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 Aeronautical Science

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 Aeronautical Science.
- 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 having a strong background in aeronautical science.

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

PEO 3: To produce graduates having the multidisciplinary knowledge to solve real-world problems with a high degree of professional ethics and standards.

PROGRAM OUTCOMES (POs)

PO 1: Disciplinary knowledge

Students will demonstrate in-depth knowledge and understanding of Aeronautical science.

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 Aeronautical Science.

PSO 2: Able to achieve a full understanding of the topics specified for the ATPL examination.

PSO 3: Able to apply advanced level skills in academic and research pursuits relevant to aeronautical science and other interdisciplinary streams.

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 (AERONAUTICAL SCIENCE)

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 (Aeronautical Science)

1. Introduction

The Learning Outcomes-based Curriculum Framework (LOCF) for the undergraduate programs in BSc Aeronautical Science 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 Aeronautical Science. The learning outcomes-based curriculum framework (LOCF) for B.Sc. aeronautical science 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. Aeronautical Science 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 Aeronautical Science Programme

The UG programs in BSc Aeronautical Science 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, Electrics Aircraft General Knowledge, Aerodynamics, Aircraft Structures, Propulsion, Airframe &Aircraft Systems, Air Navigation, Meteorology, Air Regulation.

The Bachelor of Aeronautical Science is a broad-based multi-disciplinary programme with a wide spectrum of courses in aircraft technology such as avionics, 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 aeronautical science, students have the option of further advanced courses in the field such as M.E. (Aeronautical Engineering), M.Tech. (Aeronautical Engineering), PhD (Aeronautical Engineering).

2.2 The aim and objectives of the BSc Aeronautical Science Programme

The aims and objectives of our BBA 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 Aeronautical Science

Some of the characteristic attributes of a graduate in BSc Aeronautical Science are

i. **Disciplinary knowledge and skills:** Capable of Understanding the major concepts and principles in aeronautical science 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 aeronautical science 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 Aeronautical Science 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. Aeronautical science programme:

Some of the expected learning outcomes that a student should be able to demonstrate on completion of a B.Sc. Aeronautical Science 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 aeronautical science 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 Aeronautical Science

PL01: Able to utilize the knowledge of aeronautical/aerospace science in an innovative, dynamic and challenging environment for the design and development of new products and to manage airline operations.

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: An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

PL05: Knowledge of contemporary issues

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

PL07: The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

PL08: Ability to identify, formulate, and solve engineering and operational problems.

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: = ∑iCiGi ÷ ∑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. Aeronautical Science

The B.Sc. The aeronautical science 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 Aeronautical Science

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

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. Aeronautical Science

Courses of Study and Scheme of Assessment

(Minimum Credits to be earned :140)

B.Sc Aeronautical Science 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. Aeronautical Science

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	Aviation Meteorology	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	Principle of Flight	3	1	0	4	40	60	100
CORE	Radio Navigation	3	1	0	4	40	60	100
CORE	Aircraft Electrical fundamentals	4	0	0	4	40	60	100
CORE	Aircraft Electrical fundamentals lab	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. Aeronautical Science

COURSES OF STUDY AND SCHEME OF ASSESSMENT

Code No.	Course	Hours/Week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	SEE	Total
SEMESTER 3								
CORE	Mass and Balance - Aeroplanes	3	0	0	3	40	60	100
CORE	Aircraft Propellers	3	0	0	3	40	60	100
CORE	Aircraft systems and Instruments	4	0	0	4	40	60	100
CORE	Aircraft Power Plants	4	1	0	4	40	60	100
CORE	General Navigation	4	0	0	4	40	60	100
AECC	Environmental Studies	2	0	0	2	40	60	100
CORE	Propulsion Lab	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	Load and Trim	3	0	0	3	40	60	100
CORE	Aviation safety management	3	0	0	3	40	60	100
CORE	Composite materials and structure	4	0	0	4	40	60	100
CORE	Air Traffic Management/ RTR	4	1	0	4	40	60	100
CORE	Airport and airline Passenger Management	3	0	0	3	40	60	100
CORE	Airframe Lab	0	0	4	2	40	60	100
CORE	Aircraft Simulator 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. Aeronautical Science

COURSES OF STUDY AND SCHEME OF ASSESSMENT

Code No.	Course	Hours/Week				Maximum Marks		
		Lecture	Tutorial	Practical	Credits	CA	SEE	Total
SEMESTER 5								
CORE	Air regulations	3	0	0	3	40	60	100
DSE	Aero Engine Maintenance and Repair	3	0	0	3	40	60	100
DSE	Aircraft Structures	4	1	0	4	40	60	100
DSE	Aircraft Design	3	0	0	3	40	60	100
DSE	Non Destructive testing	3	0	0	3	40	60	100
DSE	Computer Aided Design Lab	0	0	4	2	40	60	100
DSE	Aircraft Structures Lab	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	-	-	-	-	-	-	-
		16	**1**	**12**	**22**			
SEMESTER 6								
DSE	Air route planning and fleet planning	4	0	0	4	40	60	100
DSE	Airport /Airline Ground Operations	3	1	0	4	40	60	100
DSE	Airline Operations Control Centre (AOCC)	4	1	0	4	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	2	1	40	60	100
		16	**2**	**10**	**22**			

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

LIST OF CORE COURSES (Theory)		
S.NO	**COURSE CODE**	**COURSE TITLE**
1		**MATHEMATICS**
2		**BASIC PHYSICS**
3		**AVIATION METEOROLOGY**
4		**PRINCIPLE OF FLIGHT**
5		**RADIO NAVIGATION**
6		**AIRCRAFT ELECTRICAL FUNDAMENTALS**
7		**MASS AND BALANCE - AERO PLANES**
8		**AIRCRAFT PROPELLERS**
9		**AIRCRAFT SYSTEMS AND INSTRUMENTS**
10		**AIRCRAFT POWER PLANTS**
11		**GENERAL NAVIGATION**
12		**LOAD AND TRIM**
13		**AVIATION SAFETY MANAGEMENT**
14		**COMPOSITE MATERIALS AND STRUCTURE**
15		**AIR TRAFFIC MANAGEMENT/ RTR**
16		**AIRPORT AND AIRLINE PASSENGER MANAGEMENT**
17		**AIR REGULATIONS**
LIST OF CORE COURSES (Practical)		
18		**BASIC PHYSICS LAB**
19		**WORKSHOP PRACTICES**
20		**AIRCRAFT ELECTRICAL FUNDAMENTALS LAB**
21		**AERODYNAMICS LAB**
22		**PROPULSION LAB**
23		**AIRFRAME LAB**
24		**AIRCRAFT SIMULATOR LAB**

LIST OF DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE) (Theory)		
S.NO	**COURSE CODE**	**COURSE TITLE**
1		**AERO ENGINE MAINTENANCE AND REPAIR**
2		**AIRCRAFT STRUCTURES**
3		**AIRCRAFT DESIGN**
4		**NON-DESTRUCTIVE TESTING**
5		**AIR ROUTE PLANNING AND FLEET PLANNING**
6		**AIRPORT /AIRLINE GROUND OPERATIONS**
7		**AIRLINE OPERATIONS CONTROL CENTRE (AOCC)**
8		**AVIONICS**
9		**HUMAN FACTORS**
10		**AVIATION LEGISLATION**
12		**AIRCRAFT MAINTENANCE PRACTICES**
13		**DANGEROUS GOODS AND CARGO**
14		**RADIO TELEPHONY RESTRICTED**
LIST OF DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE) (Practical)		
15		**COMPUTER AIDED DESIGN LAB**
16		**AIRCRAFT STRUCTURES LAB**
17		**AIRCRAFT INSTRUMENTATION LAB**
18		**COMPUTER AIDED ANALYSIS 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		**PERSONALITY DEVELOPMENT / 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

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:

1. IC joshi, "Ground Subjects CPL/ATPL Aviation Meteorology", Himalayan Books; Sixth Edition (1 January 2019).
2. 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

PHYSICS PRACTICAL

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

1. Use sheet metal fabrication tools and make simple models as per the given diagram.
2. Fabricate carpentry components and pipe connections including plumbing works.
3. Use welding equipment to join the structures.

4. Utilize different machine tools like Surface Grinding Cylindrical Grinding etc,
5. 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).

ABILITY ENHANCEMENT COMPULSORY COURSE - I

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/

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/

PRINCIPLE OF FLIGHT

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:

1. To make the students to understand the laws and principles that apply to flight.
2. To ensure the students to understand what's about to happen when approaching any extreme limits of the flight condition.

UNIT I	**ATMOSPHERE AND BASIC AERODYNAMICS**	**12 Hours**

The Atmosphere - Definitions and Overview - Dynamic Pressure and Airspeed - Basic Aerodynamic Theory - Subsonic Airflow.

UNIT II	**FORCES ACTING ON AN AIRCRAFT**	**12 Hours**

Lift - Lift Coefficient and Equation - Density Coefficient and Altitude - Lift Curve - Lift/Drag Ratio - Effect of Other Factors - Introduction to 3-Dimensional Airflow - Wing Tip Vortices - Wake Turbulence - Ground Effect. Drag - Drag Family Tree - Parasite Drag - Induced Drag - Factors Affecting Parasite Drag - Total Drag. Thrust - Power Required – Weight.

UNIT III	**AIRCRAFT STABILITY AND CONTROL**	**12 Hours**

Stalling - Stall Speeds and Warning Systems - Stall Characteristics - Super or Deep Stall - Factors Affecting Stalling Speeds – Spinning - Special Phenomena of the Stall - High Speed Buffet (Shock Stall) - High Lift Devices (Flaps) - Trailing Edge Flaps - Leading Edge Flaps. Stability - Longitudinal Stability - Directional Stability - Lateral Stability – Controls - Aerodynamic Balance - Powered Flying Controls - Mass Balance - Longitudinal Control - Lateral Control - Directional Control -Trimming.

UNIT IV	**BASIC FLIGHT MANEUVERS**	**12 Hours**

Flight Mechanics - Straight and Level Flight - Straight Climb – Descent – Turning - Flight with Asymmetric Thrust - Minimum Control Speeds.

UNIT V	**HIGH SPEED FLIGHT, LIMITATIONS, WINDSHEAR AND PROPELLERS**	**12 Hours**

High Speed Flight – Shockwaves - Mach Number - Swept Wing - Supersonic Flights – Limitations - Maneuvering Load - Gust Loads - Landing Gear & Flap Limitation Speeds – Aeroelasticity – Windshear – Propellers - Fixed Pitch Propeller - Variable Pitch Propeller - Propeller Turning Effect.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO 1: Explain the properties of air that affect aircraft control and performance.

CO 2: Analyze the forces and its effects on the aircraft when approaching extreme limits of the flight condition.

CO 3: Demonstrate concept of stability and application to dynamic systems like Aircraft, and the role of primary controls and secondary controls in longitudinal stability.

CO 4: Demonstrate various stall maneuvers, steep turns and emergency descents.

CO 5: Identify the Flight Operating Limitations (FOLs) on the airspeed, Mach number, altitude, maneuvering, power management and/or system/subsystem.

TEXT 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).

REFERENCE BOOKS:

1. Peter J. Swatton, "Principles of Flight for Pilots (Aerospace Series)", Wiley; 1st edition (8 October 2010).
2. Robert Nelson, "FLIGHT STABILITY AND AUTOMATIC CONTROL", McGraw Hill Education; 2nd edition (1 July 2017).

WEB LINKS:

1. https://www.cfinotebook.net/notebook/aerodynamics-and-performance/principles-of-flight
2. https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/airplane_handbook/media/05_afh_ch3.pdf
3. https://air.flyingway.com/books/ac_61-23c_phak_canada.pdf

RADIO NAVIGATION

Subject Code		IA Marks			40
Number of Lecture Hours/Week	4	Exam Marks			60
Total Number of Lecture Hours	45	L	T	P	C
Credits	4	3	1	0	4

COURSE OBJECTIVES:

The course aims to provide exposure to the concept of Radio Navigation in the aircrafts and its associated instruments and techniques in real time flying on small, Medium and Heavy Aircraft.

UNIT I	**PROPAGATION THEORY**	**09 Hours**

Electromagnetic waves - Radio waves - Propagation Paths – Modulation – Antennae - Dopplar

UNIT II	**RADIO AIDS**	**09 Hours**

Ground Direction Finding - NDB/ADF – Operation - NDB/ADF – Interpretation - VOR and Doppler VOR – Operation - VOR and Doppler VOR – Interpretation - ILS – Operation - ILS – Interpretation - Microwave Landing System - Distance Measure Equipment.

UNIT III	**RADAR**	**09 Hours**

Principles of Operation - Ground Radar - Airborne Weather Radar - Secondary Surveillance Radar - Mode S

UNIT IV	**AREA NAVIGATION SYSTEMS**	**09 Hours**

Area Navigation RNAV – FMS – EFIS

UNIT V	**GPS**	**09 Hours**

GPS / GLONASS / GALLILEO - Principles and Operation - Loran C.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO 1: Analyze the propagation types of radio waves and their relations with radio frequency.

CO 2: Explain the radio waves in VLF, LF, MF and HF propagate as surface/ground waves and sky waves and doppler effect.

CO 3: Explain the working principle of RADAR in aircraft.

CO 4: Identify and summarize the important feature of area navigation systems such as FMS and EFIS.

CO 5: Analyze Global Navigation Satellite Systems: GPS/GLONASS/GALILEO principles, Operation, Errors and factors affecting accuracy.

TEXT BOOKS:

1. R. B. Underdown and David Cockburn, "Ground Studies for Pilots: Radio Aids", Wiley India Pvt Ltd; Sixth edition (7 July 2008).
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

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

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).

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

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 PROPELLERS

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:

The aim of the course is to develop the knowledge of fundamental concept of propeller design, function, and construction.

UNIT I	**BLADE ELEMENT THEORY**	**09 Hours**

High/low blade angle, reverse angle, angle of attack, rotational speed; Propeller slip; Aerodynamic, centrifugal, and thrust forces; Torque; Relative airflow on blade angle of attack; Vibration and resonance.

UNIT II	**PROPELLER CONSTRUCTION**	**09 Hours**

Construction methods and materials used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; Fixed pitch, controllable pitch, constant speeding propeller; Propeller/spinner installation.

UNIT III	**PROPELLER PITCH CONTROL AND PROPELLER SYNCHRONISING**	**09 Hours**

Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Overspeed protection. Synchronizing and synchrophasing equipment.

UNIT IV	**PROPELLER ICE PROTECTION AND PROPELLER STORAGE AND PRESERVATION**	**09 Hours**

Fluid and electrical de-icing equipment, Propeller preservation and de preservation.

UNIT V	**PROPELLER MAINTENANCE**	**09 Hours**

Static and dynamic balancing; Blade tracking; Assessment of blade damage, erosion, corrosion, impact damage, delamination; Propeller treatment/repair schemes; Propeller engine running.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1**:** Explain the effect of blade angle of attack on the propeller performance.

CO2: Describe the shape, construction and performance of a propeller.

CO3: Analyze the propeller pitch control and propeller synchronizing.

CO4: Demonstrate the propeller ice protection system.

CO5: List the propeller maintenance procedure.

TEXT BOOKS:

1. Frank Delp, “Aircraft Propellers and Controls”, Aviation Maintenance Pub (1 June 1979).
2. Fred Ernest Weick , “Aircraft Propeller Design”, McGraw-Hill Book Company, inc; 1st edition (January 1, 1930).

REFERENCE BOOKS:

1. Frank E Hitchens, “Propeller Aerodynamics”, Auk Academic; Standard ed. edition (4 August 2015).
2. Charles L. Rodriguez, Thomas Forenz, “Module 17 - Propellers for Aircraft Maintenance”, Aircraft Technical Book Company, 2016.

WEB LINKS:

1. https://www.youtube.com/watch?v=PwDaM_0XjLc
2. https://www.faa.gov/documentlibrary/media/advisory_circular/ac_20-37e.pdf

AIRCRAFT SYSTEMS AND INSTRUMENTS

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:

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**

Characteristics and general definitions, Pressure heads, Air temperature measurement, The airspeed indicator, The pressure altimeter, The vertical speed indicator, The machmeter

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

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.

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

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/

GENERAL 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	4	4	0	0	4

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/

ABILITY ENHANCEMENT COMPULSORY COURSE - II

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

PROPULSION 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

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

AVIATION SAFETY 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:

This course will examine various aspects of aviation flight and ground safety program management. Aviation safety program development, aviation human factors issues, aviation accident causation models, Safety Management Systems (SMS) and other areas relevant to aviation safety will be discussed. Case studies derived from National Transportation Safety Board Aviation Accident Reports will be discussed.

UNIT I	**AVIATION SAFETY PROGRAM MANAGEMENT**	**09 Hours**

Accident Prevention Concepts - Management Concepts and Methods - Safety Program Organization - Reporting and Information Systems - Safety Committees - Safety Inspections and Audits - safety Management Systems (SMS).

UNIT II	**HUMAN FACTORS**	**09 Hours**

Communication – Stress - Situational Awareness - Hazardous Attitudes - Crew Resource Management – Leadership – Teamwork.

UNIT III	**FLIGHT SAFETY**	**09 Hours**

Issues Related to Flight Safety - ATC Safety

UNIT IV	**AIRCRAFT ACCIDENTS**	**09 Hours**

Accident Investigation Procedures - Accident Causation Models

UNIT V	**GROUND SAFETY**	**09 Hours**

Aviation Maintenance Safety - Ground Safety

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Discuss the primary responsibility of employers in providing a safe working environment.

CO2: Analyze the relationship between stress and judgment and decision-making.

CO3: Describe the common causes, categories and classifications of ground damage.

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

CO5: Analyze the safety issues at airports.

TEXT BOOKS:

1. Michael Ferguson, Sean Nelson, "Aviation Safety: A Balanced Industry Approach", Delmar Cengage Learning; New edition (11 January 2013).
2. 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/

COMPOSITE MATERIALS AND STRUCTURE

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:

Students undergoing this course are expected

1. To understand the basics of composite materials, classification of composites, different fibers as reinforcement.
2. To formulate the elastic constants for isotropic, anisotropic, orthotropic materials.
3. To Study governing equations for laminated composites, sandwich construction.
4. To understand fabrication processes.

UNIT I	**INTRODUCTION TO COMPOSITE MATERIALS**	**12 Hours**

Stress Strain Relation Introduction- Advantages and application of composite materials, reinforcements and matrices- Generalized Hooke's law- Elastic constants for anisotropic, orthotropic and isotropic materials.

UNIT II	**ANALYSIS OF COMPOSITE MATERIALS**	**12 Hours**

Methods Of Analysis Micro mechanics- Mechanics of materials approach, elasticity approach to determine material properties – Macro mechanics – Stress-Strain relation with respect to natural axis, arbitrary axis – Determination of material properties. Experimental characterization of lamina.

UNIT III	**LAMINATED COMPOSITES**	**12 Hours**

Laminated Plates - Governing differential equation for a general laminate, angle ply and cross ply laminates. Failure criteria for composites.

UNIT IV	**SANDWICH COMPOSITE STRUCTURE**	**12 Hours**

Sandwich Constructions Basic design concepts of sandwich construction – Materials used for sandwich construction – Failure modes of sandwich panels.

UNIT V	**FABRICATION METHODS**	**12 Hours**

Fabrication Process Various open and closed mould processes. Manufacture of fibers – Types of resins and properties and applications – Netting Analysis.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Describe the fundamental concepts of composite Materials.

CO2: Analyze the composite materials by micro and macro mechanics analysis.

CO3: Analyze the laminated plates of composites.

CO4: Examine the sandwich constructions.

CO5: Classify the fabrication process.

TEXT BOOKS:

1. Calcote, L R "The Analysis of Composite Structures" Von- Noastrand Reinhold company, New York 1991.
2. Jones, R.M, "Mechanics of Composite Materials" Mc Graw-Hill Kogakusha Ltd, Tokyo, 1915.
3. B.D. Agarwal and L.J. Broutman, Analysis and Performance of Fibre Composites, 3rd Revised edition, John Wiley & Sons, 28 July 2006.

REFERENCE BOOKS:

1. Krishan K. Chawla, "Composite Materials: Science and Engineering", Springer; 3rd ed. 2012, Corr. 2nd printing 2013 edition (27 September 2012).
2. Cindy Foreman, "Advanced Composites", Avotek Information Resources (16 December 2016).
3. Autar K. Kaw, "Mechanics of Composite Materials", 2nd Edition, CRC Press Taylor & Francis Group, 2006.

WEB LINKS:

1. https://youtu.be/0kB0G6WKhKE
2. https://youtu.be/2uCzruEduDs
3. https://youtu.be/3JpXWhHdsdM

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

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

AIRFRAME LAB

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:

The objective of this course is to develop practical skills, hand-on experience and professional understanding of airplane's airframe construction, design, repair and maintenance.

Exp no	EXPERIMENTS	Number of Hours
1	Identifying aircraft reference lines, station and zone numbers	4
2	Identification of major structural members of fixed wing aircraft. Loads on major structural members.	4
3	Identification of detail structural members of aircraft and loads acting on these structural members	4
4	Aircraft structure construction	4
5	Aircraft structural assembly, joints and lightning protection	4
6	Identification of components of flight control surfaces and methods of mass balancing	4
7	Control surface, landing gear and engine attachment	4
8	Identification of type of Fuselage and method of pressure sealing Identification of Pressure bulkheads and unpressurised bulkheads	4
9	Common structural defects, simple inspection technique and recording	4
10	Types of rivets, defects, inspection of riveted joints and structure	4
11	Construction (Modeling) of various types structural joints	4
12	Check aircraft symmetry	4

COURSE OUTCOMES:

On completion of the course students will be able to

CO1: Examine the aircraft structural repairs by means of testing riveted joint.

CO2: Identify the component of flight control services.

CO3: Design and construct aircraft structure

CO4: Identify pressurized bulkheads and unpressurised bulkheads

CO5: Examine aircraft symmetry.

REFERENCES:

1. Airframe & Powerplant Mechanics (General Handbook EA-AC 65-9A) FAA.
2. Jeppesen, "A&P Technician Airframe Textbook", Jeppesen Sanderson; Illustrated edition (30 May 2003).
3. Airframe and Powerplant Mechanics (AC 65-15A) -Airframe Hand Book FAA
4. Aviation Maintenance Technician Hand book by FAA.
5. Aircraft structure Ch. 01 (FAA)
6. AC 43.13-1B - Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair
7. EASA-part-66-module-13, Aircraft tech book co.

AIRCRAFT SIMULATOR LAB

Laboratory Code		IA Marks		40	
Number of Practical Hours/Week	3	Exam Marks		60	
Total Number of Practical Hours	36	L	T	P	C
Credits	2	0	0	4	2

COURSE OBJECTIVES:

This course aims to completely substitute for actual flight training but to thoroughly familiarize students with the vehicle concerned before they undergo expensive and possibly dangerous actual flight training.

Exp no	EXPERIMENTS	Number of Hours
1	Introductory Flight	3
2	Four Fundamentals of the flight	3
3	Integrated Flight Instruction	3
4	Slow Flight and Stall Recovery	3
5	Emergency procedures	3
6	Steep Turns and Ground Reference Maneuvers	3
7	Traffic Pattern Review	3
8	Pre solo Review	3
9	First Solo check	3
10	Performance Take offs and Landings	3
11	Solo Practice	3
12	Navigation	3

COURSE OUTCOMES:

On completion of the course students will be able to

CO1: Explain the four fundamental forces of the flight.

CO2: Describe integrated flight instruction.

CO3: Perform the Steep turns and ground reference maneuvers.

CO4: Perform take offs and Landings.

CO5: Perform the Solo check.

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

AIR REGULATION

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**	**10 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**	**10 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**	**20 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**	**20 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**	**10 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:

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

LIST OF DISCIPLINE SPECIFIC ELECTIVES

AERO ENGINE MAINTENANCE AND REPAIR

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:

Students undergoing this course are expected to learn the maintenance aspect and testing procedure of gas turbine engine.

UNIT I	**CLASSIFICATION OF PISTON ENGINE COMPONENTS**	**12 Hours**

Types of piston engines-principles of operation-function of components-materials used-details of starting the engines-details of carburetion and injection systems for small and large engines-ignition system components-spark plug details-Engine operating conditioned at various altitudes-maintenance and inspection check to be carried out.

UNIT II	**INSPECTION OF PISTON ENGINES**	**12 Hours**

Inspection and maintenance and troubleshooting-inspection of all engine components-Daily and routine checks-overhaul procedure-compression testing of cylinders-special inspection schedules-engine fuel, control and exhaust systems-engine mount and super charger-checks and inspection procedure.

UNIT III	**FAULT DIAGNOSTICS OF PISTON ENGINES**	**12 Hours**

Symptoms of failure-fault diagnostics-case studies of different engine systems: tools and equipment for replacement of park and their repair. Engine testing: engine testing procedures and schedule preparation-online maintenance.

UNIT IV	**CLASSIFICATION OF JET ENGINE COMPONENTS**	**12 Hours**

12 types of jet engines-principles of operation-functions of components-materials used-details of starting and operating procedure-gas turbine engine inspection & checks-use of instruments-etc. Maintenance procedure of gas turbine engines-trouble shooting and rectification procedure-component maintenance procedures-systems maintenance procedure. Gas turbine testing procedures-test schedule preparation-storage of engines-preservation and de-preservation procedures.

UNIT V	**OVERHAUL PROCEDURES**	**12 Hours**

Engine Overhaul Procedures-Inspections and Cleaning of Components-Repair Schedules for Overhaul-Balancing of Gas Turbine Components. Trouble Shooting-Procedures for Rectification-Condition Monitoring of The Engine on Ground and At Altitude-Engine Health Monitoring and Corrective Methods.

COURSE OUTCOMES:

After the course the students are expected to be able to

CO1: Explain the classification of piston engine components.

CO2: Illustrate the usage of inspection and maintenance tools.

CO3: Explain the engine testing procedures.

CO4: Describe about the inspection of engine components.

CO5: Illustrate overhauling procedure of aero engine.

TEXT BOOKS:

1. KROES & WILD," Aircraft Power Palnts",7th Edition-McGraw Hill, York, 1994.
2. Dale Crane, "Aviation Maintenance Technician: Powerplant", Aviation Supplies & Academics Inc, September 2011.

REFERENCE BOOKS:

3. Michael Kroes, William Watkins, Frank Delp, Ronald Sterkenburg, "Aircraft Maintenance and Repair", 7th Edition, McGraw-Hill Education, 16 May 2013.
4. Shevantha K. Weerasekera, "Introduction to Maintenance, Repair and Overhaul of Aircraft, Engines and Components", SAE International (30 December 2020).
5. Rumman Akhtar, "Jet Engine Maintenance Techniques", 21 May 2021.
6. Gas Turbine Engines for Aircraft Maintenance EASA Module 15.

WEB LINKS:

11. https://www.studocu.com/in/document/anna-university/be/aero-engine-maintenance-and-repair-notes-1/7926719
12. https://youtu.be/OYVyRTiQTgs
13. https://youtu.be/npQ-JU4_W9g
14. http://www.bits.de/NRANEU/others/amd-us-archive/FM1-506%281990%29.pdf

AIRCRAFT STRUCTURES

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:

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:

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:

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

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:

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

AIRPORT AND AIRLINE GROUND 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	04	3	1	0	4

COURSE OBJECTIVES:

The course aims to educate students on Passenger handling, cargo handling, airport/ aircraft security, Load control, airside safety and deicing operations.

UNIT I	**PASSENGER HANDLING PROCEDURES**	**12 Hours**

Passenger departure check in and boarding, passenger security, passenger arrival and transit, special categories of passenger, passenger documentation, passenger irregularities, transport of animals, condition of carriage, conduct of customer services, FBO/GSP longue requirements.

UNIT II	**BAGGAGE HANDLING PROCEDURES**	**12 Hours**

Baggage discrepancies, hold baggage acceptance, hold baggage prohibited items, baggage reconciliation, cabin baggage- prohibited items, baggage security, mishandled baggage, and dangerous goods. Aircraft handling procedures – general requirements, ramp safety in aircraft handling, portable water servicing, fueling, defueling- firefighting, adverse weather condition, safety cones, chocks and aircraft & GSE. Hand signals, aircraft arrivals, doors, aircraft loadings, a/c departure, a/c towing and pushing a/c hangar parking and maneuvers, FOD & ramp cleaning, air side driving safety, aircraft parking.

UNIT III	**LOAD CONTROL & DISPATCH**	**12 Hours**

Load control principles, regulatory requirements, load control process, aircraft dispatch and turn around procedures, the aircraft dispatch process, flight documents.

UNIT IV	**AIRSIDE SAFETY**	**12 Hours**

Airside safety –operational oversight General, airside safety and operational oversight, supervision scope, ramp supervision requirements, precision time schedules. Health safety and environment. Introduction, lifting and lowering, aircraft cabin cleaning, pandemics and epidemics- hazards, hearing loss hazards, stress hazards, alcohol, drugs and psychoactive substances hazards, fuel handling hazards, first aid.

UNIT V	DE- ICING & WINTER OPERATIONS & SECURITY DESCRIPTION	12 Hours

De- icing & winter operations & security Description, de- icing fluids, general precaution during winter ops, anti- icing definitions, anti-icing application, de- icing applications, post de-icing checks, fluid-data concentration tables, hold over time, Aircraft security, security threats, potentially disruptive/ unruly passengers, reporting to local law enforcement/police.

COURSE OUTCOMES:

CO1: Illustrate the concept of passenger facilitation.

CO2: Illustrate the importance of baggage and check in procedure.

CO3: Discuss about the load control and dispatch.

CO4: Explain the airside safety.

CO5: Describe the concept of de-icing and winter operations and security.

TEXT BOOKS:

1. IATA Ground Operations Manual (IGOM).
2. IATA Airport Handling Manual (AHM)
3. Subash S Narayanan, “Aircraft Ground Handling”, Austin Macauley (31 May 2019).
4. Norman Ashford, Pierre Coutu, John Beasley, “Airport Operations”, McGraw-Hill Education, 3rd Edition, 2012.

REFERENCE BOOKS:

1. Norman J. Ashford, H. P. Martin Stanton, Clifton A. Moore, Pierre Coutu, A.A.E., Ed.D., John R. Beasley, “Airport Operations”, 3rd Edition, McGraw-Hill Education, 2013.
2. Jeffrey Price, Jeffrey Forrest, “Practical Airport Operations, Safety, and Emergency Management”, Elsevier Science, 2016.
3. Gert Meijer, “Fundamentals of Aviation Operations”, Routledge, 2020.

WEB LINKS:

1. https://www.skybrary.aero/index.php/Ground_Operations
2. https://www.sciencedirect.com/science/article/pii/S0968090X21001480
3. https://www.youtube.com/watch?v=zuijZHpPNCk

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/

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	4	0	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

AVIATION LEGISLATION

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	04	4	0	0	4

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: Explain the concepts and rules of international air law;

CO2: Analyze the relevance of the rules and procedures of international air law for their own role and functions in their organization; and

CO3: Apply their knowledge and understanding to assist their national administration in improving implementation.

CO4: Illustrated parts catalogue.

CO5: List the airworthiness limitations items (ALI)

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

WEB LINKS:

1. https://en.wikipedia.org/wiki/Aviation_law#:~:text=Aviation%20law%20is%20the%20branch%20of%20law%20that,law%20due%20to%20the%20nature%20of%20air%20travel.
2. https://youtu.be/vtsR1Jdwse4
3. https://iclg.com/practice-areas/aviation-laws-and-regulations/usa

AIRCRAFT MAINTENANCE PRACTICES

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	04	4	0	0	4

COURSE OBJECTIVES:

The objective of this course is to enable students to demonstrate competence in working effectively and safely in an aircraft maintenance organization. The course includes an introduction to Safety Precautions for aircraft and workshops; basic understanding of First Aid at work; the safe use, care and control of tools; standards of workmanship; use of workshop materials, lubrication equipment and methods; precision measuring tools.

UNIT I	**SAFETY PRECAUTIONS-AIRCRAFT & WORKSHOP, WORKSHOP PRACTICES, TOOLS**	**15 Hours**

Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals; Instructions on the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents. Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards. Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods. Operation, function and use of electrical general test equipment

UNIT II	**ENGINEERING DRAWINGS, DIAGRAMS AND STANDARDS, TYPES OF CORROSION**	**15 Hours**

Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information; Microfilm, microfiche and computerized presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams. Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist and wear; Standard methods for checking shafts, bearings and other parts. Chemical fundamentals; Formation by, galvanic action process, microbiological stress. Types of corrosion and their identification; Causes of corrosion; Material types, susceptibility to corrosion.

UNIT III	**WELDING, BRAZING, SOLDERING AND BONDING,**	**15 Hours**

	MAINTENANCE PROCEDURES	
Soldering methods; inspection of soldered joints. Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints. Types of defects and visual inspection techniques. Corrosion removal, assessment and re-protection. General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programs. Non-destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and borescope methods. Disassembly and re-assembly techniques. Trouble shooting techniques. Maintenance planning; Modification procedures; Stores procedures; Certification/release procedures; Interface with aircraft operation; Maintenance Inspection/Quality Control/Quality Assurance; Additional maintenance procedures; Control of life limited components		
UNIT IV	**BEARINGS, TRANSMISSION, CONTROL CABLES**	**15 Hours**
Purpose of bearings, loads, material, construction; Types of bearings and their application. Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes. Gear types and their application; Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns; Belts and pulleys, chains and sprockets. Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems.		
UNIT V	**PIPES AND UNIONS, HOSES, SPRINGS**	**15 Hours**
Identification of, and types of rigid and flexible pipes and their connectors used in aircraft. Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes. Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes. Types of springs, materials, characteristics and applications. Inspection and testing of springs.		
COURSE OUTCOMES:		
The students should be able to understand CO1: Explain the Safety precautions-aircraft & workshop, workshop practices, tools. CO2: Demonstrate Engineering drawings, diagrams and standards, types of corrosion. CO3: Illustrate the Welding, brazing, soldering and bonding, maintenance procedures. CO4: Identify the defects in Bearings, transmission, control cables CO5: Inspect the aircraft Pipes and unions, hoses, springs.		
TEXT BOOKS:		
1. Airframe and Powerplant Mechanics (AC 65-15A)-Airframe Hand Book FAA		

2. Civil Aircraft Inspection Procedure (CAP 459) Part II Aircraft
3. Michael Kroes, William Watkins, Frank Delp and Ronald Sterkenburg, "Aircraft Maintenance and Repair", McGraw-Hill Education, 7th Edition, 2013.

REFERENCE BOOKS:

1. Acceptable Methods, Techniques and practices (FAA)-EA-AC 43.13-1 A&2A
2. Aviation Maintenance Technician Hand book by FAA

WEB LINKS:

1. https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.ksu.lt/wp-content/uploads/2017/06/M7-vol-1-Selected-pages-Maintenance-Practices.pdf&ved=2ahUKEwikm-yTqpfyAhUOyzgGHaARDHEQFnoECBgQAg&usg=AOvVaw0tVIIFXgrkr7I8RMTdgJlI
2. https://www.google.com/url?sa=t&source=web&rct=j&url=https://m.youtube.com/watch%3Fv%3D3eI8xEOKsq0&ved=2ahUKEwiPyKHOqpfyAhXOF4gKHRANDdwQo7QBegQIChAE&usg=AOvVaw3NIIKq13ejIB_Qd0u1kwIt
3. https://www.slideshare.net/gauravgarv5205/maintenacne-practices-introduction

DANGEROUS GOODS AND CARGO

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:

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

RADIO TELEPHONY RESTRICTED

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:

Upon completion of this course, Students will be able to:

- Explain the origin and purpose of ICAO Aviation Radio Telephony communications, related legal instruments etc
- Communicate company messages/data effectively on VHF and HF radios
- Communicate relevant meteorological information and other data of safety importance to aircraft stations
- Understand aviation phrases and terminologies.

UNIT I	**Aeronautical 'Q' Code Signals**	**12 Hours**

General and Aeronautical 'Q' Code Signals and other abbreviations of International Civil Aviation Organization. Radio telephone Communication procedures and radio telephone communication procedure for distress urgency and direction finding.

UNIT II	**Procedures for distress communication**	**12 Hours**

Procedures for distress communication in Maritime Mobile Service. Words and figures spelling used in radio telephone.

UNIT III	**Operation of radio apparatus in aircraft**	**12 Hours**

Licensing requirements of installation and operation of radio apparatus used in aircraft. Minimum requirement of radio equipment to be carried on aircraft of the International Civil Aviation Organization and Civil Aviation Authority in India.

UNIT IV	**Radio Communication**	**12 Hours**

Flight Information Regions in India and main Radio Communication and Navigation facilities available together with principal frequencies to be used for communication and navigation within India. Meteorological codes, pre-flight briefing services and their usages.

UNIT V	**Notices to Airmen**	**12 Hours**

Knowledge of notices to airmen issued by the Civil Aviation Authorities in India as applicable to the Aeronautical mobile and Air traffic Control Services.

COURSE OUTCOMES:

CO1: List Aviation Alphabets and phonetics

CO2: Demonstrate the ability to deliver various operational messages.

CO3: Participate and show satisfactory ability to communicate with pilots and other radio stations.

CO4: Demonstrate how to deliver Traffic Information.

CO5: Demonstrate how to communicate effectively during emergencies

TEXT BOOKS:

1. wg. Cdr. R.K. Bali, "AVIATION RADIOTELEPHONY MANUAL", Sterling Book House (1 January 2020).
2. Trevor Thom, "Air Pilot's Manual: Radiotelephony", Airlife Publishing Ltd (August 1, 1998).

REFERENCE BOOKS:

1. OXFORD Radiotelephony, CAE Oxford Aviation Academy 2014.
2. R.P. Kashyap, Rajni Kashyap, "GUIDE TO RTR (A) LICENCE RADIO TELEPHONY RESTRICTED (AERONAUTICAL)", Himalayan Books, 2007.

WEB LINKS:

1. https://www.skybrary.aero/bookshelf/books/249.pdf
2. https://www.youtube.com/watch?v=2aK1HXgXrdg
3. https://www.youtube.com/watch?v=pekW6luD7FM
4. https://kupdf.net/downloadFile/59cf976308bbc5745a686fc3?preview=1
5. https://files.fpz.hr/Djelatnici/ifrancetic/Radiotelephony-communications-1-handbook.pdf

COMPUTER AIDED DESIGN 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 make the students understand and interpret drawings of machine components.
- To prepare assembly drawings both manually and using standard CAD packages.
- To familiarize the students with Indian Standards on drawing practices and standard components.
- To gain practical experience in handling 2D drafting and 3D modeling software systems.

Exp no	EXPERIMENTS	Number of Hours
1	Navigating Auto CAD mechanical interface	3
2	Structure re using and editing mechanical data	3
3	Managing layers and object properties	3
4	Adding centerlines and holes	3
5	Creating key geometry	3
6	Annotating parts and sub-assemblies	3
7	Creation of templates and data	3
8	Placement of dimensions	3

COURSE OUTCOMES:

CO1: Apply principles of technical drawings to create different 3D models.

CO2: Use the appropriate tools to edit the mechanical data for the design.

CO3: Annotate Parts and Sub-assemblies

CO4: Create 3D assemblies that represent static or dynamic Mechanical Systems.

CO5: Analyze technical drawings using both CAD and basic manual tools.

REFERENCES:

1. https://www.youtube.com/watch?v=EgKc9L7cbKc
2. https://www.youtube.com/channel/UCpTi5sLZXyYVnQEyqM-2Kig
3. https://www.youtube.com/user/caddsoftsolutions
4. https://wiki.auckland.ac.nz/download/attachments/31851381/AutoCAD+Tutorial+002.pdf
5. Bill Fane, “AutoCAD For Dummies”, John Wiley & Sons, ohn Wiley & Sons; 17th edition (29 July 2016).

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

COMPUTER AIDED ANALYSIS 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 give exposure to software tools needed to analyze engineering problems.
- To expose the students to different applications of simulation and analysis tools.

Exp no	EXPERIMENTS	Number of Hours
1	Stress analysis of a plate with a circular hole.	4
2	Stress analysis of rectangular L bracket	4
3	Stress analysis of an axi-symmetric component	4
4	Stress analysis of beams (Cantilever, Simply supported, Fixed ends)	4
5	Mode frequency analysis of a 2 D component	4
6	Mode frequency analysis of beams (Cantilever, simply supported, Fixed ends)	4
7	Harmonic analysis of a 2D component	4
8	Thermal stress analysis of a 2D component	4
9	Conductive heat transfer analysis of a 2D component	4
10	Convective heat transfer analysis of a 2D component	4

COURSE OUTCOMES:

On completion of the course students will be able to

CO1: Understand and solve simple problems in vibration using ANSYS.

CO2: Analyze mechanism simulation using Multibody Dynamic software

CO3: Solve stress analysis problems of link elements in Trusses, cables, beams, flat plates, simple shells and axi – symmetric components.

CO4: Solve thermal stress and heat transfer analysis of plates, cylindrical shells.

CO5: Examine the model analysis of beams and harmonic, transient and spectrum analysis of simple systems.

REFERENCES:

1. https://www.ansys.com/en-in
2. https://www.youtube.com/watch?v=CTi1ru-pfi0
3. https://www.youtube.com/channel/UCYbrTXmBgpr4lOiVjDhJSvg
4. https://www.youtube.com/watch?v=4RwtbDv2II4&t=5s
5. https://www.youtube.com/channel/UCZLqJ2c2xJUB9HDeT2VjGsQ

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.

SKILL ENHANCEMENT COURSES

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

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:

1. Khanna, Sri Ram, SavitaHanspal, Sheetal Kapoor, and H.K. Awasthi, “Consumer Affairs”, Universities Press, 3rd edition, 2007
2. Choudhary, Ram Naresh Prasad, “Consumer Protection Law Provisions and Procedure”, Deep and Deep Publications Pvt Ltd, 2nd edition, 2005.

REFERENCE BOOKS:

1. G. Ganesan and M. Sumathy, “Globalisation and Consumerism: Issues and Challenges”, Regal Publications,5th edition, 2012

2. Suresh Misra and Sapna Chadah, “Consumer Protection in India: Issues and Concerns”, IIPA, New Delhi, 3rd edition, 2012.
3. 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/**