Engine	6
5	Familiarization of Aircraft Electrical system	6
6	Familiarization of Aircraft Hydraulic system	6
7	Familiarization of Aircraft Landing gear system	6

COURSE OUTCOMES:

On completion of the course students will be able to

CO1: Identify various hand tools used in workshop.

CO2: Classify Types and class of fire.

CO3: Inspect the piston engine performance.

CO4: Identify the Name and functions of various Electrical instruments.

CO5: Check the working condition of Hydraulic and landing gear system.

REFERENCES:

1. https://www.moglix.com/blog/what-are-the-types-of-hand-tools-and-how-are-they-important/
2. https://www.youtube.com/watch?v=4o0tqF0jDdo
3. https://www.aai.aero/en/services/fire-service
4. https://www.faa.gov/airports/airport_safety/aircraft_rescue_fire_fighting/
5. https://www.aircraftsystemstech.com/2019/01/aircraft-instrument-systems-maintenance.html

FLIGHT PLANNING AND OPERATIONS

Laboratory Code		IA Marks			40
Number of Practical Hours/Week	4	Exam Marks			60
Total Number of Practical Hours	45	L	T	P	C
Credits	2	0	0	4	2

COURSE OBJECTIVES:

Flight planning aims to produce a flight plan to describe a proposed aircraft flight.

Exp no	EXPERIMENTS	Number of Hours
1	Understanding, Coordination with different agencies.	3
2	Filling of Flight Plan	3
3	Mode of submissions of flight plan	3
4	Obtaining FIC and ADC	3
5	Study of NOTAM	3
6	ATIS	3
7	Weather obtaining procedures.	3
8	Regulatory framework	3
9	Organization and management	3
10	Flight operations management composition	3
11	Management responsibilities	3
12	Flight operations environment	3
13	Flight operations department	3
14	Human factors in flight operations	3
15	Management systems in flight operations	3

COURSE OUTCOMES:

On completion of the course students will be able to

CO1: Communicate with different agencies involved in flight planning.

CO2: Fill flight plan form as per ICAO prescribed procedure.

CO3: Explain the procedure & necessity of obtaining FIC & ADC

CO4: Interpret NOTAMS and understand its importance for a flight operation

CO5: Describe the procedure to obtain departure, Enroute and destination weather report and forecast.

REFERENCES:

1. https://www.skybrary.aero/index.php/Flight_Plan_Completion
2. Gerald N. Cook, Bruce Billig, "Airline Operations and Management", Routledge; 1st edition (15 February 2017).
3. Ahmed Abdelghany, Khaled Abdelghany, "Airline Network Planning and Scheduling", John Wiley & Sons, Inc., 13 November 2018.
4. https://www.iata.org/en/training/courses/flight-operations-management/talp03/en/
5. https://www.cargolux.com/careers/teams-roles/flight-operations
6. Airport Development Reference Manual (ADRM)IATA
7. Ground Operations Manual (IGOM)Airport Handling Manual (AHM)

AIRCRAFT MAINTENANCES WORKSHOP

Laboratory Code		IA Marks			40
Number of Practical Hours/Week	3	Exam Marks			60
Total Number of Practical Hours	50	L	T	P	C
Credits	2	0	0	4	2

COURSE OBJECTIVES:

Flight operations aims to provide high-quality and thorough day-to-day operations with safety and standards.

Exp no	EXPERIMENTS	Number of Hours
1	Safety Precautions-Aircraft and Workshop	6
2	Familiarization of Tools	6
3	Avionic General Test Equipment	6
4	Electrical Wiring Interconnection System	3
5	Material handling	6
6	Welding, Brazing, Soldering and Bonding	6
7	Disassembly, Inspection, Repair and Assembly Techniques	6
8	Maintenance Procedures	6

COURSE OUTCOMES:

On completion of the course students will be able to

CO1: Explain about Safety Precautions-Aircraft and Workshop.

CO2: Identify various tools used in maintenance workshop

CO3: Perform various Joining process like welding, soldering and Bonding.

CO4: Disassemble, inspect, repair various systems in an aircraft.

CO5: Examine the maintenances procedures.

REFERENCES:

1. https://www.skybrary.aero/index.php/Aircraft_Maintenance
2. https://nptel.ac.in/courses/101/104/101104075/
3. https://www.sciencedirect.com/topics/engineering/aircraft-maintenance
4. https://www.nap.edu/read/5070/chapter/9
5. https://www.faa.gov/regulations_policies/handbooks_manuals/aircraft/

AIRCRAFT STRUCTURES LAB

Subject Code		IA Marks		40	
Number of Practical Hours/Week	4	Exam Marks		60	
Total Number of practical Hours	48	L	T	P	C
Credits	02	0	0	4	2

COURSE OBJECTIVES:

The objective of conducting structures Lab is to make the students understand and appreciate various principles and theorems involved in the theory of aircraft structures, vibrations and experimental stress analyzing the results. This immensely help the students to enrich their goal in the design of various aircraft structural components, namely wings fuselage landing gear, control surfaces, etc.

Exp no	EXPERIMENTS	Number of Hours
1	Determine Youngs modulus of steel using Mechanical extensometers	6
2	Determine Youngs modulus of steel using electrical extensometer	6
3	Find deflection of beams under various conditions	6
4	Coloumn testing and south – wells plot	3
5	Verify the maxwells theorem using supported Beam and tested	6
6	Shear centre location of open sections and closed sections	3
7	Unsymmetrical bending of beams	3
8	Stresses in circular discs beams using photo elastic beams	3
9	Vibration of beams	6
10	Wagner beam tension field	6

COURSE OUTCOMES:

CO1: Determine Youngs Modulus of steel.

CO2: Find the deflection of beams under various load conditions.

CO3: Locate the Shear centre for open and closed sections.

CO4: Verify the Maxwell theorem.

CO5: Analyze vibration of beams.

REFERENCES:

1. R K Rajput, “Strength of Materials”, S. Chand Publishing (6th Edition) (1 January 2015).
2. https://www.youtube.com/watch?v=qLTVHBAtbAA
3. https://www.youtube.com/watch?v=GUOKSExdjq8
4. https://www.youtube.com/watch?v=k2h8YainuC8
5. https://www.youtube.com/watch?v=NcQzmJDSlPc
6. https://www.youtube.com/watch?v=EqzbouOLrdo
7. https://www.youtube.com/watch?v=XSFDYG413C0
8. https://www.youtube.com/watch?v=Z_JSNxNXEjo
9. https://www.youtube.com/watch?v=5qUouwW-m2s

AIRCRAFT INSTRUMENTATION LAB

Subject Code		IA Marks		40	
Number of Practical Hours/Week	4	Exam Marks		60	
Total Number of practical Hours	30	L	T	P	C
Credits	02	0	0	4	2

COURSE OBJECTIVES:

- To inculcate the students with the basic knowledge and understanding of various aircraft instruments and their applications.
- To educate students with the safety precautions and methodology of handling aircraft instruments.

Exp no	EXPERIMENTS	Number of Hours
1	Instrument displays, panels and layouts	4
2	Pitot-static instruments and systems	4
3	Primary flight instruments	4
4	Heading indicating instruments	4
5	Remote-indicating compasses	4
6	Aircraft magnetism and its effects on compasses	4
7	Synchronous data-transmission systems	4
8	Measurement of engine speed	4
9	Measurement of temperature	4
10	Measurement of pressure	4
11	Measurement of fuel quantity and fuel flow	4

12	Engine power and control instruments	4
13	Integrated instrument and flight director systems	4
14	Flight data recording	4

COURSE OUTCOMES:

On completion of the course students will be able to

CO1: Describe the working principles of pitot static instruments and systems in aircraft.

CO2: Summarize the operations of Heading indicating instruments.

CO3 Illustrate the concepts of starting, ignition, fuel and lubricating systems of typical aircraft power plants.

CO4: Discuss the ideas of engine power and control instruments working.

CO5: Explain the technical aspects of aircraft instruments and their working principle

REFERENCES:

1. https://content.kopykitab.com/ebooks/2016/02/5635/sample/sample_5635.pdf
2. S. Nagabhushana, L. K. Sudha, “Aircraft Instrumentation and Systems”, I K International Publishing House Pvt. Ltd (30 December 2013).
3. https://www.youtube.com/watch?v=u3z2qZex1gg
4. https://www.youtube.com/watch?v=wjTZsHU3T5g
5. https://nptel.ac.in/content/storage2/courses/101104007/Module7/Lec29.pdf

AIRCRAFT ELECTRICAL FUNDAMENTALS – LAB

Laboratory Code		IA Marks		40	
Number of Practical Hours/Week	4	Exam Marks		60	
Total Number of Practical Hours	45	L	T	P	C
Credits	2	0	0	4	2

COURSE OBJECTIVES:

The course objectives are,

1. Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context.
2. Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
3. To explain the working principle, construction, applications of DC machines, AC machines & measuring instruments.
4. Highlight the importance of transformers in transmission and distribution of electric power.

Exp no	EXPERIMENTS	Number of Hours
1	Simple experiments with static electricity and the coulomb's law	3
2	Application of Electromotive forces and Potential difference Ballistic Galvanometer: (i) Measurement of charge and current sensitivity	3
3	Measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d) checking electrical fuses and connection	3
4	Use of a range of test meters to measure volts, amps and resistance	3
5	Resistor colour codes - Calculation of resistance value using colour codes	3
6	Potentiometer, rheostat and wheat stone bridges and determine unknown resistance	3
7	Use a Multimeter for measuring Resistances, checking electrical fuses Identify various types of resistance	3
8	Identify various types of capacitances	3
9	Measurement of magnetic field strength. Magnetic field density and permeability using flux meter.	3
10	Production of electricity by inductance methods.	3
11	Single phase and three phase power supply distribution using star and delta connection	3

12	Construct series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor,	3
13	Construct parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q	3
14	Use of transformer in power distribution and measurements.	3
15	Make filters circuit to study function of low pass, high pass, band pass and band stop.	3

COURSE OUTCOMES:

On completion of the course students will be able to

CO1: Predict the behavior of any electrical and magnetic circuits.

CO2: Formulate and solve complex AC, Dc circuits.

CO3: Identify various types of electrical components (resistance, capacitance).

CO4: Identify the type of electrical machine used for that particular application.

CO5: Realize the requirement of transformers in transmission and distribution of electric power and other applications.

REFERENCES:

1. B L Theraja and AK Theraja, "A Textbook of Electrical Technology - Vol I", S Chand; Twenty Third edition, 1959.
2. E. H. J. Pallett, "Aircraft electrical systems", Pearson Education, Third Edition, 2006.
3. Aircraft Technical Book Company LLC, "EASA Electrical Fundamentals Aviation Maintenance Technician Certification Series, Module 03", 2016.
4. David Wyatt and Mike Tooley, "Aircraft Electrical and Electronic Systems", Routledge; 2nd edition (29 May 2018).
5. Hughes, "Hughes Electrical and Electronic Technology", Pearson Education India; 10th edition (1 January 2010).

DISCIPLINE ELECTIVE COURSE

PROJECT WORK

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	8	Exam Marks		60	
Total Number of Lecture Hours	60	L	T	P	C
Credits	04	**0**	**0**	**8**	**4**

Guidelines for Project work

1. Each student has to undertake a project as a group of maximum 4 students under the supervision of a faculty.
2. The students can do their project work on his own idea in the university.

   (OR)

   The students can undergo with their project work in the V semester vacation in any of the private limited and public limited companies.
3. The candidates should submit the confirmation certificate from the organisation for having undertaken the project work for a minimum period of 30 days.
4. The project report must be typed and hard bound.
5. The project report must be submitted by the end of VI semester.
6. Failure to submit the Project Report or failure to appear at the Viva-voce Examination will be treated as "Absent" in the Examination. He /she has to submit the Project Report and appear at the Viva-Voce Examination in the subsequent years.

ABILITY ENHANCEMENT COMPUSLORY COURSE (AECC)

COMMUNICATION SKILLS

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	3	Exam Marks		60	
Total Number of Lecture Hours	30	L	T	P	C
Credits	02	1	0	2	2

COURSE OBJECTIVES:

- This course is to subject the students to practise the components in various units.
- To make students ready for placement interviews within campus.
- To infuse confidence to face job situations.

UNIT I		**06 Hours**

- Resume and CV Writing
- Complaint Letter
- Social Correspondence
- Letter of Enquiry

UNIT II		**06 Hours**

Short Essay Writing

UNIT III		**06 Hours**

Explaining Proverbs

UNIT IV		**06 Hours**

Use of Prepositions

UNIT V		**06 Hours**

Synonymous Words

COURSE OUTCOMES:

At the end of the course the student will be able to,

CO1: To enhance learners' confidence level.

CO2: To make learners' feel the assimilation of skills.

CO3: To engage in a conversation with others to exchange ideas.

CO4: To impart leadership qualities among the participants.

CO5: To express opinions to enhance their social skills.

BOOKS PRESCRIBED:

1. For Unit I – V Effective Communication For You – V. Syamala Emerald Publishers, Chennai.
2. Cameron, David. Mastering Modern English, Hyderabad: Orient Blackswan, 1978 (rpt. 1989, 1993, 1995,1998).
3. Freeman, Sarah. Written Communication in English, Hyderabad: Orient Blackswan, 1977 (21st Impression,2007).
4. Singh, Vandana R. The Written Word. New Delhi: Oxford university Press, 2003 (3rd Impression, 2007).
5. Seely, John. Oxford Guide to Effective Writing and Speaking. New Delhi: Oxford University Press, 2000 (4thImpression,2008).

WEB LINK:

1. https://www.myperfectresume.com/career-center/resumes/how-to/write
2. https://www.englishgrammar.org/
3. https://www.thesaurus.com/browse/

ENVIRONMENTAL STUDIES

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	2	Exam Marks		60	
Total Number of Lecture Hours	30	L	T	P	C
Credits	02	2	0	0	2

COURSE OBJECTIVES:

To inculcate the importance of environmental pollution, preservation of nature and environmental management for human welfare.

UNIT I	**MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES, NATURAL RESOURCES**	**06 Hours**

Definition, scope and importance, need for public awareness. Renewable and non-renewable resources - Natural resources and associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification - Role of an individual in conservation of natural resources- Equitable use of resources for sustainable lifestyles.

UNIT II	**ECOSYSTEMS, BIODIVERSITY AND ITS CONSERVATION**	**06 Hours**

Concept of an ecosystem. - Structure and function of an ecosystem Producers, consumers and decomposers. -Energy flow in the ecosystem. Ecological succession. - Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Introduction–Definition, genetic, species and ecosystem diversity. Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option

values - Biodiversity at global, National and local levels. Inida as a mega-diversity nation. Hot-sports of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III	**ENVIRONMENTAL POLLUTION**	**06 Hours**

Definition, Cause, effects and control measures of a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear hazards. Solid waste Management. Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Diaster management- floods, earthquake, cyclone and landslides.

UNIT IV	**SOCIAL ISSUES AND THE ENVIRONMENT**	**06 Hours**

From Unsustainable to Sustainable development, Urban problems related to energy - Water conservation, rain water harvesting, watershed management- Resettlement and rehabilitation of people; its problems and concerns. Case Studies - Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act - Issues involved in enforcement of environmental legislation. Public awareness.

UNIT V	**HUMAN POPULATION AND THE ENVIRONMENT**	**06 Hours**

Population growth, variation among nations. Population explosion – Family Welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health. Case Studies. Field work - Visit to a local area to document environmental assets river/forest/grassland/hill/mountain, Visit to a local polluted site-Urban/Rural/Industrial/Agricultural, Study of common plants, insects, birds, Study of simple ecosystems-pond, river, hill slopes, etc.

COURSE OUTCOMES:

At the end of the course the student will be able to,

CO1: Explain the various types of natural resources.

CO2: To find and implement scientific, technological, economic solutions to environmental problems.

CO3: To know about the interrelationship between living organisms and environment.

CO4: To understand the integrated themes and biodiversity, natural resources, pollution control and waste management.

CO5: To appreciate the importance of environment by assessing its impact on the human world.

TEXT BOOKS:

1. De AK, Environmental Chemistry, Wiley Eastern Ltd.
2. BharuchaErach, 2003. The Biodiversity of India, Mapin Publishing Pvt. Ltd, India.
3. Brunner RC, 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480pgs.
4. Clark RS, Marine Pollution, Clanderson Press, Oxofrd (TB).

REFERENCE BOOKS:

1. Agarwal KC, 2001. Environmental Biology, Nidi Publishers Ltd. Bikaner.
2. Gleick HP, 1993. Water in Crisis, Pacific Institute for Studies in Development, Environment and Security. Stockholm Environmental Institute, Oxford University Press, 473pgs.
3. Heywood VH, and Watson RT, 1995. global Biodiversity Assessment. Cambridge University Press 1140pgs.
4. Jadhav H and Bhosale VM, 1995. Environmental Protection and Laws. Himalaya Publishing House, Delhi 284pgs.
5. Miller TG, Jr. Environmental Science, Wadsworth Publishing CO. (TB).

WEB LINKS:

1. https://en.wikipedia.org/wiki/Environmental_studies#:~:text=Environmental%20studies%20is%20a%20multidisciplinary,address%20complex%20contemporary%20environmental%20issues.
2. https://nptel.ac.in/courses/120/108/120108004/
3. https://www.youtube.com/watch?v=mIPBPG-5dUw

SKILL ENHANCEMENT COURSE (SEC)

SOFT SKILLS - I

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	2	Exam Marks		60	
Total Number of Lecture Hours	30	L	T	P	C
Credits	02	2	0	0	2

COURSE OBJECTIVES:

- To enable participants Business Communication Skills
- To enhance participants, E-mail writing skills
- To impart Leadership and Team Bonding skills

UNIT I	**EFFECTIVE COMMUNICATION SKILLS**	**06 Hours**

Talking about your company – Making Polite requests – Introducing yourself and others–Socializing with others – Talking about work activities – Talking about your job – Communication practice – Role plays.

UNIT II	**WRITTEN BUSINESS COMMUNICATION**	**06 Hours**

Essential Email writing skills – Formal and Informal E-mails – Usage of formal language – Report Writing – Writing project reports – Extended writing practice – Email Etiquette – Understanding Business E-mails.

UNIT III	**TELEPHONE ETIQUETTE**	**06 Hours**

The basics of Telephone Etiquette – Customer Service – Being courteous – Making arrangements – Giving clear and concise information – Tone and Rate of speech – Pronunciations – Summarization – Mock Telephonic Conversations.

UNIT IV	**LEADERSHIP SKILLS**	**06 Hours**

Essential Leadership Skills – Interpersonal Skills – Team Building – Team work – Do's and Don'ts of Leadership skills – Importance of communication in Leadership – Delegating and Handling of Projects

UNIT V	**LISTENING AND ANSWERING QUESTION**	**06 Hours**

Listening for the main ideas – Listening for details – Listening for specific information – Predicting and listening for opinions – Recognizing context – Listening for sequence – Understanding Pronunciation – Listening practice.

COURSE OUTCOMES:

At the end of the course the student will be able to,

CO1: To enhance participant's Business Communication Skills

CO2: To enhance the participant's Reading, Speaking, Listening and Writing capabilities

CO3: To engage in a conversation with others to exchange ideas

CO4: To impart leadership qualities among the participants

CO5: To express opinions to enhance their social skills

BOOKS PRESCRIBED:

1. Raman, M. and Sangeeta Sharma. Technical Communication.OUP.2008.
2. Taylor, Grant.English Conversation Practice. Tata McGraw Hill Education Pvt. Ltd. 2005.
3. Tiko, Champa& Jaya Sasikumar. Writing with a Purpose.OUP. New Delhi. 1979.

WEB LINKS:

1. https://www.skillsyouneed.com/ips/communication-skills.html
2. https://blog.smarp.com/top-5-communication-skills-and-how-to-improve-them
3. https://blog.hubspot.com/service/phone-etiquette

SOFT SKILLS - II

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	2	Exam Marks		60	
Total Number of Lecture Hours	30	L	T	P	C
Credits	02	2	0	0	2

COURSE OBJECTIVES:

- To enable students to develop their communication skills effectively
- To enhance students Reading, Writing, Listening and Speaking skills
- To develop their self-confidence through communication

UNIT I	**READING COMPREHENSION AND VOCABULARY**	**06 Hours**

Reading Techniques – Types of Reading – Skimming – Scanning – Reading for detail – Identifying key words – Underlining unfamiliar key words – Vocabulary Building – Reading Comprehension practice.

UNIT II	**PRESENTATION SKILLS**	**06 Hours**

Presentation Methods – Preparation and Practice – Organizing content – Do's and Don'ts of a Presentation – Presentation Techniques – Mock Presentation.

UNIT III	**GROUP DISCUSSION**	**06 Hours**

Introduction to Group Discussion – Preparation for GD – Structure of GD's – Do's and Don'ts – Tips and Strategies – Etiquette and Practice – Body Language and Posture – Sharing Ideas with respect – Understanding Opinions – Mock GD Practice.

UNIT IV	**CONVERSATIONAL SKILLS**	**06 Hours**

Introduction to Small talk – How to start and end a conversation – Exchanging ideas – Expressing Interests – Giving Opinions – Social skills and Etiquette – Informal Conversations – Formal Meetings – Group Practice.

UNIT V	**INTRODUCTION AND ROLE PLAY**	**06 Hours**

Introducing oneself – Exchange of Greetings – Appropriate Greetings – Usage of Vocabulary – Rapport Building – Handshakes and First Impressions – Basic Etiquette.

COURSE OUTCOMES:

At the end of the course the student will be able to,

CO1: To get students to understand the importance of communicating in English

CO2: To understand effective communication techniques

CO3: To increase self-confidence through regular practice

CO4: To encourage active participation in their regular class

CO5: To enable participants to face large group of audience with confidence

BOOKS PRESCRIBED:

1. English for Competitive Examinations by R.P.Bhatnagar& Rajul Bhargava Macmillan India ltd. Delhi.
2. Carnegie, Dale. The Quick and Easy Way to Effective Speaking. New York: Pocket Books, 1977.
3. Kalish, Karen. How to Give a Terrific Presentation. New York: AMACOM, 1996

WEB LINKS:

1. https://www.skillsyouneed.com/ips/communication-skills.html
2. https://venngage.com/blog/presentation-skills/
3. https://gdpi.hitbullseye.com/Group-Discussion.php

SOFT SKILLS - III

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	2	Exam Marks		60	
Total Number of Lecture Hours	30	L	T	P	C
Credits	02	2	0	0	2

COURSE OBJECTIVES:

- To enable students to develop their soft skills and Body Language
- To enhance students Reading, Writing, Listening and Speaking skills.
- To develop their self-confidence to excel at Interviews

UNIT I	**SKILL ENHANCEMENT**	**06 Hours**

Time Management – Planning and Organization – Scheduling – Prioritization – Delegation – Task Management – Stress Management – Overcoming anxiety – Confidence Building – Body Language.

UNIT II	**RESUME / COVER LETTER WRITING**	**06 Hours**

SWOT Analysis – Details and Resume Writing – Resume Examples – Building Resume using SWOT – Writing Resume – Writing Cover Letter – Resume Correction – Resume Feedback.

UNIT III	**INTERVIEW SKILLS**	**06 Hours**

Interview Do's and Don'ts – First Impression – Grooming – Body Language – Frequently asked questions – Useful Language – Mock Interview.

UNIT IV	**QUANTITATIVE ABILITY**	**06 Hours**

Permutation & Combinations – Probability – Profit and Loss – Ratio Proportions & Variations – Cubes – Venn Diagrams – Logical Reasoning – Critical Reasoning

UNIT V	**REVISIONARY MODULES**	**06 Hours**

Group Discussions – HR Process – Interview Process – Mock Group Discussions

COURSE OUTCOMES:

At the end of the course student will be able to

CO1: To develop participants social and professional skills

CO2: To help participants manage time effectively

CO3: To build a strong resume to suit corporate requirements

CO4: To face interviews confidently

CO5: To enhance their aptitude abilities

BOOKS PRESCRIBED:

1. Meena. K and V.Ayothi (2013) A Book on Development of Soft Skills (Soft Skills: A Road Map to Success) P.R. Publishers & Distributors.
2. Soft Skills – Know Yourself & Know the World, S.Chand and Company LTD, Ram Nagar, New Delhi.
3. Prasad, H. M. How to Prepare for Group Discussion and Interview. New Delhi: Tata McGraw-Hill Publishing Company Limited, 2001.
4. Pease, Allan. Body Language. Delhi: Sudha Publications, 1998.

WEB LINKS:

1. https://www.skillsyouneed.com/ips/communication-skills.html
2. https://www.businessnewsdaily.com/5836-top-interviewing-skills.html
3. https://gdpi.hitbullseye.com/Group-Discussion.php

ENTREPRENEURSHIP DEVELOPMENT

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	2	Exam Marks		60	
Total Number of Lecture Hours	30	L	T	P	C
Credits	02	2	0	0	2

COURSE OBJECTIVES:

- To develop and strengthen entrepreneurial quality and motivation in students
- To impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.
- To understand the concept and process of entrepreneurship and its contribution in and role in the growth and development of individual and the nation.

UNIT I	**ENTREPRENEURSHIP**	**06 Hours**

Entrepreneur – Personality characteristics of successful entrepreneur– Types of Entrepreneurs – Knowledge and skills required for an entrepreneur –Difference between Entrepreneur and Intrapreneur.

UNIT II	**BUSINESS**	**06 Hours**

Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business –Market Survey and Research–Techno Economic Feasibility Assessment.

UNIT III	**BUSINESS PLAN PREPARATION**	**06 Hours**

Sources of product for business – Pre-feasibility study – Criteria for selection of product– Ownership – Capital – Budgeting project profile preparation – Matching entrepreneur with the project – Feasibility report preparation and evaluation criteria.

UNIT IV	**SUPPORT TO ENTREPRENEURS**	**06 Hours**

Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures – Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry.

UNIT V	**ENTPRENEURSHIP DEVELOPMENT PROGRAMME**	**06 Hours**

Meaning, Objectives–Phases of EDP– steps in EDP–Strategies for Entrepreneurship development– Institutions in aid of Entrepreneurship Development Programme–Use of IT enabled services in entrepreneurship - E Licensing, E filing.

COURSE OUTCOMES:

At the end of the course, a student will be able to

CO1: Understand the concept of Entrepreneurship

CO2: Identify, create and analyze entrepreneurial opportunities.

CO3: Assess techno economic feasibility of a Business Plan

CO4: Create Business Plans

CO5: State various statutory institutions involved in the process of Entrepreneurship development

TEXT BOOKS:

1. Hisrich R D, Peters M P, "Entrepreneurship" 8th Edition, Tata McGraw-Hill, 2016
2. Khanka S.S., "Entrepreneurial Development" S Chand & Company; edition, 2016

REFERENCE BOOKS:

1. Sharma, "Entrepreneurship Development", PHI LEARNING PVT LTD, (2017).
2. Abhinav Ganpule&Aditya Dhobale, "Entrepreneurship Development", Kindle Edition, Jatayu Publication; 1 edition ,2018.
3. Sangeeta Sharma, "Entrepreneurship Development", 10th Edition, Kindle EditionPHI Learning, 2018.

WEB LINKS:

1. http://www.simplynotes.in/e-notes/mbabba/entrepreneurship-development/
2. https://openpress.usask.ca/entrepreneurshipandinnovationtoolkit/chapter/chapter-1-introduction-to-entrepreneurship/
3. https://articles.bplans.com/10-great-websites-for-entrepreneurs/
4. https://www.entrepreneur.com/article/272185

MINI PROJECTS

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	2	Exam Marks		60	
Total Number of Lecture Hours	30	L	T	P	C
Credits	02	0	0	4	2

COURSE OBJECTIVES:

The mini project is designed to help students to develop practical ability and knowledge with the practical tools/techniques for solving real life problems related to the industry, academic institutions and research centers. The course Mini Project is one that involves practical work for understanding and solving problems in the field of Aviation.

Instructions for preparation of Mini-Project Reports

The Mini-Project should be written in standard scientific paper format.

Title page: Authors name, Supervisors Name and Designation

Abstract: 250 words = 1 page.

Introduction: ~500-750 words = 2-3 pages

Materials and Methods: ~1500 words = 6 pages

Results: ~1500 words = 6 pages

This should provide a concise account of the results obtained, in a logical order that hopefully tells a story. This will not necessarily be the order in which you carried out the experiments! Make maximum use of figures / tables - remember a picture often replaces a thousand words. A standard scientific paper in most journals will contain ~6 (maximum 8) figures or tables.

Discussion :1500 words = 6 pages

This is valuable inclusion in a project report where the student may not have sufficient time to complete the work and it contains constant ideas of further work.

Reference :1250words = 5 pages

Standard format should be followed and include all the details, Including the full reference in the list maximum of 30 reference is adequate.

TECHNICAL SEMINAR

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	2	Exam Marks		60	
Total Number of Lecture Hours	30	L	T	P	C
Credits	01	0	0	2	1

COURSE OBJECTIVES:

The objective of the seminar is to impart training to the students in collecting materials on a specific topic from books, journals and other sources, compressing and organizing them in a logical sequence, and presenting the matter effectively both orally and as a technical report. The use of slides/transparencies and overhead/slide/multimedia projector is also introduced to the user during the seminar.

Guidelines for preparing Seminar

1. Selection of topic/area in Aeronautical Science Subjects.
2. Approval to the selected topic from the concerned faculty in charge.
3. Study of topic: Students are requested to acquire a thorough knowledge on the subject by referring back papers and reference books (These may be included as references at the end of the paper) on the corresponding area.
4. Preparation of slides for presentation Slides may be presented in MS power point. Time allowed for presentation is 20 minutes for presentation and 5 minutes for discussions. So, number of slides may be around 20 - 25 to adhere the time limit.
5. Organization of slides
   - The first slide will be a title page showing the title, name of author (presenter), roll no. and Class.
   - 2nd page will contain overview of the seminar.
   - Successive pages will contain
   - Objectives of the paper
     (1) Introduction
     (2) Body of the paper includes system dynamics, methodology, graphs, block diagrams etc. arranged in a logical sequence depending on the problem.
     (3) Results and discussions
     (4) Conclusion
6. Each slide will have a title and each figure have a caption.
7. Draft copy of the Seminar report should also be submitted before the presentation.

PERSONALITY DEVELOPMENT

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	2	Exam Marks		60	
Total Number of Lecture Hours	30	L	T	P	C
Credits	02	2	0	0	2

COURSE OBJECTIVES:

- To make aware about the importance of personality and development in the business world.
- To make the students follow the good personality and create a good relationship with others.

UNIT I	**PERSONALITY DEVELOPMENT-INTRODUCTION**	**06 Hours**

The concept personality - dimensions of personality - term personality development - significance. The concept of success and failure what is success? - hurdles in achieving success - overcoming hurdles - factors responsible for success – what is failure - causes of failure - do's and don'ts regarding success and failure.

UNIT II	**ATTITUDES AND VALUES**	**06 Hours**

Attitude - concept - significance - factors affecting attitudes - positive attitude - advantages -negative attitude - disadvantages - ways to develop positive attitude – difference between personalities having positive and negative attitude.

UNIT III	**BODY LANGUAGE AND SELF ESTEEM**	**06 Hours**

Body language - assertiveness - problem-solving - conflict and stress management - decision-making - self-esteem – advantage - positive and negative self-esteem.

UNIT IV	**GOALS SETTING**	**06 Hours**

Concept of goal-setting - importance of goals - dream vs goal - why goal-setting fails? – smart (specific, measurable, achievable, realistic, time-bound) goals - art of prioritization - do's and don'ts about goals.

UNIT V	**LEADERSHIP & WORK ETHICS**	**06 Hours**

Positive and creative thinking - leadership and qualities of a successful leader – team work - time management - work ethics - good manners and etiquettes (concept, significance and skills to achieve should be studied.)

TOPICS PRESCRIBED FOR WORKSHOP/SKILL LAB

1. Group Discussion
2. Presentation Skill
3. Problem-Solving
4. Decision-Making
5. Creativity
6. Leadership
7. Time Management
8. Body Language

COURSE OUTCOMES:

Co – 1: Will know the origin of personality and its performance

Co – 2: Will know how the personality is helping in enhancing one behaviour when they face success and failure

Co – 3: Will understand the attitude and evaluate it

Co – 4: Will appraise their attitudes and develop the positive attitudes

Co – 5: Will be motivated by understanding different internal and external motives

Co – 6: Will know the demotivating factors

Co – 7: Will develop the personality with self-esteemed

Co – 8: Will know the values of goal settings and prioritization

Co – 9: Will know will adopt the actual body language regarding the places

Co – 10: Will learn teaming and lateral thinking.

TEXT BOOKS:

1. Organisational Behaviour - S. P. Robbins - Prentice-Hall Of India Pvt. Ltd., New Delhi-15th edition,2013.
2. Communicate To Win - Richard Denny - Kogan Page India Private Limited, New Delhi-2009.
3. Essentials Of Business Communication - Rajendra Pal And J. S. Korlhalli - Sultan Chand & Sons, New Delhi,1st edition,2012.

REFERENCE BOOKS:

1. Business Communication - K. K. Sinha - Galgotia Publishing Company, New Delhi.-4th edition,2012.
2. Media And Communication Management - C. S. Rayudu - Himalaya Publishing House,Bombay.2011.
3. Business Communication - Dr. S.V. Kadvekar, Prin. Dr. C. N. Rawal And Prof. Ravindra Kothavade - Diamond Publications, Pune.2009.
4. You Can Win - Shiv Khera - Macmillan India Limited.2012.
5. Group Discussion And Public Speaking - K. Sankaran And Mahendra Kumar - M.I. Publications, Agra .2000.

WEB LINKS:

1. https://onlinecourses.nptel.ac.in/noc20_hs43/preview
2. https://onlinecourses.swayam2.ac.in/cec21_mg22/preview
3. https://www.udemy.com/course/the-complete-personal-development-course/

INTERNSHIP

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	2	Exam Marks		60	
Total Number of Lecture Hours	30	L	T	P	C
Credits	01	0	0	2	1

COURSE OBJECTIVES:

The goal of student internship program is to have the professional training and growth in various organizations and all types of Aviation companies.

Purpose

The purpose of the student internship program is to provide students with an opportunity to gain workplace skills and learn more about corporate field. This is also an opportunity to contribute to the local community by reaching out to future professionals.

Parties Involved

The student internship program involves two parties:

1. The Intern Supervisor (The Company)
2. The Intern (The Student)

Category	**Requirements**
Status	Group Internship Maximum of 5 person for one company.
Length	Period of 2 weeks
Hours	Hours will be agreed upon between the intern and the Intern Supervisor.
Reports To	The Intern Supervisor
Required Meetings	1. Attend Orientation 2. Attend meetings as requested by the Intern Supervisor.
Duties	1. Perform all duties as assigned by the Intern Supervisor 2. If performing the internship for school credit, the intern will be responsible for providing and submitting the required forms to the Intern Supervisor.

Evaluation process for Internship Reporting:

Internal Marks for Internship Report	40 marks
External Marks for Internship Report	60 marks

Certification	Content	Presentation
20 marks	**20 marks**	**20 marks**
COURSE OUTCOME:		
CO1: To Contribute to organizations of all types and sizes by managing critical internship. CO2: To provide creative solutions to key challenges. CO3: To design marketing strategies. CO4: To Provide a variety of ways to engage in experiential Learning CO5: To lay the foundation for strong relationship and subsequent job offers CO6: To apply the Knowledge and skills acquired in the classroom to a professional context		

GENERIC ELECTIVE COURSES (GE)

CONSUMER AFFAIRS

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	3	Exam Marks		60	
Total Number of Lecture Hours	45	L	T	P	C
Credits	3	3	0	0	3

COURSE OBJECTIVES:

This paper seeks to familiarize the students with their rights and responsibilities as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights. It also provides an understanding of the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards. The student should be able to comprehend the business firms interface with consumers and the consumer related regulatory and business environment.

UNIT I	**CONCEPTUAL FRAMEWORK**	**10 Hours**

Consumer and Markets: Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, E-Commerce with reference to Indian Market, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labeling and packaging along with relevant laws, Legal Metrology. Consumer buying process, Consumer Satisfaction / dissatisfaction – Grievances – complaint, Consumer Complaining Behavior: Alternatives available to Dissatisfied Consumers, Complaint Handling Process: ISO 10000 suite.

UNIT II	**THE CONSUMER PROTECTION LAW IN INDIA**	**10 Hours**

Consumer rights and UN Guidelines on consumer protection, Consumer goods, defect in goods, spurious goods and services, service, deficiency in service, unfair trade practice and restrictive trade practice. Advisory Bodies: Consumer Protection Councils at the Central, State and District Levels; Adjudicatory Bodies: District Forums, State Commissions, National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA with important case law.

UNIT III	**GRIEVANCE REDRESSAL MECHANISM UNDER THE INDIAN CONSUMER PROTECTION LAW**	**10 Hours**

Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint;

Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal, frivolous and vexatious complaints; Offences and penalties. Leading Cases decided under Consumer Protection law by Supreme Court/National Commission: Medical Negligence; Banking; Insurance; Housing & Real Estate; Electricity and Telecom Services; Education; Defective Products; Unfair Trade Practices.

UNIT IV	**ROLE OF INDUSTRY REGULATORS IN CONSUMER PROTECTION**	**10 Hours**

Banking: RBI and Banking Ombudsman, Insurance: IRDA and Insurance Ombudsman, Telecommunication: TRAI, Food Products: FSSAI, Electricity Supply: Electricity Regulatory Commission, Real Estate Regulatory Authority.

UNIT V	**CONTEMPORARY ISSUES IN CONSUMER AFFAIRS**	**05 Hours**

Evolution of Consumer Movement in India, Formation of consumer organizations and their role in consumer protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing, Sustainable consumption and energy ratings. Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance; Role of International Standards: ISO an Overview.

COURSE OUTCOMES:

At the end of the course the student will be able to,

CO1: Explain the concepts of consumer affairs

CO2: Analyses the consumer protection act and its procedures.

CO3: Apply the consumer grievances handling mechanisms and procedures.

CO4: Analyses the role of consumer protection act in India.

CO5: Identify the contemporary issues in consumer affairs including the role of BIS, ISO and other issues.

TEXT BOOKS:

5. Khanna, Sri Ram, SavitaHanspal, Sheetal Kapoor, and H.K. Awasthi, “Consumer Affairs”, Universities Press, 3rd edition, 2007
6. Choudhary, Ram Naresh Prasad, “Consumer Protection Law Provisions and Procedure”, Deep and Deep Publications Pvt Ltd, 2nd edition, 2005.

REFERENCE BOOKS:

6. G. Ganesan and M. Sumathy, "Globalisation and Consumerism: Issues and Challenges", Regal Publications,5th edition, 2012
7. Suresh Misra and Sapna Chadah, "Consumer Protection in India: Issues and Concerns", IIPA, New Delhi, 3rd edition, 2012.
8. Rajyalaxmi Rao, "Consumer is King", Universal Law Publishing Company, 2nd edition, 2012.

WEB LINKS:

1. https://egazette.nic.in/WriteReadData/2019/210422.pdf
2. https://www.indialegallive.com/special-story/rights-of-consumer-and-the-redressal-system/
3. https://www.slideshare.net/vijayyadav107/consumer-protection-act-80098278
4. https://slideplayer.com/slide/5845006/

DISASTER MANAGEMENT

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	3	Exam Marks		60	
Total Number of Lecture Hours	45	L	T	P	C
Credits	12	3	0	0	3

COURSE OBJECTIVES:

1. To Understand basic concepts in Disaster Management
2. To Understand Definitions and Terminologies used in Disaster Management
3. To Understand Types and Categories of Disasters
4. To Understand the Challenges posed by Disasters
5. To understand Impacts of Disasters

UNIT I	**INTRODUCTION TO DISASTERS**	**10 Hours**

Concepts and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks).

UNIT II	**DISASTERS: CLASSIFICATION CAUSES, IMPACTS**	**10 Hours**

(Including social, economic, political, environmental, health, psychosocial etc.). Differential impacts - in terms of caste, class, gender, age, location, disability Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change.

UNIT III	**APPROACHES TO DISASTERS RISK REDUCTION**	**10 Hours**

Disaster cycle – its analysis, Phases, Culture of safety, prevention, mitigation and preparedness, community based DRR, Structural – nonstructural measures, roles and responsibilities of community, Panchayat Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre and other stake-holders.

UNIT IV	**INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT**	**10 Hours**

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT V	DISASTER RISK MANAGEMENT IN INDIA	05 Hours

Hazard and Vulnerability profile of India - Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation).

COURSE OUTCOMES:

At the end of the course the student will be able to,

CO1: Explain the concepts and associated terms with disaster.

CO2: Identify the causes and impacts of disasters.

CO3: Formulate the action plan for disaster management.

CO4: Illustrate the relationship between disaster and development.

CO5: Evaluate the disaster risk management in India.

TEXT BOOKS:

1. Alexander David, “Introduction in 'Confronting Catastrophe'”, Oxford University Press, 5th edition,2000.
2. Andharia J. “Vulnerability in Disaster Discourse”, JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008.
3. Blaikie, P, Cannon T, Davis I, Wisner B. “At Risk Natural Hazards, Peoples' Vulnerability and Disasters”, Routledge, 1997.

REFERENCE BOOKS:

1. Coppola P Damon, “Introduction to International Disaster Management”, Bullock &Haddow LLC, Third edition,2007.
2. Carter, Nick, “Disaster Management: A Disaster Manager's Handbook. Asian Development Bank”, Manila Philippines, Ist edition, 1991.

WEB LINKS:

1. https://www.emdat.be/classification
2. http://www.odpm.gov.tt/node/162
3. https://www.slideshare.net/brissomathewarackal/disaster-preparedness-brisso
4. https://www.slideshare.net/pramodgpramod/disaster-management-system-in-india

UNIVERSAL HUMAN VALUES

Subject Code		IA Marks		40	
Number of Lecture Hours/Week	3	Exam Marks		60	
Total Number of Lecture Hours	45	L	T	P	C
Credits	3	3	0	0	3

COURSE OBJECTIVES:

- To create an awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

UNIT I	**INTRODUCTION TO VALUE EDUCATION**	**09 Hours**

Value Education, Definition, Concept and Need for Value Education. - The Content and Process of Value Education. - Basic Guidelines for Value Education. - Self exploration as a means of Value Education. - Happiness and Prosperity as parts of Value Education.

UNIT II	**HARMONY IN THE HUMAN BEING**	**09 Hours**

Human Being is more than just the Body. - Harmony of the Self ('I') with the Body. - Understanding Myself as Co-existence of the Self and the Body. - Understanding Needs of the Self and the needs of the Body - Understanding the activities in the Self and the activities in the Body.

UNIT III	**HARMONY IN THE FAMILY AND SOCIETY AND HARMONY IN THE NATURE**	**09 Hours**

Family as a basic unit of Human Interaction and Values in Relationships. - The Basics for Respect and today's Crisis: Affection, e, Guidance, Reverence, Glory, Gratitude and Love. Comprehensive Human Goal: The Five Dimensions of Human Endeavour. Harmony in Nature: The Four Orders in Nature. The Holistic Perception of Harmony in Existence.

UNIT IV	**SOCIAL ETHICS**	**10 Hours**

The Basics for Ethical Human Conduct. Defects in Ethical Human Conduct. Holistic Alternative and Universal Order. Universal Human Order and Ethical Conduct. Human Rights violation and Social Disparities.

UNIT V	PROFESSIONAL ETHICS	08 Hours

Value based Life and Profession. Professional Ethics and Right Understanding. Competence in Professional Ethics. Issues in Professional Ethics – The Current Scenario. Vision for Holistic Technologies, Production System and Management Models.

COURSE OUTCOMES:

CO-1: Analyze the significance of value inputs in a classroom and start applying them in their life and profession.

CO-2: Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.

CO-3: Describe the role of a human being in ensuring harmony in society and nature.

CO-4: Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

CO-5: Illustrate Value based Life and Professional Ethics.

TEXT BOOKS:

1. A.N Tripathy, "HUMAN VALUES", New Age International Publishers, 3rd Edition, 2003.
2. Bajpai.B.L., "Indian Ethos and Modern Management", New Royal Book Co., Lucknow, Reprinted, 2004.
3. Dr. Rajan Misra, "Human Values", Laxmi Publications, Ltd., 1st Edition 2009.
4. Gaur.R.R., Sangal.R, Bagaria.G.P., "A Foundation Course in Value Education, Excel Books", 1st Edition, 2009.

REFERENCE BOOKS:

1. Corliss Lamont, "The Philosophy of Humanism", Humanist Press, 8th edition, 1997.
2. C. Ed. Stanley M. Daugert. Sharma, "Ethical Philosophies of India", George Allen & Unwin, 1st Edition, 1965.
3. Mortimer. J. Adler, "Whatman has made of man", Read Books, 1st Edition, 2007.

WEB LINKS:

1. **https://nptel.ac.in/courses/109/104/109104068/**