ALAGAPPA UNIVERSITY

(Accredited with A+ Grade by NAAC (CGPA: 3.64) in the Third Cycle,
Graded as Category-I University and granted autonomy by MHRD-UGC)

DIRECTORATE OF COLLABORATIVE PROGRAMMES

B.Sc. (Aeronautical Science)

Regulations and Syllabus

[For those who join the Course in July 2023 and after]

CHOICE BASED CREDIT SYSTEM

GENERAL INSTRUCTIONS AND REGULATIONS

B.Sc Aeronautical Science conducted by Alagappa University, Karaikudi, Tamil Nadu through its Collaborative Institution **Nehru College of Aeronautics and Applied Sciences** at Kuniamuthur, Coimbatore.

Applicable to all the candidates admitted from the academic year **2023** onwards.

1. **Eligibility:**
   A pass in the Higher Secondary Examination (HSC) or an examination accepted as equivalent thereto by the Syndicate. Candidate for admission to **B.Sc Aeronautical Science** shall be required to **have passed qualifying examination** with Physics, Chemistry and Mathematics (PCM).

2. **For the Degree:**
   The candidates shall have subsequently undergone the prescribed programme of study in a institute for not less than three academic years, passed the examinations prescribed and fulfil such conditions as have been prescribed therefore.

3. **Admission:**
   Admission is based on the marks in the qualifying examination.

4. **Duration of the course:**
   The course shall extend over a period of **Three years** under semester pattern accounting to six semesters.

5. **Standard of Passing and Award of Division:**
   a. Students shall have a minimum of 40% of total marks of the University examinations in each subject. The overall passing minimum is 40% both in aggregate of Continuous Internal Assessment and external in each subject.
   b. The minimum marks for passing in each theory / Lab course shall be 40% of the marks prescribed for the paper/lab.
   c. A candidate who secures 40% or more marks but less than 50% of the aggregate marks prescribed for three years taken together, shall be awarded **THIRD CLASS.**
   d. A candidate who secures 40% or more marks but less than 60% of the aggregate marks prescribed for three years taken together, shall be awarded **SECOND CLASS.**
   e. A candidate who secures 60% or more of the aggregate marks prescribed for three years taken together, shall be awarded **FIRST CLASS.**
   f. Only Part-III subjects were considered for the ranking.
   g. The Practical/ Project shall be assessed by the two examiners, by an internal examiner and an external examiner.

6. **Continuous internal Assessment:**
   a. Continuous Internal Assessment for each paper shall be by means of Written Tests, Assignments, Class tests and Seminars
   b. **25 marks** allotted for the Continuous Internal assessment is distributed for Written Test, Assignment, Class test and Seminars.
   c. Two Internal Tests of 2 hours duration may be conducted during the semester for each course / subject and the best marks may be considered and one Model Examination will be conducted at the end of the semester prior to University examination. Students may be asked to submit at least five assignments in each subject. They should also participate in Seminars conducted for each subject and marks allocated accordingly.
   d. Conduct of the continuous internal assessment shall be the responsibility of the concerned faculty.
   e. The continuous internal assessment marks are to be submitted to the University at the end of every year.
   f. The valued answer papers /assignments should be given to the students after the valuation is over and they should be asked to check up and satisfy themselves about the marks they have scored.
   g. All mark lists and other records connected with the continuous internal assessments should be in the safe custody of the institution for at least one year after the assessment.

7. **Attendance:**
   a. Students must have earned 75% of attendance in each course for appearing for the examination.
   b. Students who have earned 74% to 70% of attendance to be applied for condonation in the prescribed form with the prescribed fee.
   c. Students who have earned 69% to 60% of attendance to be applied for condonation in the prescribed form with the prescribed fee along with the medical certificate.
   d. Students who have below 60% of attendance are not eligible to appear for the examination. They shall re-do the semester (s) after completion of the programme.

8. **Examination:**
   Candidate must complete course duration to appear for the university examination. Examination will be conducted with concurrence of Controller of Examinations as per the Alagappa University regulations. **University may send the representatives as the observer during examinations.** University Examination will be held at the end of the each semester for duration of 3 hours for each subject. Certificate will be issued as per the AU regulations. **Hall ticket will be issued to the 1st year candidates and upon submission of the list of enrolled students along with the prescribed course fee subsequent 2nd and 3rd year hall tickets will be issued.**

9. Question Paper pattern:

Theory – Maximum 75 marks

Section A	10 questions. All questions carry equal marks. (Objective- type questions)	10 x1= 10	10 questions – 2 each from every unit.
Section B	5 questions. Either/ or type like 1.a (or) b. All questions carry equal marks and each answer should not exceed one page or 250 words.	5 x 5= 25	5 questions – 1 each from every unit.
Section C	Essay type questions. Either/ or type like 1.a (or) b. All questions carry equal marks and each answer should not exceed two page.	5 x 8= 40	Should cover all units.

10. Miscellaneous

a. Each student posses the prescribed text books for the subject and the workshop tools as required for theory and practical classes.
b. Each student is issued with an identity card by the University to identify his /her admission to the course
c. Students are provided library and internet facilities for development of their studies.
d. Students are to maintain the record of practical's conducted in the respective laboratory in a separate Practical Record Book and the same will have to be presented for review by the University examiner.
e. Students who successful complete the course within the stipulated period will be awarded the degree by the University.

11. Fee structure

Course fee shall be as prescribed by the University and 50% of the course fee should be disbursed to University. Special fees and other fees shall be as prescribed by the Institution and the fees structure must intimated to the University. Course fees should be only by Demand draft / NEFT and A U has right to revise the fees accordingly.

12. Other Regulations:

Besides the above, the common regulation of the University shall also be applicableto this programme.

13. Other Regulations:

Besides the above, the common regulation of the University shall also be applicabletothis programme.

Department of B.Sc. Aeronautical Science

VISION:

- To be the leader in aeronautical Science through quality education and Training in emerging areas with a high degree of interpersonal skills and ethical responsibilities.
- To provide Aeronautical Education with nationally and internationally accepted qualifications by considering contemporary educational culture and values,
- To attain excellence and a global reputation in Aeronautical Education and Training.

MISSION:

- Prepare the students to have very good fundamental knowledge to meet the present and future needs of industries.
- Improve the technical knowledge of the students in tune with the current requirements through collaboration with industries and Training organizations.
- Make the students gain enough knowledge in various aspects of system integration.
- Motivate the students to take up jobs in national laboratories, aircraft manufacturing industries, aerospace industries, airline industries, MRO, AMO, Technical publication companies, and all other Aviation related and allied industries of our country.

GRADUATE ATTRIBUTES:

1. Graduates will demonstrate a comprehensive understanding of aircraft systems, structures, and components, showcasing their ability to perform maintenance, repairs, and inspections with a high level of technical expertise.
2. Graduates will exhibit strong analytical skills, enabling them to identify, diagnose, and resolve complex issues within aircraft systems, fostering a safe and efficient operational environment.
3. Graduates will prioritize safety above all else, adhering to industry standards, regulations, and best practices to ensure the highest level of aviation safety for passengers, crew, and aircraft.
4. Graduates will effectively communicate with team members, engineers, and other stakeholders, both verbally and in writing, to relay technical information and collaborate on maintenance tasks.
5. Graduates will exhibit leadership qualities by taking initiative, mentoring junior colleagues, and leading by example, thereby contributing to the professional growth of the aircraft maintenance industry.

P.E.O- Programme Education Objectives.

PEO 1 To acquire knowledge in Aeronautical Science and to work towards solving complex problems to excel in the professional career.

PEO 2 To Work effectively as an individual and as a team member with professional ethics, social and environmental concerns.

PEO 3 To provide exposure to the advancements in aeronautical science and Training and related fields.

PEO 4 To gain competence and confidence to handle problems in theoretical and experimental aspects of various domains of aeronautical Science

PEO 5 To continue their professional development by utilizing educational and career-building opportunities through their employer, educational institutions, or professional bodies.

P.S.O-Programme Specific Objectives

PSO 1 To cultivate a high level of technical competence in aircraft maintenance procedures, encompassing inspection, repair, and servicing protocols. Acquire hands-on skills in utilizing advanced tools, equipment, and software relevant to the field, fostering the ability to diagnose, rectify, and prevent mechanical issues.

PSO 2 To demonstrate a meticulous understanding of aviation regulations and safety standards, including those outlined by aviation authorities such as FAA, EASA, and ICAO. Learn to apply these regulations rigorously in maintenance operations, ensuring a safe operating environment for aircraft and personnel.

PSO 3 To enhance critical thinking abilities by systematically approaching complex maintenance challenges. Acquire the capability to analyze symptoms, identify root causes, and formulate effective solutions in real-time scenarios, considering safety, efficiency, and regulatory aspects.

PSO 4 To foster the ability to collaborate effectively within maintenance teams, acknowledging diverse perspectives and harnessing collective strengths to achieve common goals. Additionally, develop leadership traits that can guide and inspire teams toward efficient and safe aircraft maintenance practices.

PSO 5 To cultivate a comprehensive awareness of the broader aviation industry, including its stakeholders, emerging technologies, and market trends. Develop networking skills to establish meaningful connections within the aviation community, opening doors to potential career opportunities and collaborations.

Program Outcome (POs)

On successful completion of B.Sc. (Aeronautical Science) program:

PO 1 Students will develop a deep understanding of aircraft systems, encompassing avionics, power plants, structures, and control systems, enabling students to comprehend the intricacies of aviation technology.

PO 2 Students will Identify, formulate, review, and analyze complex engineering problems using the first principles of mathematics, and synthesis the information to provide valid conclusion.

PO 3 Students will design solutions for complex aircraft problems related to diagnose complex aviation issues and make informed decisions quickly, minimizing downtime and ensuring flight safety that meet the specified needs with appropriate consideration for public health and safety and the cultural societal and environmental consideration.

PO 4 Students will engage in investigations of complex problems including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

PO 5 Students will be aware of the emerging technologies used in aircraft to Create, Select, and apply appropriate techniques, resources, and IT tools including prediction and modeling in the field of Aeronautical Science.

PO 6 Students will apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional Aeronautical Science practice.

PO 7 Students will understand the impact of Aeronautical solutions in societal and environmental contexts and demonstrate the knowledge in need for sustainable development.

PO 8 Foster a strong sense of ethics, integrity, and professionalism, emphasizing the importance of responsible conduct and ethical decision-making within the aviation industry.

PO 9 Cultivate the ability to work collaboratively within diverse teams of aviation professionals, promoting effective communication, leadership, and teamwork skills.

PO 10 Students will communicate their thoughts and ideas in writing effective reports and design documentation, making effective presentations, and giving and receiving clear instructions.

PO 11 Students will demonstrate knowledge and understanding of Aeronautical Science and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.

PO 12 Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

P.S.O-Program Specific Outcome

After the successful completion of B.Sc. in Aeronautical Science programme, the students are expectedto:

PSO 1 Utilize the knowledge of Aeronautical Science in innovative, dynamic, and challenging environments for the design and development of new products.

PSO 2 Use the software package in the design, manufacturing, testing, and maintenance of aeronautical-based components and systems.

PSO 3 To work as a team member will be a main requirement in an industry or in any business enterprise. and also play a role in the success of the organization.

PSO 4 To undertake research in the areas of aircraft maintenance, design requirements of aircraft, aero engine and demonstrate professional acumen in the development of aeronautical science.

PSO 5 To exhibit professionalism in their chosen profession and adapt to current trends, technologies and industrial scenarios.

B.Sc. (Aeronautical Science) Programme
Structure

Part	Course Code	Name	T/P	Cr.	Hrs./ Week	Marks		Total
						Int.	Ext.	
SEMESTER-I								
I	11811T/11H/11F/11M/TU/A/S	**Part I -** Tamil / Other Languages-I	T	3	3	25	75	100
II	11812	**Part –II –** General English-I	T	3	3	25	75	100
III	11813	Workshop Practices	T	5	5	25	75	100
	11814	Work Shop Practices, Engineering Graphics and Machine Drawing – Practical	P	4	8	25	75	100
	11815	Aviation Mathematics	T	3	3	25	75	100
	11816	Computer Lab	P	2	4	25	75	100
IV	11817	**Value Education**	T	2	2	25	75	100
		Library			2	--	--	
		Total		**22**	**30**	**175**	**525**	**700**
SEMESTER-II								
I	11821T/H/F/M/TU/A/S	**Part I -** Tamil / Other Languages-II	T	3	3	25	75	100
II	11822	**Part –II –** General English-II	T	3	3	25	75	100
III	11823	Aircraft Basics Electricity & Electronics	T	5	5	25	75	100
	11824	Aircraft Basics Electricity & Electronics Lab – Practical	P	4	8	25	75	100
	11825	Applied Mechanics	T	3	3	25	75	100
	11826	Auto CAD Lab – Practical	P	2	4	25	75	100
IV	11827	**Environmental Studies**	T	2	2	25	75	100
		Library			2	--	--	--
		Total		**22**	**30**	**175**	**525**	**700**

SEMESTER-III								
I	11831T/H/F/TU/M/A/S	**Part I -** Tamil / Other Languages-III	T	3	3	25	75	100
II	11832	**Part –II –** General English-III	T	3	3	25	75	100
III	11833	Basic Aerodynamics	T	3	4	25	75	100
	11834	Aircraft Construction & Systems	T	3	3	25	75	100
	11835	Aerodynamics and Aircraft Construction Lab – Practical	P	3	6	25	75	100
	11836	Fluid Mechanics & Hydraulic Machines	T	3	3	25	75	100
	11837	NDT Lab	P	2	4	25	75	100
IV	11838	Entrepreneurship	T	2	2	25	75	100
	11839A	Adipadai Tamil (for non tamil students compulsory)	P	2	2	25	75	100
	11839B	Advance Tamil	T					
	11839C	IT Skill for Employment	T					
	Optional	1. Self learning course - MOOC'S	T	Extra credit				
		Total		**24**	**30**	**225**	**675**	**900**
SEMESTE-IV								
I	11841T/H/F/M/TU/A/S	**Part I -** Tamil / Other Languages-IV	T	3	3	25	75	100
II	11842	**Part –II –** General English-IV	T	3	3	25	75	100
III	11843	Aircraft Instruments	T	4	4	25	75	100
	11844	Aircraft Rules and Airworthiness Regulations	T	4	4	25	75	100
	11845	Aircraft Materials &Strength Of Material Lab– Practical	P	3	6	25	75	100
	11846	Aero Engineering Thermodynamics	T	3	4	25	75	100
	11847	Software Multi-Sim Lab - Practical	P	2	4	25	75	100
IV	11848A	Adipadai Tamil (for non tamil students compulsory)	P	2	2	25	75	100
	11848B	Advance Tamil	T					
	11848C	Small Business Management	T					
	Optional	Self learning course - MOOC'S	T	Extra credit				
				24	**30**	**200**	**600**	**800**

SEMESTER-V								
III	11851	Piston Engine and Propeller	T	4	4	25	75	100
	11852	Gas Turbine Engine	T	4	4	25	75	100
	11853A 11853B 11853C	**Elective– I** i)Basics of Aviation Industry ii) Aircraft Communication and Navigation system iii) Additive Manufacturing	T	4	4	25	75	100
	11854A 11854B 11854C	**Elective II** i) Airport and Air Traffic Service ii) Air Cargo Management iii)Air Travel Management	T	4	4	25	75	100
	11855A 11855B 11855C	**Elective III** i)Helicopter Theory ii) Avionics iii)Wind Tunnel Technique	T	4	4	25	75	100
	11856	Aero Engine Laboratory	P	4	8	25	75	100
		Career Development/ Employability Skill			2	--	--	
		Total		**24**	**30**	**150**	**450**	**600**
SEMESTER-VI								
III	11861	Aircraft Maintenance, Ground Handling and Support Equipment.	T	4	4	25	75	100
	11862	Aero Engine Maintenance	T	4	4	25	75	100
	11863	Aircraft and Engine Maintenance Lab – Practical	P	4	8	25	75	100
	11864A 11864B 11864C	**Elective III** i) Industrial Management ii) Aircraft Maintenance Management iii)Human Values and Ethics	T	4	4	25	75	100
	11865A/ 11865B	Project/ Dissertation	PR/ D	8	10	25	75	100
Total				**24**	**30**	125	**375**	**500**
Grand Total				**140**	**180**	**1050**	**3150**	**4200**

I - Semester					
T/OL	**Course code: 11811F**	**FRENCH**	**T**	**Credits: 3**	**Hours: 3**
Course Objectives	1. Recall and remember the usage of grammatical tenses in constructingsentences in a dialogue. 2. Apply the learnt grammar rules in practice exercises to improve their understanding 3. Explain the nuances in the usage of various grammatical tenses and their aspects 4. Demonstrate knowledge of various expressions used to express opinions, emotions, cause, effect, purpose, and hypothesis in French 5. Communicate in French and summarize a given text				
Unit I	Salut ! Enchanté				**(9) Hours**
Unit II	J'adore				**(9) Hours**
Unit III	Tu veux bien ?				**(9) Hours**
Unit IV	On se voit quand ?				**(9) Hours**
Unit V	Bonne idée				**(9) Hours**
					Total : (45) Hours
References Régine Mérieux & Yves Loiseau, *Latitudes* -1- (A1 /A2), méthode defrançais, Didier, 2017 (units 1-6 only)					

Course Outcomes		**Knowledge level**
CO-1	Identify the basic French sentence structure	K1
CO-2	Define and describe the various grammatical tenses and use them to communicate in French	K2
CO-3	Examine the various documents presented and discuss and reply to the questions asked on it	K2 and K3
CO-4	Analyze and interpret expressions used to convey thecause, the effect, the purpose, and the opposition in French	K4
CO-5	Evaluate the grammatical nature present in passages	K5

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	S	M	M	L	S	M	L	S	S	M	S	M
CO 2	S	M	M	L	M	M	L	S	S	S	S	M
CO 3	M	S	S	M	M	M	L	M	M	M	S	M
CO 4	S	M	M	L	S	M	L	S	S	M	S	M
CO 5	S	M	M	L	M	M	L	S	S	S	S	M

S-Strong M-Medium L-Low

<table>
<tr><th colspan="6">I - Semester</th></tr>
<tr><td>E</td><td>Course code: 11812</td><td>GENERAL ENGLISH-I</td><td>T</td><td>Credits: 3</td><td>Hours: 3</td></tr>
<tr><td>Course Objectives</td><td colspan="5">To enable learners to acquire self awareness and positive thinking required in various life situations.
To help them acquire the attribute of empathy.
To assist them in acquiring creative and critical thinking abilities
To enable them to learn the basic grammar
To assist them in developing LSRW skills</td></tr>
<tr><td>Unit I</td><td colspan="5">SELF-AWARENESS(WHO)&POSITIVETHINKING(UNICEF) (9) Hours
Life Story
1.1 Chapter 1 from MalalaYousafzai, I am Malala
An Autobiography or The Story of My Experiments with Truth (Chapters 1, 2 & 3) M.K.Gandhi
Poem
Where the Mind is Without Fear – Gitanjali 35 – Rabindranath Tagore
Love Cycle – Chinua Achebe</td></tr>
<tr><td>Unit II</td><td colspan="5">EMPATHY (9) Hours
Poem
Nine Gold Medals – David Roth
Alice Fell or poverty – William Wordsworth
Short Story
The School for Sympathy – E.V. Lucas
Barn Burning – William Faulkner</td></tr>
<tr><td>Unit III</td><td colspan="5">CRITICAL & CREATIVE THINKING (9) Hours
Poem
The Things That Haven’t Been Done Before –Edgar Guest
Stopping by the Woods on a Snowy Evening –Robert Frost
Readers Theatre
The Magic Brocade – A Tale of China
Stories on Stage – Aaron Shepard (Three Sideway Stories from Wayside School”by LouisSachar)</td></tr>
<tr><td>Unit IV</td><td colspan="5">Part of Speech (9) Hours
Articles
Noun
Pronoun
Verb
Adverb
Adjective
Preposition</td></tr>
<tr><td>Unit V</td><td colspan="5">Paragraph and Essay Writing(9) Hours
Descriptive
Expository
Persuasive
Narrative
Reading Comprehension</td></tr>
<tr><td colspan="6">Total : (45) Hours</td></tr>
</table>

References

MalalaYousafzai. I am Malala, Little, Brown and Company, 2013.

M.K. Gandhi. An Autobiography or The Story of My Experiments with Truth(Chapter – I), Rupa Publications, 2011.

Rabindranath Tagore. "Gitanjali 35" from Gitanjali (Song Offerings): A Collection of Prose Translations Made by the Author from the Original Bengali.

MacMillan, 1913.N.Krishnasamy. Modern English: A Book of Grammar, Usage and Composition Macmillan,1975.

Aaron Shepard. Stories on Stage, Shepard Publications, 2017.

J.C. Nesfield. English Grammar Composition and Usage, Macmillan, 2019.

Course Outcomes		**Knowledge level**
CO-1	Acquire self-awareness and positive thinking required in various life situations	PO1, PO7
CO-2	Acquire the attribute of empathy.	PO1, PO2, PO10
CO-3	Acquire creative and critical thinking abilities.	PO4, PO6, PO9
CO-4	Learn basic grammar	PO4, PO5, PO6
CO-5	Development and integrate the use of four language skills i.e., listening, speaking, reading and writing.	PO3, PO8

Mapping with Programme Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	3	3
Weightage	15	15	15	15
Weighted percentage of Course Contribution to POS	3.0	3.0	3.0	3.0

3 – Strong, 2 – Medium, 1 - Low

<table>
<tr><th colspan="6">I - Semester</th></tr>
<tr><td rowspan="2">Core</td><td rowspan="2">Course code: 11813</td><td rowspan="2">WORKSHOP PRACTICES</td><td>T</td><td>Credits: 5</td><td>Hours: 5</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. To understand the importance of safety Precautions
2. To identify various types of Tools and Calibration of Equipment
3. To understand Precision Instruments and its uses
4. To evaluate the Fits Clearance for Drills
5. To understand the functioning of Lathe and Welding Machines</td></tr>
<tr><td>Unit I</td><td colspan="5">SAFETY PRECAUTIONS: (9) Hours
Workshop location, Arrangement of tools, Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen oil and Chemicals. Also, instruction in the remedial action to be taken in the event of fire or another accident with one or more of these hazards including knowledge on extinguishing agents, Fire, types of Fires-Solid, Liquid, Electrical, Metal, Extinguishers for each</td></tr>
<tr><td>Unit II</td><td colspan="5">TOOLS: (9) Hours
Common hand tools types; Hammer, Screw Driver, Pliers, Punches, Wrenches, Files, Taps and Dies. Common power tools types; Lubrication equipment and methods- operation, function and use of electrical general test equipment – care of tools, control of tools use of workshop materials; Dimensions, allowances, and tolerance, Standards of workmanship; Calibration of tools and equipment, calibration standards.</td></tr>
<tr><td>Unit III</td><td colspan="5">PRECISION INSTRUMENTS : (9) Hours
Construction, Operation, and use of precision instruments – Micrometers of various types, Internal micrometers, External micrometers, Depth micrometers, Tube micrometers – Purpose usage and calibration and error correction, Vernier calipers – purpose, usage and calibration, Vernier bevel protractor, Dial gauge, Optical flat, Slip gauge – usage. Combination sets, calipers inside caliper, outside caliper, Dial Test Indicator, Screw pitch gauge</td></tr>
<tr><td>Unit IV</td><td colspan="5">FITS AND CLEARANCE : (9) Hours
Definition of clearance, Tolerance, Allowance, Limit, and bow. Types of drills, bolts, and their construction. Drill sizes for bolt holes. Classes of fits, a common system of fits and clearances. Loose fit, free fit, Medium fit, close fit. Class I A and Class I B threads, Class 2 A and Class 2 B threads, and Class 3 A and Class 3 B threads. Checking the thread size, ring thread gauge, plug thread gauge, go and not go gauge. Fits and allowance, interference, transition, clearance, and standard methods for checking shafts, bearings, and other parts.</td></tr>
<tr><td>Unit V</td><td colspan="5">PRODUCTION MACHINES : (9) Hours
Description, function, operation of Lathe parts, Types of Lathe, Feed and Thread Cutting mechanism Types of welding; Gas welding process - arc welding process, Brazing, Soldering and Bronze welding Types of Milling Machines, Types of gears (application of all machine)</td></tr>
<tr><td colspan="6">Total : (45) Hours</td></tr>
</table>

Text book

1. M Mahajan "A Textbook of Metrology ", Dhanpatrai and Co, 2nd Edition, 2013

References

1. Shop Theory by James Anderson Earl E. Tata McGraw Hill, 6th edition
2. Airframe & Power plant Mechanics (General Handbook EA-AC 65-9A) –byFederal Aviation Administration; Shroff publishers, Edition 2012
3. Workshop Technology by Hazra Chodhary (Volume I and II).
4. R. K. Jain, Engineering Metrology, Khanna Publishers, 1st Edition, 2013
5. R. S. Sirohi, H. C. Radha Krishna, "Mechanical Measurements", New Age Publishers, 3 rd Edition, 2011.

Course Outcomes		Knowledge level
CO-1	Understand the importance of safety Precautions	K2
CO-2	Identify various types of Tools and Calibration of Equipment	K3
CO-3	Apply Precision Instruments and its uses	K3
CO-4	Evaluate the Fits Clearance for Drills and Threads	K5
CO-5	Illustrate the functioning of Lathe and Welding Machines	K2

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	3	2	2	2	2	2	3	3	3	3	2	3
CO2	2	2	2	2	2	2	2	2	2	2	2	2
CO3	2	2	2	2	2	2	2	2	2	2	2	2
CO4	2	2	2	2	2	2	2	2	2	2	2	2
CO5	2	2	2	2	2	2	2	2	2	2	2	3
W.AV	**2.2**	**1.2**	**1.4**	**1.2**	**1.8**	**1.4**	**2.2**	1.6	2.2	**1.8**	1.8	**2.2**

S –Strong (3), M-Medium2, L- Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	2	2
CO2	2	2	2	3	2
CO3	2	2	2	2	2
CO4	2	2	2	3	1
CO5	2	2	3	2	2
W.AV	**2.2**	**2**	**2.2**	**2.4**	**1.8**

S –Strong (3), M-Medium2, L- Low (1)

<table>
<tr><th colspan="6">I - Semester</th></tr>
<tr><td rowspan="2">Core</td><td rowspan="2">Course code:11814</td><td rowspan="2">WORKSHOP PRACTICES , ENGINEERING GRAPHICS & MACHINE DRAWING-PRACTICAL</td><td>P</td><td>Credits: 4</td><td>Hours: 8</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. Understanding a variety of tools and equipment used for the workplace practice.
2. Understanding what safety precautions are being taken in the workshop
3. To understand techniques of drawings in various fields of engineering
4. To understand and apply national and international standards while drawing machine component.
5. To understand the concept of various tolerances and fits used for component design</td></tr>
</table>

i. WORKSHOP PRACTICES

1. Familiarization and use of work shop equipment and Machinery and production of job related to these.
   a. Bench Vice
   b. 'V' Block
   c. Scribing Block
   d. Lathe
   e. Drilling Machine
   f. Welding Apparatus
2. Familiarization and use of Precision instruments and measuring tools.
   a. Micrometer
   b. DTI
   c. Height Gauge
   d. Depth Gauge
3. Familiarization and use of the following workshop tools as appropriate to the nature of the work performed
   a. Files
   b. Hack Saw
   c. Drills
   d. Reamers
   e. Taps
   f. Wrenches

ii. ENGINEERING GRAPHICS

1. Plate – 1 Line types, Lettering, Dimensioning.
2. Plate – 2 Ellipse – Concentric circle method, Rectangular oblong Method.
3. Plate – 3 Cycloidal curves- Involute of a circle, Cycloid, Epicycloid and Hypocycloid.
4. Plate – 4 Conics section –Ellipse, Parabola, and Hyperbola by Eccentricity method.
5. Plate – 5 Planes of projection – 1st and IIIrd Angle – Conversion of pictorial drawing into Orthographic views (First angle method alone).
6. Plate – 6 Projection of Points and lines.
7. Plate – 7 Projection of solids – cylinder, cone, truncated types.
8. Plate – 8 Isometric drawing of plane figures.
9. Plate – 9 Developments of surfaces –cylinders, pipe bends (Y.L. Shapes pipe joints).
10. Plate – 10 Welded joints and Riveted Joints –Representation.

MACHINE DRAWING

1. Plate – 1 Dimensioning types and Lettering.
2. Plate – 2 Sectioning – Full sectioning half broken Removal Revolved offset

Sectioning with simple drawing examples. 3. Plate – 3 Sleeve & cotter joint, socket & spoigot joint, knucle joint. 4.Plate – 4 Flanged coupling Oldham's coupling Universal coupling Muff coupling, SplitMuff coupling. 5.Plate – 5 Engine parts Connecting rod, stuffing box crank shaft.	
	Total : 30 Hours

	Course Outcomes	**Knowledge level**
1	Ability to Produce Fitting jobs as per specified dimensions	K1
2	To know how to represents letters & numbers in drawing sheet	K3
3	To know about different types of projection	K5
4	Identify the national and international standards pertaining to machine drawing.	K3
`5	Apply limits and tolerances to assemblies and choose appropriate fits.	K6

Mapping Course Outcome VS Programme Outcomes

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**P11**	**P12**
CO1	2	2	2	2	2	2	1	2	2	2	2	2
CO2	1	3	3	2	1	1	2	1	2	2	2	2
CO3	2	2	2	2	2	1	2	2	3	2	1	2
CO4	2	3	2	1	2	2	1	1	2	2	2	2
CO5	2	2	2	2	1	2	2	2	2	2	2	2
W.AV	**1.8**	**2.4**	**2.2**	**1.**	**1.6**	**1.6**	**1.6**	**1.6**	**2.2**	**2**	**1.8**	**2**

S –Strong (3), M-Medium2, L- Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	2	2	2	2
CO2	2	2	3	2	2
CO3	2	1	2	2	2
CO4	2	2	2	2	2
CO5	2	1	2	2	2
W.AV	**2.2**	**1.6**	**2.2**	**1.8**	**2**

S –Strong (3), M-Medium2, L- Low (1)

I - Semester					
Allied	**Course code: 11815**	**AVIATION MATHEMATICS**	**T**	**Credits: 3**	**Hours: 3**
Course Objectives	1. To develop logical understanding of the subjects 2. To visualize and conceptualize the problems 3. To provide the students with sufficient knowledge in calculus and matrix algebra to model the problem mathematically 4. To establish a correspondence between geometric curves and algebraic equations. 5. To assist the students in identifying the way to optimize the cost and the time involved in networking activities and project planning.				
Unit I	**MATRICES: (9) Hours** Rank of a matrix- Consistency of linear system of equations – Eigen value problem – Eigen values and eigenvectors of a real matrix- Characteristic equation – Properties of eigen values and eigenvectors – Cayley – Hamilton theorem–inverse of a matrix- Similarity transformation -Basic concepts–Diagonalization by similarity transformation.				
Unit II	**THREE DIMENSIONAL ANALYTICAL GEOMETRY** : **(9) Hours** Direction cosines and ratios, Angle between two lines- Equations of a plane- Equations of a straight line – Coplanar lines – Shortest distance between skew lines – Sphere – Tangent plane – Plane section of a sphere – Orthogonal spheres				
Unit III	**GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS: (9) Hours** Curvature – Cartesian and polar co-ordinates – Centre and radius of curvature – Circle of curvature – Involutes and evolutes – Envelopes – Properties of envelopes and evolutes -Evolutes as envelope of normal				
Unit IV	**FUNCTIONS OF SEVERAL VARIABLES : (9) Hours** Functions of two variables – Partial derivatives – Total differential – Taylor's expansion – Maxima and minima – Constrained maxima and minima – Lagrange's Multiplier method – Jacobinans				
Unit V	**NETWORK ANALYSIS** : **(9) Hours** Programme Evaluation and Review Technique(PERT)-Critical Path Method(CPM)-Concepts-Application problems-Computation of earliest time-Latest time-floats				
					Total : 45 Hours

Text book

1. Sandro Salsa, " Partial differential equations in action: From modelling to theory", Springer, Cham, 2008

References

1. Veerarajan, T., "Engineering Mathematics (for First Year)", Second Edition, Tata McGraw – Hill Pub. Co. Ltd. New Delhi, 2012.
2. Venkataraman, M.M. "Engineering Mathematics, Volume I, "Fourth Edition, the National Pub. Co., Chennai, 2003.

3. Kreyszig, E, "Advanced Engineering Mathematics", Eight Edition, John Wiley and Sons (Asia) Ltd, Singapore, 2001.

4. C.R.Kothari, "Quantitative Techniques(New Format)",Third Edition, Vikas Publishing,2013.

5. Mathew P. Coleman, " An introduction to partial differential equations with Matlab", CRC Press, Second edition, Boca Raton, 2013.

Course Outcomes		Knowledge level
CO-1	Apply the knowledge of matrices to solve the problem and understand the applications of matrices.	K2
CO-2	Analyse the characteristics and properties of three-dimensional geometric shapes and Develop mathematical arguments about	K3
	geometric relationships. Specify locations and describe spatial relationships using coordinate geometry and other representational systems.	
CO-3	Fix the center of curvature, determines the direction of curvature of the curve at that specific point and to find the radius of curvature which determines the magnitude of that curvature	K4
CO-4	Find the rate of change of quantity with respect to other, find a function which is increasing or decreasing and to find the maximum and minimum value of a curve.	K2
CO-5	Get a clear idea about of how to manage and plan their project, concerning resources and time	K5

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	3	2	2	2	2	3	2	2	2	2	2	2
CO2	2	2	2	2	2	2	2	2	2	1	2	3
CO3	2	3	2	2	2	2	2	2	2	2	2	2
CO4	3	2	2	2	2	2	2	2	2	2	2	2
CO5	2	2	2	2	2	2	2	2	2	2	3	2
W.AV	**2.4**	**2.2**	**2**	**1.**	**1.8**	**2.2**	**1.8**	**2**	**1.8**	**1.8**	2.2	**2.2**

S –Strong (3), M-Mediu2, L- Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	2
CO2	2	1	3	2	2
CO3	2	2	2	2	2
CO4	3	2	2	2	2
CO5	2	2	2	2	1
W.AV	**2.4**	**1.8**	**2.2**	**2.2**	**1.8**

S –Strong (3), M-Mediu2, L- Low (1)

I - Semester					
Allied	**Course code: 11816**	**COMPUTER LAB**	**P**	**Credits: 2**	**Hours: 4**

Course Objectives

1. To educate about creating professional documents using word.
2. To educate about analyse, manage and present data using excel.
3. To educate how to create and manage presentation using power point.
4. To study about insert a table, picture and drawing into the documents.
5. To educate about create a data base using access.

List of Experiments

1. Create a document and apply different formatting options.
2. Design a Greeting Card using Word Art for different festivals.
3. Create your Bio-data and use page borders and shading.
4. Create a document and insert header and footer, page title etc.
5. To create a document, set the margins, orientation, size, column, water mark, page color and page borders.
6. Prepare a mark sheet of your class subjects.
7. Apply the creating, editing, saving, printing securing & protecting operations to an excel spreadsheets.
8. Prepare a bar chart & pie chart for analysis of five year results of your institute.
9. Work on the following exercise on a workbook:
   a. Copy an existing sheet.
   b. Rename the old sheet.
   c. Insert a new sheet into an existing Workbook.
   d. Delete the renamed sheet.
10. Prepare an Attendance sheet of 10 students for any 6 subjects of your syllabus. Calculate their total attendance, total percentage of attendance of each student & average of attendance.
11. Apply themes and layouts to power point slides and insert pictures, graphics, shapes, and tables into presentations.
12. In power point slide make use of adding transitions and animation & Working with mater slides.
13. Create a excel worksheet and perform computations using available data and using mathematical functions chosen from menus.
14. Create a database on students list of any 4 faculties and perform following database functions on it.
    a. Sort data by Name
    b. Filter data by Class
    c. Subtotal of no. of students by Class
15. Create Database to maintain at least 10 addresses of your class mates with the following constraints
    a. Roll no. should be the primary key.
    b. Name should be not null

Total : 30 Hours

Course Outcomes	Knowledge level
• To create and manage professional documents using word.	K6
• To analyse, manage and present data using excel.	K4
• To create and manage presentation using power point.	K6
• To insert a table, picture and drawing into the documents.	K6
• To create a data base using access.	K4

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	2	2	2	2	2	2	1	2	2	2	2	2
CO2	1	2	3	1	1	1	2	1	2	2	2	2
CO3	2	2	2	2	2	1	2	2	2	2	1	2
CO4	2	2	2	1	1	2	2	1	2	2	2	2
CO5	2	2	2	2	1	2	2	2	2	2	2	2
W.AV	1.8	2	2.2	1.6	1.4	1.6	1.8	1.6	2	2	1.8	2

S –Strong (3), M-Medium2, L- Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2
CO2	2	2	2	2	2
CO3	1	1	2	2	2
CO4	2	2	2	2	3
CO5	2	1	2	1	2
W.AV	2	1.6	2	1.8	2.2

S –Strong (3), M-Medium2, L- Low (1)

<table>
<tr><th colspan="6">I - Semester</th></tr>
<tr><td>SEC I</td><td>Course code:
11817</td><td>VALUE EDUCATION</td><td>T</td><td>Credits: 2</td><td>Hours: 2</td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. To impart humanism values among the student under various religious thoughts
2. To make them awareness of ethics and civil rights
3. To familiarities the students with basic features of extracurricular activities such NSS and NCC and relevance of Abdul Kalam and Mother Teresa efforts to teachvalues
4. To impart skills by preparing project works such as writing poems and stories</td></tr>
<tr><td>Unit I</td><td colspan="5">(6) Hours
Definition – Need for value Education – How important human values are – humanism and humanistic movement in the world and in India – Literature on the teaching of values under various religions like Hinduism, Buddhism, Christianity, Jainism, Islam, etc. Agencies for teaching value education in India – National Resource Centre for Value Education – NCERT– IITs and IGNOU.</td></tr>
<tr><td>Unit II</td><td colspan="5">Vedic Period (6) Hours
Influence of Buddhism and Jainism – Hindu Dynasties – Islam Invasion – Moghul invasion – British Rule – culture clash – Bhakti cult – social Reformers – Gandhi – Swami Vivekananda – Tagore – their role in value education.</td></tr>
<tr><td>Unit III</td><td colspan="5">Value Crisis (6) Hours
Independence- After Independence – democracy – Equality – fundamental duties – Fall of standards in all fields – Social, Economic, Political, Religious and Environmental – corruption in society. Politics without principle – Commerce without ethics – Education without Character – Science without humanism – Wealth without work – Pleasure without conscience – Prayer without sacrifice – steps taken by the Governments – Central and State – to remove disparities on the basis of class, creed, gender.</td></tr>
<tr><td>Unit IV</td><td colspan="5">(6) Hours
Transition from school to college – problems – Control – free atmosphere – freedom mistaken for license – need for value education – ways of inculcating it – Teaching of etiquettes – Extra- Curricular activities – N.S.S., N.C.C., Club activities – Relevance of Dr. A.P.J. Abdual Kalam’s efforts to teach values – Mother Teresa.</td></tr>
<tr><td>Unit V</td><td colspan="5">PROJECT WORK (6) Hours
1. Collecting details about value education from newspapers, journals and magazines.
2. Writing poems, skits, stories centering around value-erosion in society.
3. Presenting personal experience in teaching values.
4. Suggesting solutions to value – based problems on the campus.</td></tr>
<tr><td colspan="6">Total : 30 Hours</td></tr>
<tr><td colspan="6">Text book
1. Radhakrishnan, S. “Religion and culture” (1968), Orient Paperbacks, New Delhi.
References
1. Satchidananda. M.K. (1991), “Ethics, Education, Indian unity and culture” – Delhi, Ajantha publications.
2. Saraswathi. T.S. (ed) 1999. Culture”, Socialisation and Human Development: Theory, Research and Application in India” – New Delhi Sage publications.
3. Venkataiah. N (ed) 1998, “Value Education” New Delhi Ph. Publishing Corporation.
4. Chakraborti, Mohit (1997) “Value Education: Changing Perspectives” New Delhi: Kanishka Publications.</td></tr>
</table>

5. "Value Education – Need of the hour" Talk delivered in the HTED Seminar – Govt. of Maharashtra, Mumbai on 1-11-2001 by N.Vittal, Central Vigilance Commissioner.
6. "Swami Vivekananda's Rousing call to Hindu Nation": EKnath Ranade (1991) Centenary Publication

Course Outcomes		**Knowledgelevel**
CO-1	Knowledge about Humanism and Humanistic Movements in the World and in India	K2
CO-2	Understand the Social Reformers and Their Role in Value Education	K2
CO-3	Explore the theories of Fundamental Duties, Ethics, Extra-Curricular Activities –N.S.S., N.C.C	K3
CO-4	Know the concept of Value Education on College Campus	K5
CO-5	To Develop the Project Work regarding Writing Poems, Skits, Stories	K2

Mapping Course Outcome VS Programme Outcomes

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**P11**	**P12**
CO1	3	2	2	2	1	3	2	2	2	2	1	2
CO2	2	2	1	1	1	2	1	1	2	1	2	2
CO3	2	3	2	2	2	2	2	2	1	1	2	2
CO4	2	2	1	1	2	2	2	2	2	2	2	1
CO5	2	2	3	2	2	2	1	2	1	1	3	2
W.AV	**2.2**	**2.2**	**1.8**	**1.**	**1.6**	**2.2**	**1.6**	**1.8**	**1.6**	**1.4**	**2**	**1.8**

S –Strong (3), M-Medium 2, L- Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	2	2	2	2	2
CO2	2	1	1	2	2
CO3	2	1	2	3	2
CO4	1	2	1	2	1
CO5	2	2	2	3	2
W.AV	**1.8**	**1.6**	**1.6**	**2.4**	**1.8**

S –Strong (3), M-Medium 2, L- Low (1)

II-Semester					
T/OL	**Course code: 11821F**	**FRENCH**	**T**	**Credits:3**	**Hours:3**
Course Objectives	1. Understand and apply the grammatical concepts in drafting sentences and paragraphs 2. Apply the rules and regulations to effectively employ past tense 3. Practice exercises and identify errors 4. Explain and summarize a French document such as posters, bulletins, info graphics, etc. 5. Demonstrate knowledge of various expressions used to convey opinion, emotions, cause, effect, purpose, and hypothesis in French 6. Build upon acquired writing and communication skills to develop them				
Unit I	C'estoù?				**(9) Hours**
Unit II	N'oubliez pas				**(9) Hours**
Unit III	Belle vue sur la mer				**(9) Hours**
Unit IV	Quel beau voyage				**(9) Hours**
Unit V	Oh joli Et après				**(9) Hours**
					Total : 45 Hours

References

Régine Mérieux & Yves Loiseau, *Latitudes*-1-(A1/A2),méthode defrançais, Didier, 2017 (units 7-12 only)

Course Outcomes		**Knowledge Level**
CO-1	Revise and recall the French sentence structure	K1
CO-2	Enumerate the various grammatical tenses and use Them to communicate better in French	K2
CO-3	Summarize and develop ideas from the documents After discussing it in detail	K2 and K3
CO-4	Analyze and interpret verbal expressions of cause, effect, purpose, and opposition in French	K4
CO-5	Evaluate and comprehend text passages	K5

Mapping with Programme Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	M	L	M	M	L	S	M	M	M	M
CO2	S	M	M	L	M	M	L	S	M	S	M	M
CO3	M	S	S	M	S	M	M	M	S	M	S	S
CO4	S	S	M	L	S	M	L	S	S	M	S	S
CO5	S	S	S	L	M	M	L	S	S	M	S	S

S-Strong M-Medium L-Low

II-Semester					
E	**Course Code: 11822**	**GENERAL ENGLISH-II**	**T**	**Credits:3**	**Hours:3**
Course Objectives	To make students realize the importance of resilience To enable them to be come good decisionmakers To enable them to imbibe problem-solving skills To enable them to use tenses appropriately To help them use English effectively at the work place.				
Unit I	**RESILIENCE** **(9) Hours** **Poem** Don't Quit– Edgar A. Guest Still Here–Langston Hughes **Short Story** Engine Trouble –R.K. Narayan Rip VanWinkle–Washington Irving				
Unit II	**DECISIONMAKING** **(9)** **Short Story** The Scribe – Kristin Hunter The Lady or the Tiger-Frank Stockton **Poem** The Road not Taken – Robert Frost Snake– D. H Lawrence				
Unit III	**PROBLEMSOLVING** **(9)** **Prose life Story** 3.1 How I taught My Grandmother to Read –Sudha Murthy **Autobiography** How frog Went to Heaven–A Tale of Angolo Wings of Fire (Chapters 1,2,3) by A. P. J Abdul Kalam				
Unit IV	**Tenses** **(9) Hours** Present Past Future Concord				
Unit V	**English in the Workplace** **(9) Hours** E-mail – Invitation, Enquiry, Seeking Clarificatior Circular Memo Minutes of the Meeting				
Total : 45 Hours					

References

1 Martin Hewings. Advanced English Grammar. Cambridge University Press, 2000
2 SP Bakshi, Richa Sharma. Descriptive English. Arihant Publications (India)Ltd.,2019.
3 Sheena Cameron, Louise Dempsey. The Reading Book: A Complete Guide to Teaching Reading. S& L. Publishing, 2019.
4 Barbara Sherman. Skimming and Scanning Techniques, Liberty University Press, 2014.
5 Phil Chambers. Brilliant Speed Reading: Whatever you need to read, however. Pearson, 2013.
6 Communication Skills: Practical Approach Ed.ShaikhMoula

Course Outcomes		Knowledge Level
CO-1	Realize the import rice of resilience	PO1, PO7
CO-2	Become good decision-makers	PO1, PO2, PO10
CO-3	Imbibe problem-solving skills	PO4, PO6, PO9
CO-4	Use tenses appropriately	PO4, PO5, PO6
CO-5	Use English effectively at the work place.	PO3, PO8

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 – Low

Mapping with Programme Specific Outcomes:

CO/PO	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	3	3
Weightage	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0

II-Semester					
Core	**Course Code: 11823**	**AIRCRAFTBASICSELECTRICITY&ELECTRONICS**	**T**	**Credits: 5**	**Hours: 5**
Course Objectives	• To familiarize about basic electricity and electrical devices. • To familiarize about the batteries used in the aircraft and its maintenance. • To study the about the motors, generators and its controls. • To educate about power distributions systems used in the aircraft. • To educate about the various circuits used in the aircraft				
Unit I	**FUNDAMENTALS : (15) Hours** Basic laws of Electrical system, Resistors- Capacitors-Inductors, Transistor, Field effect transistor, Direction of current flow, Circuit control devices switches, Relays and solenoids, Circuit protection devices, fuses and circuit breakers. Basic Electronic Measurement devices such as Multi-meter, voltmeter, ammeter, CRO, Function Generator				
Unit II	**STORAGEBATTERIES : (15) Hours** Theory and constructional features of lead acid and Nickel cadmium batteries, Charging and capacity check of aircraft batteries. Maintenance of batteries; Battery circuits, Ground power circuit.				
Unit III	**MOTORS AND GENERATORANDRELATEDCONTROLS: (15) Hours** DC Motors construction-Types-Principle of operation, Construction of Aircraft generator, principle of operation, characteristics-types of generators-Voltage regulators, reverse current cutout relay, current limiter; Generator load balancing; equalizing circuit; DC alternate or circuit. Starter generator . Principle of alternator, Induction motor: Construction, Principle of operation, Ac generators, High power brush less alternators. Inverters.				
Unit IV	**POWER SUPPLIES AND POWER DISTRIBUITION SYSTEM: (15) Hours** Half and full wave rectifier –Bridge rectifier–Rectification Efficiency-Voltage regulator - SMPS and UPS Silicon Controlled Rectifier, Electrical load analysis. Basic power distribution system; Large air craft power distribution system, Spilt-power system, parallel electrical system, spilt parallel system; Characteristics of aircraft electric wire.				
Unit V	**ELECTRICALCIRCUITS (15) Hours** Starter circuit-Navigation light circuit-landing and taxi light circuit-landing gear actuation and indicating circuit – Antiskid brake system, turbine engine auto ignition circuit.				
Total : 75 Hours					

Text book

1. Basic Electricity- by Dale Crane (2017)

References

1. Aircraft Electrical System by E.H.J. Pallet1996
2. Aircraft Electrical and Electronics by Thomas K Eismin 1994
3. Electrical technology by B L Theraja
4. Aircraft Electrical System --- E.H.J.Pallett
5. Aviation Maint. Technician Hand Book-General -9A -----FAA

Course Outcomes		Knowledge Level
CO-1	To understand about basic electricity and electrical devices	K2
CO-2	To acquire the knowledge of batteries used in the aircraft and its maintenance	K3
CO-3	To understand the working principle and constructions of motor and generators	K2
CO-4	To analysis power distribution system used in the aircraft.	K4
CO-5	To understand various circuits used in the aircraft.	K2

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	3	2	2	2	2	2	3	2	2	2	2	2
CO2	2	2	2	2	2	2	2	2	2	2	2	3
CO3	3	3	2	2	2	2	2	2	2	2	2	2
CO4	2	2	2	2	2	2	2	2	2	2	2	2
CO5	2	2	3	2	2	2	2	2	2	2	3	2
W.AV	**2.4**	**2.2**	**1.8**	**1.8**	**2**	**2**	**2.2**	**1.6**	**1.8**	**1.8**	**2.2**	**2.2**

S–Strong (3), M-Medium (2), L-Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	2	2
CO2	2	2	2	1	2
CO3	3	2	2	2	2
CO4	2	2	3	2	2
CO5	3	1	2	1	2
W.AV	**2.4**	**1.8**	**2.2**	**1.6**	**2**

S–Strong (3), M-Medium (2), L-Low (1)

II-Semester					
Core	**Course Code: 11824**	**AIRCRAFT BASICS ELECTRICITY & ELECTRONICSLAB – PRACTICAL**	**P**	**Credits:4**	**Hours:8**

Course Objectives	• To gain hand on experience in Ohm's law, Kirchhoff's law, and Thevinin's Theorems • To make a circuit of RC phase shift oscillator • To learn the characteristics of basic electronic devices such as BJT, FET and Zenor diode. • To make different rectifier circuits. • To measure the load characteristics of motors.

List of Experiments

1. Verification of Kirchhoff's Law.
2. Verification of Thevinin Theorem.
3. Verification of Ohm's Law.
4. R.C. Phase shift Oscillator
5. Characteristics of Transistor–CE configuration
6. To construct a DC source using single diode and transformer.
7. To construct a DC source using two diode and transformer.
8. To construct a DC source using four diode and transformer.
9. Zenor diode as a voltage regulator.
10. Characteristics of FET
11. To study the load characteristics of DC shunt motor
12. To study the load characteristics of Induction motor

Total : 60 Hours

Course Outcomes	**Knowledge Level**
• To verifying Ohm's law, Kirchhoff's law, and Thevinin's Theorems	K6
• To analyze a circuit of RC phase shift oscillator.	K3
• To analyze a circuit to study characteristic of Transistors, FET and Zenor diode.	K3
• To analyze different rectifier circuits.	K3
• To measure the load characteristics of motors.	K5

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	2	2	3	1	2	2	2	2	2	2	1	2
CO2	2	2	2	2	1	1	2	1	2	2	2	1
CO3	2	2	2	2	2	2	2	2	2	2	2	2
CO4	2	3	1	1	2	2	1	1	2	2	2	2
CO5	2	2	2	2	1	2	2	2	2	2	2	2
W.AV	**2**	**2.2**	**2**	**1.6**	**1.6**	**1.8**	**1.8**	1.6	2	**2**	1.6	**1.8**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	1
CO2	2	2	3	2	2
CO3	1	2	2	2	2
CO4	2	2	2	2	1
CO5	2	1	3	3	2
W.AV	**2**	**1.8**	**2.4**	**2.4**	**1.6**

II-Semester					
Allied	**Course Code: 11825**	**APPLIEDMECHANICS**	**T**	**Credits:3**	**Hours:3**
Course Objectives	1. To understand the Fundamental concept of mechanics 2. To identify various types of force and Projectile Motion 3. To analyze the Friction on Simple Machine 4. To evaluate the Frame and Resolution of force 5. To develop the Relationship between stress and strain				
Unit I	**MECHANICS** **(9) Hours** Fundamental Concepts: Mechanics, Statics, Dynamic, Kinetics, Kinematics – Basic terms and definitions and units – Resolution of forces on a system, Concept of forces, non-Coplanar- Coplanar, Concurrent, Parallel, Non – Concurrent, Non – Parallel, Forces – composition of forces. Resultant of forces, parallelogram law of forces, Moment of forces, couples lever arm – the principle of Virtual work				
Unit II	**DYNAMICS** **(9) Hours** External and Internal forces, principle of transmissibility, Equivalent forces, Moment of couple, force Centroid and Center of gravity, Moment of Inertia-Newton's law of motion, D ' Alembert's principle, Momentum impulse, work, energy methods, curvilinear translation, motion of projectiles, Momentum, Rotation resultant, inertia force in rotation, rigid body motions, free and forced vibration, simple harmonic motion of Vibrations				
Unit III	**FRICTION** **(9) Hours** Laws of Friction, Coefficient of Friction, Angle of Friction, Wedges, Screws, Journal Bearing, Thrust Bearings, Rolling resistance, Belt friction inclined plane, simple Machines, Screw Jack Velocity Ratio, Mechanical Efficiency				
Unit IV	**FRAMES** **(9) Hours** **Analysis of perfect frames by Analytical methods**: Introduction, Classification of frames perfect, imperfect, deficient, and redundant frames, Assumptions Resolution of forces using the method of sections and method of joints – force table, Cantilever trusses – Structures with one end hinged and other freely supported on rollers subjected to horizontal and skew load				
Unit V	**STRENGTH OF MATERIALS** **(9) Hours** Stress, strain definitions, Relationship between stress and strain, Hooke's law- poisons ratio, a factor of safety, volumetric strain, simple problems – Elastic constants, principal stress, and strains – simpler problems, Mohr's circles – Thin and thick cylinders, shells subjected to internal pressure – simple problems. Beams –types of beams, types of load, beams subjected to point load and UDL shear force, and bending moment diagram				

Text book

1. Rajasekaran S and Sankarasubramanian G, "Engineering Mechanics-Statics and Dynamics", Vikas Publishing House Pvt. Ltd., New Delhi, 2006

References

1. Engineering Mechanics – A text book of Applied Mechanics by S. Ramamurtham
2. A text book of text strength of Materials – R .K. Bansal

3. Beer F P and Johnson E R, “Vector Mechanics for Engineers, Statics and Dynamics”, Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi, 2006.
4. Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013.

J.L. Meriam & L.G. Karige, Engineering Mechanics: Statics (Volume I) and Engineering Mechanics: Dynamics (Volume II), 7th edition, Wiley student edition, 2013

Course Outcomes		**Knowledge Level**
CO-1	Understand the Fundamental concept of mechanics	K2
CO-2	Identify various types of force and Projectile Motion	K3
CO-3	Analyze the Friction on Simple Machine	K4
CO-4	Evaluate the Frame and Resolution of force	K5
CO-5	Develop the Relationship between stress and strain	K6

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	3	3	2	2	1	2	2	2	1	1	1	3
CO2	2	3	2	2	1	1	2	2	2	1	2	2
CO3	2	2	2	2	2	1	1	1	2	2	2	2
CO4	2	2	2	2	1	2	1	2	1	1	1	2
CO5	2	2	2	2	2	1	2	2	2	2	2	3
W.AV	**2.2**	**2.4**	**2**	**2**	**1.4**	**1.4**	**1.8**	**1.8**	**1.6**	**1.4**	**1.6**	**2.4**

S–Strong(3),M-Medium 2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2
CO2	2	1	2	2	3
CO3	2	1	2	1	2
CO4	2	2	1	2	2
CO5	3	2	2	2	2
W.AV	**2.4**	**1.4**	**1.8**	**1.8**	**2.2**

S–Strong (3), M-Medium 2, L-Low (1)

<table>
<tr><td colspan="6">II-Semester</td></tr>
<tr><td rowspan="2">Allied</td><td rowspan="2">Course Code: 11826</td><td rowspan="2">AUTOCAD LAB-PRACTICAL</td><td>P</td><td>Credits:2</td><td>Hours:4</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. To apply basic concept to drawing, edit, dimension, hatching etc. to develop 2D
2. Understand the AutoCAD environment by creating new drawings, opening existing drawings and saving drawings.
3. Understand the basic building drawing fundamentals for creating and manipulate geometric models by CAD System
4. To apply basic concept to drawing, edit, dimension, hatching etc. to develop 2D & 3D Modelling.
5. To prepare surface modelling and sheet metal operations through various exercises</td></tr>
<tr><td colspan="6">List of Experiment :
1. Introduction of cad software and its utilities in the engineering software.
2. Study of the basic initial setting and viewing of drafting software interface.
3. Study of various tool bar options and exercises to familiarize all the drawing tools.
4. Study and implementation of co-ordinate systems and ucs.
5. Use of basic entities in 2d.
6. Use of various modify commands of drafting software.
7. Dimensioning in 2d and 3d entities.
8. Draw different types of 3d modelling entities using viewing commands, to view them (isometric projection).
9. Sectioning of solid primitives and rendering in 3d.
10. Intersection of solid primitives.</td></tr>
<tr><td colspan="5">Course Outcomes</td><td>Knowledge Level</td></tr>
<tr><td colspan="5">1. Able to use software like Auto CAD
2. Comprehend the fundamentals of building drawings and understand CAD software for drafting.
3. Develop Geometric Plan, Sections and Elevations for single and multi-storeyed building with suitable scale and dimensions.
4. Able to prepare surface modelling and sheet metal operations through various exercises
5. Create and manage layouts, viewports and page setups</td><td>K1
K2
K3
K1
K6</td></tr>
</table>

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	2	2	2	1	1	2	1	2	2	1	1	2
CO2	2	2	1	2	2	1	2	1	2	2	2	3
CO3	2	2	2	2	3	1	2	2	2	1	2	2
CO4	2	2	2	2	2	2	1	2	3	2	2	2
CO5	2	2	3	2	2	2	2	2	2	2	2	3
W.AV	**2**	**2**	**2**	**1.8**	**2**	**1.6**	**1.6**	**1.8**	**2.2**	**1.6**	**1.8**	**2.4**

S–Strong (3), M-Medium(2), L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	1	3	2
CO2	2	2	2	2	2
CO3	2	3	2	3	1
CO4	3	2	2	2	2
CO5	2	3	2	2	2
W.AV	**2.2**	**2.4**	**1.8**	**2.4**	**1.8**

S–Strong (3), M-Medium (2), L-Low (1)

II-Semester					
SEC II	**Course Code: 11827**	**ENVIRONMENTAL STUDIES**	**T**	**Credits:2**	**Hours:2**
Course Objectives	1. To understand the multidisciplinary nature of environmental studies such as forest, water, mineral and energy and land resources. 2. To portray the eco system bio diversity and its conservation. 3. To impart the knowledge of environmental pollution. 4. To know the importance of field work to study common plants, insects and birds and visit local areas to document environmental assets				
Unit I	**The Multidisciplinary Nature of Environmental Studies** **(3) Hours** Definition, Scope and importance Need for public awareness				
Unit II	**Natural Resources**: **(9) Hours** Renewable and non-renewable resources **A). Forest Resources:** Use and Over-Exploitation, Deforestation, Case Studies, Timber Extraction, Mining, Dams and Their Effect on Forests 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, Experimental 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 Resources, Case Studies. **F). Land Resources:** Land as a Resource, Land Degradation, Main Induced Landsides, Soil-Erosion and Desertification. Role of Individual in Conservation of Natural Resources -Equitable Use of Resources for Sustainable Lifestyle				
Unit III	**ECOSYSTEMS, BIO-DIVERSITY AND ITS CONSERVATION** **(6) Hours** **Ecosystems:** Concept of an Ecosystem, Structure and Function of an Ecosystem, Energy Flow in The Ecosystem, Food Chains, Food Webs and Ecological Pyramids. **Biodiversity and Its Conservation:** Introduction- Definition: Genetic, Species and Ecosystem Diversity, Bio-Geographical Classification of India, Value of Biodiversity: Consumptive Use, Productive Use, Social Ethical, Aesthetic and Option Values. Biodiversity at Global, National and Local Levels, India as a Mega-Diversity Nation, Hot Spots 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 IV	**Environmental Pollution:** **(6) Hours** Causes, 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.				
Unit V	**Field Work** **(6) Hours** 1. Visit to a Local Area to Document Environmental Assets–River/ Forest/ Grassland/ Hill/ Mountain 2. Visit to a Local Polluted Site- Urban/Rural/Industrial/Agricultural 3.Study of Common Plants, Insects, Birds 4.Study of Simple Ecosystem-Pond, River, Hill Slopes, etc.				
	Total : 30 Hours				

Text book .

1. Sharma, B. K. (2001). *Environmental Chemistry–6th Revised Edition*.
2. Townsend, C.R., Begon, M., & Harper, J.L. (2008). *Essentials of Ecology* (3rd edition). Oxford: Blackwell Publishing.
3. Trivedi, R. K. (2010). *Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards*. *Vol. I and II, Enviro Media*.

Wanger, K.D. (1998). *Environmental Management*. Saunders Co. Philadelphia, USA

References

1. Agarwal, K. C. (2001). *Environmental Biology*. Nidi Publication Ltd.
2. Bharucha, E. (2002). *The Biodiversity of India* (Vol. 1). Mapin Publishing Pvt Ltd, Ahamedabad, India.Brunner, C. R. (1993). *Hazardous waste incineration*. Mcgraw Hill Inc.
3. Clark, R. B., Frid, C., & Attrill, M. (2001). *Marine pollution* (Vol. 5). Oxford: Oxford university press. Cunningham, W. P., Cooper, T. H., Gorham, E., & Hepworth, M. T. (1998). *Environmental encyclopedia*.De, A.K. (1990). *Environmental Chemistry*. Wiley Eastern Ltd.
4. Gleick, H.P.(1993). *Water In Crisis, Pacific Institute For Studies In Dev, Environment & Security*. StockholmEnv. Institute, Oxford University Press.
5. Goel, P. K., & Trivedi, R. K. (1998). *An introduction to air pollution*. Technoscience Publication, India. Hawkins, R. E. *Encyclopedia of Indian Natural History.* Bombay Natural History Society, Bombay.
6. Heywood, V. H., & Watson, R. T. (1995). *Global biodiversity assessment* (Vol. 1140). Cambridge: Cambridgeuniversity press.
7. Jadhav, H. V., & Bhosale, V. M. (2006). *Environmental Protection and laws*. Himalaya Publishing House. McKinney, M. L., & Schoch, R. M. (1996). *Environmental Science: Systems and Solutions* (St. Paul, MN).Mhaskar, A. K. *Matter Hazardous*. Techno-Science Publications.
8. Miller, T. G. (1989). *Environmental Science: Working with the earth (2 nd).* Wadsworth Publicing Co.
9. Narain, S., Mahapatra, R., Das, S., Misra, A., Parrey, A. A., Pandey, K., & Banerjee, S. (2014). *Down toEarth*. Centre for Science and Environment.
10. Odum, E. P., & Barrett, G. W. (1971). *Fundamentals of ecology* (Vol. 3, p. 5). Philadelphia: Saunders. Rao, M.N., & Datta, A.K. (1987). *Waste Water Treatment*. Oxford & Ibh Publ,Co.Pvt. Ltd

Course Outcomes		**KnowledgeLevel**
CO-1	Renewable and non-renewable resources.	K 2
CO-2	Species and Ecosystem Diversity**,** Bio-Geographical Classification of India**,**Value ofBiodiversity	K 2
CO-3	Causes, Effects and Control Measures of environmental pollution	K 4
CO-4	Field work knowledge of studying eco system pond, river, hill andcommon plants,insects and birds	K 2
CO-5	Documentation of environmental assets	K 4

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	2	1	2	2	2	2	3	2	2	2	2	2
CO2	2	2	1	2	1	2	2	2	2	2	2	3
CO3	2	2	2	2	2	1	2	2	1	1	2	2
CO4	2	2	1	1	2	2	2	2	2	2	2	2
CO5	2	2	1	2	2	1	2	2	1	1	2	2
W.AV	**2**	**1.8**	**1.4**	**1.8**	**1.8**	**1.6**	**2.2**	**2**	**1.8**	**1.6**	**2**	**2.2**

S–Strong(3), M-Medium (2), L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	3
CO2	2	1	1	2	2
CO3	2	1	2	1	2
CO4	1	2	1	2	1
CO5	2	2	2	2	2
W.AV	**2**	**1.6**	**1.6**	**1.8**	**2**

III-Semester					
T/OL	**Course Code: 1831F**	**FRENCH**	**T**	**Credits:3**	**Hours:3**

Course Objectives	1. Identify and appreciate the construction and the structure of different tenses and sentences 2. Translate simple texts 3. Draft and summarize literary texts 4. Apply the grammatical rules to express one's ideas using different tenses 5. Analyze literary texts with respect to their structure and composition
Unit I	Les feuilles mortesLe Vrai Père Les pronoms relatifs **(9) Hours**
Unit II	Nos études Demain dès l'aube Le passé composé **(9) Hours**
Unit III	Par une journée d'été L'imparfait Le Plus-que-parfait **(9)Hours**
Unit IV	Une visite inattendueLe subjonctif Le conditionnel **(9) Hours**
Unit V	L'hiver Le libraire La comparaison **(9) Hours**
	Total : 45 Hours

References

K. Madanagobalane & N.C. Mirakamal, *Le français par les textes*, Chennai, Samhita Publications – Goyal Publisher & Distributors Pvt Ltd,2017

Course Outcomes		**Knowledge Level**
CO-1	Understand the structure and use of the different grammaticaltenses	K2
CO-2	Translate texts and examine them	K2 and K4
CO-3	Draft summaries of literary texts	K2 and K6
CO-4	Identify the requirement and employ the different grammatical tenses	K3
CO-5	Analyze and critically assess the literary texts	K4 and K5

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	S	M	M	M	M	M	L	S	S	S	S	M
CO 2	M	M	S	S	S	S	M	M	M	S	M	S
CO 3	S	M	S	M	M	M	M	S	S	M	S	M
CO 4	S	S	M	M	S	M	L	S	S	S	S	M
CO 5	M	M	S	S	S	M	M	S	S	M	S	M

S-Strong M-Medium L-Low

III-Semester					
E	**Course Code: 11832**	**GENERAL ENGLISH-III**	**T**	**Credits:3**	**Hours:3**

Course Objectives	To make them active listeners To enhance the interpersonal relationship skills To embolden them to cope with stress To master grammar skills To help them to use English effectively in a business environment
Unit I	**ACTIVE LISTENING** **(9) Hours** **Short Story** In a Grove – Akutagawa Ryunosuke Translated from Japanese By TakashiKojima The Gift of the Magi – O' Henry **Prose** Listening – Robin Sharma Nobel Prize Acceptance Speech – Wangari Maathai
Unit II	**INTERPERSONAL RELATIONSHIPS** **(9) Hours** **Prose** Telephone Conversation – Wole Soyinka Of Friendship – Francis Bacon **Song on (Motivational/ Narrative)** Ulysses – Alfred Lord TennysonAnd Still I Rise – Maya Angelou
Unit III	**COPING WITH STRESS** **(9) Hours** **Poem** Leisure – W.H. Davies Anxiety Monster – RhonaMcFerran **Readers Theatre** The Forty Fortunes: A Tale of Iran Where there is a Will – Mahesh Dattani
Unit IV	**Grammar** **(9) Hours** Phrasal Verbs & Idioms Modals and Auxiliaries Verb Phrases – Gerund, Participle, Infinitive
Unit V	**Composition/ Writing Skills** **(9) Hours** Official Correspondence – Leave Letter , Letter ofApplication, Permission Letter Drafting Invitations Brochures for Programmes and Events

References

1 WangariMaathai – Nobel Lecture. Nobel Prize Outreach AB 2023. Jul 2023.
2 Mahesh Dattani, Where there is a Will. Penguin, 2013.
3 Martin Hewings, Advanced English Grammar, Cambridge University Press, 2000
4 Essential English Grammar by Raymond Murphy

Course Outcomes		Knowledge Level
CO-1	Listen actively	PO1, PO7
CO-2	Develop interpersonal relationship skills	PO1, PO2, PO10
CO-3	Acquire self-confidence to cope with stress	PO4, PO6, PO9
CO-4	Master grammar skills	PO4, PO5, PO6
CO-5	Carry out business communication effectively	PO3, PO8

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes:

CO /PO	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	3	3
Weightage	15	15	15	15
Weighted percentage of Course Contribution to Pos	**3.0**	**3.0**	**3.0**	**3.0**

III-Semester					
Core	**Course Code: 11833**	**BASICAERODYNAMICS**	**T**	**Credits:3**	**Hours:4**
Course Objectives	1. To familiarize the basic concepts and characteristics associated with the atmosphere and the concepts of the application of the International Standard Atmosphere (ISA) to aerodynamics. 2. To provide technical knowledge on airflow around a body its' relationship between lift, weight, thrust and drag, methods of lift augmentation. 3. To educate and provide an understanding in the flight controls, level flight conditions, operation and effect of controls. 4. To learn and apply their knowledge on various design features that provide aircraft stability about that axis. 5. To educate the students to understand compressible subsonic and transonic flows and supersonic flows.				
Unit I	**Physics of the Atmosphere** **(9) Hours** The characteristics associated with the atmosphere - such as Composition - Pressure – temperature - distribution effects of altitude - and effects of humidity - temperature and - Pressure on density - International Standard Atmosphere (ISA) - its application to aerodynamics.				
Unit II	**Aerodynamics** **(9) Hours** Airflow around a body - Boundary layer - laminar and turbulent flow - free stream flow - relative airflow - up wash and Downwash – vortices – stagnation - The terms: camber – chord - mean aerodynamic chord - profile (parasite) drag - induced drag - center of pressure - angle of attack - wash in and wash out - fineness ratio - wing shape and aspect ratio – Thrust – Weight - Aerodynamic Resultant - Generation of Lift and Drag - Lift coefficient - Drag coefficient – stall - High lift devices – slots – slats – flaps – Relationship - between lift – weight - thrust and drag.				
Unit III	**Theory of Flight** **(9) Hours** Aero plane Aerodynamics - Flight Controls - Level flight conditions - Operation and effect of roll control - ailerons and spoilers - pitch control – elevators – stabilizers - yaw control – rudders – fin – maneuvers – climbing – turning - gliding.				
Unit IV	**Flight Stability and Dynamics** **(9) Hours** Static stability - Dynamic stability – Longitudinal - lateral - and directional stability - spiral stability and Dutch roll stability.				
Unit V	**High Speed Theory** **(9) Hours** The speed of sound - compressibility and incompressibility - approaching the speed of sound – shock waves and their observation - effects of shock waves - shock drag - variation of speed of sound – critical Mach number – subsonic – transonic - supersonic speeds - behavior of aeroplane at shock stalls.				

Text Books:

1. Module 8 Basic Aerodynamics by Thomas Forenz, Aircraft Technical Book Company, 2016
2. Aircraft Basic science by Michael J. Kroes; Michael S. Nolan; Publisher: The McGraw-

Hill Companies, Inc. Edition: Eighth Edition - 2013

References

1. Mechanics of Flight by A C Kermode, Pearson 11 edition
2. Aerodynamics - By L J Clancy; Publisher: Shroff; Date 1 January 2006
3. Airframe & Power plant Mechanics (General Handbook EA-AC 65-15A) by Federal Aviation Administration, 2019

Course Outcomes		**Knowledge Level**
CO-1	To have knowledge on the atmosphere and the concepts of the International Standard Atmosphere (ISA) to aerodynamics	K 1
CO-2	To understand and give a detailed description about the airflow around the body and aerofoil.	K 2
CO-3	The applicant will be able to apply his knowledge on generation of Lift, Drag Relationship between lift, weight, thrust and drag.	K 3
CO-4	The applicant will be able to analyze the equilibrium position in level flight, operation and effect of roll, pitch and yaw.	K 4
CO-5	The applicant will be able to evaluate the flight stability and dynamics; the speed of sound, compressibility, incompressibility and behavior of aeroplane at shock stalls	K 5

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	3	1	1	1	1	2	1	1	1	1	1	1
CO2	2	3	2	2	1	1	1	2	1	1	2	2
CO3	2	2	3	1	1	1	2	2	2	1	2	1
CO4	1	2	1	1	1	2	1	2	1	1	1	1
CO5	2	1	2	3	2	3	2	2	3	3	2	3
W.AV	**2**	**1.8**	**1.8**	**1.6**	**1.2**	**1.8**	**1.4**	1.8	1.6	**1.4**	1.6	**1.6**

S –Strong (3), M-Mediu2, L- Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3
CO1	3	2	2
CO2	2	2	2
CO3	1	2	2
CO4	1	1	2
CO5	2	3	3
W.AV	**1.8**	**2**	**2.2**

S –Strong (3), M-Mediu2, L- Low (1)

III-Semester					
Core	**Course Code: 11834**	**AIRCRAFTCONSTRUCTION&SYSTEMS**	**T**	**Credits: 3**	**Hours: 3**
Course Objectives	1. To study the aircraft basic structure 2. To understand the different flight controls 3. Acquire the knowledge of Landing gear system for safe aircraft operation 4. To impart knowledge of the hydraulic system components 5. To impart knowledge of the Aircraft fuel system components				
Unit I	**FRAME WORK OF AIRCRAFT** **(9) Hours** Basic aircraft structure station number Zoning nomenclature and definition forces acting on aircraft structure construction of different type of fuselage and wings. Description of failsafe design, safe life concept sandwich construction and Honey comb construction.				
Unit II	**FLIGHT CONTROLS** **(9) Hours** Constructional features of primary and secondary controls, purpose, mode of operation, and layout. Balancing of control surfaces, inspection and maintenance. Description of power assisted controls and fly by wire system. Rigging of flight control and symmetry checks				
Unit III	**LANDING GEAR SYSTEM** **(9) Hours** Type and parts of landing gear description of nose wheel steering system, retraction system, skid controls wheel assembly, brake system and their operation.				
Unit IV	**HYDRAULIC SYSTEM** **(9) Hours** Principle of Pascal's law, Aircraft hydraulic system advantages, Properties of Hydraulic fluid. Types of Hydraulic fluid used in aircraft and its characteristics. Contamination of hydraulic fluids, System layout, purpose and operation of Major components –Reservoir, Filter, Accumulator, Pressure regulator, Check Valve, Pressure regulator, Selector valve, Actuator, Line disconnect valve, restrictors and sequence valve. Purpose of seals and its classifications & Fluid lines				
Unit V	**AIRCRAFT FUEL SYSTEM** **(9) Hours** Classification of fuel, Properties and Characteristics of aviation fuels. Aircraft fuel tanks and their installation. Gravity feed and Pressure feed system. Twin engine and multi engine aircraft fuel system. Components and their function, Fuel cross feed system and jettisoning system. Replenishment of fuel tanks- gravity fueling, pressure fueling. Defueling operation, Fuel contamination and its checks.				

TEXT BOOK:

1. Airframe Hand Book (AC 65-15 A) – 1994 (Chapter 1,2, &3)
2. General Hand Book (AC 65-9 A) – 1994 (Chapter 3)

Reference Book:

1. Aircraft Maintenance and Repair by Kores – 1993
2. G F Titterton, Aircraft Materials and Processes, Himalayan Books, New Delhi
3. E T Hill, The Materials for Aircraft Construction, Pitman, London

Course Outcomes		Knowledge Level
CO-1	To understand the basic aircraft structure	K2
CO-2	Keep abreast knowledge on various flight control system and its recent advancements	K1
CO-3	Demonstrate the fundamental understanding of the Landing gear systems.	K3
CO-4	Demonstrate the ability to design a various system using hydraulic components	K2
CO-5	To understand the Aircraft fuel system and its components.	K2

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	2	1	2	2	2	1	3	2	3	2	2	2
CO2	2	2	1	3	1	2	2	2	2	2	3	3
CO3	2	2	2	2	2	1	2	1	2	2	2	2
CO4	1	1	1	1	1	2	1	2	2	2	2	2
CO5	2	3	2	2	2	1	2	2	2	3	3	2
W.AV	**1.8**	**1.8**	**1.6**	**2**	**1.6**	**1.4**	**2**	**1.8**	**2.2**	**2.2**	**2.2**	**2.2**

S –Strong (3), M-Mediu2, L- Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	2
CO2	2	2	2	2	2
CO3	3	1	2	1	1
CO4	2	2	3	2	2
CO5	2	2	2	1	2
W.AV	**2.4**	**1.8**	**2.4**	**2**	**1.8**

S –Strong (3), M-Mediu2, L- Low (1)

III-Semester					
Core	**Course Code: 11835**	AERO DYNAMICS AND AIRCRAFT CONSTRUCTION LAB– PRACTICAL	**P**	**Credits :3**	**Hours: 6**

Course Objectives	1. The objective of this lab is to teach students, the importance of Aerodynamics through involvement in experiments. 2. This lab helps to have knowledge of the world due to constant interplay between observations and hypothesis, experiment and theory in this subject. 3. Students will gain knowledge in various areas of Aerodynamics so as to have real time applications in Aeronautical science.

1. Study of Aircraft Symmetry Check and its relevance to Aircraft flying Characteristics.
2. Study of Honey Comb structure and its characteristics.
3. Study of power assisted controls and their advantages over mechanically operated controls.
4. Study on Aircraft Wheels
5. Study on Landing Gear retraction Systems.
6. Familiarization of various Hydraulic Components
7. Calculation of Aircraft empty weight C.G during aircraft weighment and preparation of weight schedule.
8. Study of wind tunnel and its components
9. Pressure distribution over an aerofoil.
10. Lift and Drag Measurement over a sphere and Hemisphere.

Total : 30 Hours

Course Outcomes	**Knowledge Level**
1. Calibrate the wind tunnel for various motor speeds	K1
2. Analyze the results of smoke and tuft flow visualization techniques	K3
3. Calculate and plot the pressure distribution around different airfoils and circular cylinders using pitot-static probes	K5
4. Estimate the drag co-efficient for 2-D objects using pitot-static wake survey method	K3
5. Predict the boundary layer velocity profile on wind tunnel wall and on the airfoil using pitot-static wake survey method	K6

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	2	2	2	2	2	2	1	2	2	2	2	2
CO2	1	2	2	2	1	1	2	1	3	3	2	2
CO3	2	1	2	2	2	1	2	2	2	2	1	2
CO4	2	2	2	1	2	2	1	1	3	2	2	2
CO5	2	2	2	2	1	2	2	2	2	2	2	2
W.AV	**1.8**	**1.8**	**2**	**1.8**	**1.6**	**1.6**	**1.6**	**1.6**	**2.4**	**2.2**	**1.8**	**2**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	3	2	2
CO2	2	2	2	2	2
CO3	2	1	2	2	1
CO4	2	2	2	2	2
CO5	2	1	2	2	1
W.AV	**2**	**1.6**	**2.2**	**1.8**	**1.6**

S–Strong(3),M-Medium2,L-Low(1)

<table>
<tr><th colspan="6">III-Semester</th></tr>
<tr><td rowspan="2">Allied</td><td rowspan="2">Course Code: 11836</td><td rowspan="2">FLUID MECHANICS & HYDRAULIC MACHINES</td><td>T</td><td>Credits: 3</td><td>Hours: 3</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. To understand the basic principles of fluid mechanics
2. To identify various types of flows
3. To understand Euler’s equation of motion and flow through pipes
4. To evaluate the Impact of jet on plate and Hydraulic Machines
5. To understand the functioning of Fluid Systems and Hydraulic, Pneumatic circuits.</td></tr>
<tr><td>Unit I</td><td colspan="5">INTRODUCTION (9) Hours
Properties of fluids-Fluid characteristics-Terms and definition –pressure at a point pressure head- gauge and absolute pressure - Pascal’s Law, Measurement of fluid pressure, Manometer, Mechanical gauges -Numerical problems.</td></tr>
<tr><td>Unit II</td><td colspan="5">STATICS OF FLUIDS (9) Hours
Forces acting on a submerged body-Forces on a curved surface - Total pressure and center of pressure – Buoyancy, Metacenter, Metacentric height, Stability of the submerged and floating body-Numerical problems.
KINEMATICS OF FLOW
Types of fluids flow- Terms and definition –Rate of flow or Discharge continuity equation –Numerical problems – stream lines stream function velocity potential function –Equipotential line Flownet Relationship between stream function and velocity potential function –Numerical problems.</td></tr>
<tr><td>Unit III</td><td colspan="5">DYNAMICS OF FLUID FLOW (9) Hours
Equation of motion –Euler’s equation from Bernoulli’s equation –Various Assumptions in deriving the equations allied problems, Application of Bernoulli’s equation, Venturimeter and Orifice meter, Pitot tube allied problems, Momentum equation and Allied problems.
FLOW THROUGH PIPES:
Losses in flow, Flow through siphon, Pipes, Compound pipes, equivalent pipes, parallel pipes, branched pipes, Power transmission through pipes. Flow through nozzles, Water hammers and related problems.</td></tr>
<tr><td>Unit IV</td><td colspan="5">IMPACT OF JET AND JET PROPULSION: (9) Hours
Force exerted by a jet, jet on hinged plate, moving plate, jet propulsion. Jet propulsion of tank propulsionof Aircraft.
HYDRAULIC MACHINES
Turbines, Hydroelectric power plant, Classification of turbines. Centrifugal pumps, Reciprocating pumps</td></tr>
<tr><td>Unit V</td><td colspan="5">FLUID SYSTEMS (9) Hours
Hydraulic Press, Hydraulic accumulator, Hydraulic intensifier, Hydraulic Ram, Hydraulic lift, Hydraulic crane, Hydraulic coupling, Torque converter, Gear pump.
HYDRAULICS & PNEUMATICS
Hydraulic, pneumatic circuit components, Hydraulic and pneumatic joints, valves operation types of valves and controls. Methods of joints of hydraulic and pneumatic circuits.</td></tr>
</table>

Text book

1. Hydraulic Machines by Banga & Sharma, Khanna Publishers.

References

1. A text book of fluid mechanics and Hydraulic Machines –R.K. Bansal
2. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.
3. Fluid Mechanics and Hydraulic Machines by Rajput.
4. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.
5. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.

Course Outcomes		**Knowledge Level**
CO-1	Understand the fluid mechanics fundamentals,	K2
CO-2	Analyze the types of flow and Forces acting on a submerged body	K4
CO-3	Apply the Bernoulli equation to solve problems and Losses in pipes	K3
CO-4	Acquire knowledge of the Impact of jet and Hydraulic Machines	K1
CO-5	Understand the Function of Fluid Systems and Hydraulic, Pneumatic circuits	K2

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	3	1	1	1	1	2	1	1	1	1	1	1
CO2	2	3	2	2	1	1	1	2	1	1	2	2
CO3	2	2	3	1	1	1	2	2	2	1	2	1
CO4	1	2	1	1	1	2	1	2	1	1	1	1
CO5	2	1	2	3	2	3	2	2	3	3	2	3
W.AV	**2**	**1.8**	**1.8**	**1.6**	**1.2**	1.8	1.4	1.8	1.6	1.4	1.6	**1.6**

S–Strong(3),M-Medium 2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2
CO2	2	2	2	2	3
CO3	1	2	2	2	2
CO4	1	1	2	2	2
CO5	2	3	3	2	2
W.AV	**1.8**	**2**	**2.2**	**1.8**	**2.2**

S–Strong(3),M-Medium 2,L-Low(1)

III-Semester					
Allied	**Course Code: 11837**	**NDT LAB**	**P**	**Credits:2**	**Hours:4**
Course Objectives	• To learn more about the various NDT methods • Explanation of the relevant techniques used for detecting defects in components • To impart knowledge on quantification and calibration of equipment • To study about the process of Surface Testing Methods (LPT & MPT) • To learn about the Sub Surface Testing methods (Eddy current & UT)				

1. Inspection of welds using solvent removable visible dye penetrant.
2. Inspection of welds using solvent removable fluorescent dye penetrant.
3. Familiarization and calibration of eddy current equipment.
4. Inspection on non magnetic/magnetic materials by eddy current method.
5. Inspection of welds by Eddy current Testing.
6. Inspection of welds by Magnetic Particle Testing - Dry method.
7. Inspection of welds by Magnetic Particle Testing- Wet method
8. Familiarization of ultrasonic flaw detectors
9. Familiarization and Calibration of reference blocks using ultrasonic flaw detector.
10. Plotting DAC curves by normal and angle beam probes.
11. Inspection of welds in plates by ultrasonic angle beam testing.
12. Inspection of butt welds in pipes by ultrasonic angle beam testing.

Total : 30 Hours

Course Outcomes	**Knowledge Level**
To determine the defect, use different NDT techniques	K5
For various defects, select the appropriate NDT techniques	K4
The ability to use scientific and technological knowledge in the field of Non-destructive Testing	K3
Assess the instruments and interpretation of techniques	K6
Recognition that it is necessary to engage in lifelong learning, thinking processes and development.	K2

Mapping Course Outcome VS Programme Outcomes

CO	PO 1	PO2	PO 3	PO4	PO 5	PO6	PO7	PO8	PO 9	PO10	P11	P12
CO1	2	2	2	2	2	2	2	2	2	2	2	2
CO2	2	2	3	2	2	2	1	1	2	2	2	2
CO3	1	1	2	2	2	1	2	2	2	1	3	2
CO4	2	2	2	1	2	2	1	2	2	2	2	3
CO5	1	2	3	2	2	2	2	2	3	2	2	2
W.AV	**1.6**	**1.8**	**2.4**	**1.8**	**2**	**1.8**	**1.6**	1.8	2.2	**1.8**	2.2	**2.2**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	3	2
CO2	2	2	2	2	2
CO3	3	3	2	2	2
CO4	2	2	3	3	2
CO5	2	2	3	2	2
W.AV	**2.2**	**3.1**	**2.4**	**2.4**	**1.8**

S–Strong(3),M-Medium2,L-Low(1)

<table>
<tr><td colspan="6">III-Semester</td></tr>
<tr><td>SEC III</td><td>Course Code: 11838</td><td>ENTREPRENEURSHIP</td><td>T</td><td>Credits:2</td><td>Hours:2</td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. To enable the students to understand the concept of Entrepreneurship and to learn the professional behaviour about Entrepreneurship.
2. To identify significant changes and trends which create new business opportunities?
3. To analyse the institutional arrangement for potential business opportunities.
4. To provide conceptual exposure on converting ideas to an women entrepreneurship</td></tr>
<tr><td>Unit I</td><td colspan="5">UNITI ENTREPRENEURSHIP
Entrepreneur–Meaning–Importance–Definition–Types–Functions–Qualitiesofan Entrepreneur – Entrepreneurship as a career.
.</td></tr>
<tr><td>Unit II</td><td colspan="5">UNITII BUSINESS
Business Promotion – Product selection – Form of ownership – Plant location – land, building, water and power, raw material, machinery, power and other infrastructural facilities– Licensing, registration and local bye laws.</td></tr>
<tr><td>Unit III</td><td colspan="5">UNITIII BUSINESSPLAN PREPARATION
Institutional arrangements for entrepreneurship development – DIC, SIDCO, NSIC, SISI – Institutional finance to entrepreneurs – TIIC, SIDBI, Commercial banks – Incentives to small scale industries.</td></tr>
<tr><td>Unit IV</td><td colspan="5">UNITIV PROJECT
Project report – Meaning and importance – Project report – Format of a report (as per requirements of financial institutions) – Project appraisal – Market feasibility – Technical feasibility – Financial feasibility and economic feasibility – Break even analysis.</td></tr>
<tr><td>Unit V</td><td colspan="5">UNITV ENTREPRENEURSHIPDEVELOPMENT PROGRAMME
Entrepreneurship development in India – Women entrepreneurship in India – Sickness in small scale industries and their remedial measures</td></tr>
<tr><td colspan="6">Total : 30 Hours</td></tr>
</table>

Text book

1. Ramachandran , Entrepreneurship Development, Mc Graw Hill
2. Katz , Entrepreneurship Small Business, Mc Graw Hill
3. Byrd Megginson, Small Business Management An Entrepreneur's Guidebook 7th ed,McGrawHill

References

1. Entrepreneurship and Management of Small business – Centre for Entrepreneurship Development, Madurai
2. Joseph Paul, N. Ajit kumar and T.Mampilly. Entrepreneurship development. Himalayan Publishing House.
3. Khan, M.A. Entrepreneurship Development Programmes in India. Kanishka Publishing House, Delhi
4. Saravanavel, P. (1997). Entrepreneurial Development. Ess Pee kay Publishing House, Chennai.
5. Vasant Desai. Dynamics of Entrepreneur Development and Management. Himalayan Publishing House.

Course Outcomes		Knowledge Level
CO-1	To understand the significance of entrepreneurship and entrepreneur qualities	K 2
CO-2	To know about the developing ideas and techniques of business.	K 2
CO-3	To understand about the procedures of startup.	K 2
CO-4	To identify the institutional support provided to entrepreneurs.	K 3
CO-5	To analyse the women entrepreneurship development	K 4

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	2	1	2	2	2	1	3	2	3	2	2	2
CO2	2	2	1	3	1	2	2	2	2	2	3	3
CO3	2	2	2	2	2	1	2	1	2	2	2	2
CO4	1	1	1	1	1	2	1	2	2	2	2	2
CO5	2	3	2	2	2	1	2	2	2	3	3	2
W.AV	**1.8**	**1.8**	**1.6**	**2**	**1.6**	**1.4**	**2**	**1.8**	**2.2**	**2.2**	**2.2**	**2.2**

S–Strong(3),M-Medium 2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	2	3
CO2	2	2	2	2	2
CO3	3	1	2	1	2
CO4	2	2	3	2	3
CO5	2	2	2	2	2
W.AV	**2.4**	**1.8**	**2.4**	**1.8**	**2.4**

S–Strong(3),M-Medium 2,L-Low(1)

இரண்டாம் ஆண்டு - மூன்றாம் பருவம்				
பாடக்குறியீட்டு எண்:	பள்ளியில் தமிழ் பயிலாத மாணாக்கர்களுக்கான அடிப்படைத் தமிழ்ப் பாடங்கள்	T/P	C	H/W
	தமிழ் மொழியின் அடிப்படைகள்	P	2	2

நோக்கம் :	➢ இலக்கணம் அறிந்து கொள்ள வாய்ப்பினை ஏற்படுத்துதல். ➢ தமிழ் மொழியில் பிழையின்றி எழுத அறிந்துகொள்ள வாய்ப்பினை ஏற்படுத்துதல்.
அலகு -1	எழுத்துக்கள் – உயிர் எழுத்துக்கள் – மெய்யெழுத்துக்கள் – உயிர்மெய்யெழுத்துக்கள்
அலகு -2	சொற்களின் வகை அறிதல் – பெயர்ச்சொல் – வினைச்சொல் – இடைச்சொல் – உரிச்சொல்
அலகு-3	எழுத்துக்களின் வேறுபாடு அறிதல்: ணகர, னகர எழுத்துக்கள் சொற்களில் பயின்று வருதல் லகர, ழகர, ளகர வேறுபாடு அறிதல் ரகர, றகர வேறுபாடு அறிதல்.
அலகு -4	எழுத்துக்களின் பிறப்பு – உச்சரிப்புப் பயிற்சி அளித்தல் – பிழையின்றிப் படிப்பதற்குப் பயிற்சி அளித்தல்.
அலகு -5	பிறமொழிச் சொற்களைக் கண்டறிதல் – தமிழ் மாதங்கள் – கிழமைகள் – எண்கள் – சுவைகள் – உறவுப் பெயர்கள் ஆகியவற்றை அறிதல்
பயன்கள்:	➢ அடிப்படை இலக்கணச் சூழலியல் கற்றால் தமிழ் மொழி இலக்கணங்கலை பிறமொழிகளோடு ஒப்பிடும் ஆற்றல் பெறுவர். ➢ அழகியல் உணர்ச்சிகளைப் புரிந்து கொள்ள ஏதுவாக இலக்கணம் இருக்கிறது என்பதை உணர்ந்து தனித்துவம் வாய்ந்தவர்களாக தன்னம்பிக்கைப் பெற்றவர்களாக மாறலாம்.

இரண்டாம் ஆண்டு - மூன்றாம் பருவம்				
பாடக்குறியீட்டு எண்:	பள்ளியில் மேல்நிலைப் படிப்பு வரை தமிழ் பயின்று கல்லூரியில் பகுதி 1– இல் தமிழ் பயிலாத மாணாக்கர்களுக்கான சிறப்புத் தமிழ்ப் பாடங்கள்	T/P	C	H/W
	இக்கால இலக்கியம்	P	2	2

நோக்கம்	➢ கவிதை, சிறுகதை, புதினம், உரைநடை ஆகிய படைப்பியல் வகைகளைப் பற்றிய பரந்துபட்ட புலமையைப் பெருக்குதல். ➢ இக்காலத் தமிழ் இலக்கியங்களின் உள்ளடக்கம், வெளியீட்டு நெறி, படைப்பில் கொள்கை ஆகியவற்றை அறியச் செய்தல்
அலகு1	**கவிதை இலக்கியம்**
அலகு2	1. பாரதியார் – சுதந்திரப் பாடல்கள்: 'சுதந்திரப் பெருமை' என்ற பாடல் முதல் 'சுதந்திரப் பள்ளு' என்ற பாடல் வரை உள்ள 06 பாடல்கள். 2. பாரதிதாசன் – தமிழ் (முதல்தொகுதி) 'தமிழின் இனிமை' என்ற பாடல் முதல் 'தமிழ்க்கனவு' என்ற பாடல் வரை உள்ள 10 பாடல்கள். 3. நாமக்கல் கவிஞர் – காந்தி மலர் : 'காந்தி அஞ்சலி' என்ற பாடல் முதல் 'இணையிலர் காந்தி' என்ற பாடல்வரை உள்ள 6 பாடல்கள். 4. கவிமணி – உடல் நலம் பேணல் 'உடலின் உறுதி உடையவரே' என்ற பாடல் முதல் 'அருமை உடலின் நலமெல்லாம்' என்ற பாடல் வரை உள்ள 8 பாடல்கள் 5. பட்டுக் கோட்டை கல்யாண சுந்தரம் - காடு வெளையட்டும் பொண்ணே 6. கண்ணதாசன்- மனிதரைப் பாட மாட்டேன் (கவிதைகள்) 7. ஜீவா - பெண் விடுதலை 8. அப்துல் ரகுமான் - வீட்டுக்கொரு மரம் (கூடு துறக்கும் பறவை) 9. சண்முகம் சரவணன் - இயல்பாய் நடந்தேறியது
அலகு3	**நாவல் இலக்கியம்** இறையன்பு - ஆத்தங்கரை ஓரம்,
அலகு4	**சிறுகதை இலக்கியம்** 1. வ.வே.சு.ஐயர் - குளத்தங்கரை அரசமரம் 2. அறிஞர் அண்ணா - செவ்வாழை 3. ஜெயகாந்தன் - முன் நிலவும் பின் பனியும் 4. கி. ராஜநாராயணன். - கதவு 5. தனுஷ்கோடி ராமசாமி. - வாழ்க்கை நெருப்பு 6. சே. செந்தமிழ்ப்பாவை. - வல்லமை தந்துவிட்டாய் 7. கரு. முருகன். - அப்பாவுக்கு காய்ச்சல் 8. சு.காந்திதுரை - துணிக்காரச் சாமி 9. கெண்டக்கரை வேட்டி - பாண்டுரங்கன்

அலகு I	**இலக்கணம்** முதல் எழுத்துக்கள் – சார்பெழுத்துக்கள் – மொழி முதல் எழுத்துக்கள் – மொழி இறுதி எழுத்துக்கள் – வல்லினம் மிகும் இடங்கள், மிகா இடங்கள்.
நியூ செஞ்சுரி புக் ஹவுஸ் பிரைவேட் லிமிடெட்.சென்னை - 98.	
பயன்கள்	➢ இலக்கியங்கள் வாயிலாக மாணவர்கள் பல்வகைப்பட்ட சமூகப் போக்குகளையும் மக்களின் பண்பு நலன்களையும் அறிந்து கொள்ள இயலும். ➢ பல வகையான இலக்கிய வாசிப்பின் வாயிலாக மாணவர்கள் தங்களின் படைப்பாற்றல் உள்ளிட்ட பணி நிலைகளுக்கு உயர்வதற்கான வாய்ப்பினைப் பெறுவர்.

Semester III				
Course Code	**NME**	**T/P**	**C**	**H/W**
11839B	**IT Skills for Employment (Common to all UG programmes)**	**T**	**2**	**2**

Objectives:

- Understand the components of computer
- Understand Internet and its terminology
- Understand basic cyber safety and security norms

Unit-1	IntroductiontoComputers–TypesofComputer-Hardware–Motherboard-Processor- RAM–ROM – SMPS – Graphics Card– Storage Devices – Hard Disc – SSD – DVD – CD – Pen drive- – Input/Output Devices – Keyboard – Mouse – Mic- Monitor-Camera-Types of Printer, Scanner, Projector. Basic of Computer network-Modem, Hub, Switch, Bridge, Routers-Wi-Fi – Bluetooth. Introduction to Free and Open Source Software(FOSS)–Need of Open Sources– Advantages of Open Sources–Copyrights-Software piracy.
Unit-2	BasicsofOperatingSystem–Differencebetweenvariousoperatingsystems-UserInterface of windows 10 OS - create , Copy ,Move and delete files and folders -Use of pen drive -CD-DVD Burning -Windows tools and features-Disk Space management-Disk Clean up-Managing Recycle Bin-Disk defragmentation-Add/remove software' sand programs.
Unit-3	Basic operating of word processing - Creating, opening and closing documents- Use of shortcuts-Creating and Editing of Text - Formatting the text - Find and replace - Drawing Table-Page layout-Header / Footer - Setting page number-Creating simple applications like - resume - letter writing ,job application ets- Printing document. Basics of Excel worksheet & its importance-creating simple worksheets- formulas-conditional formatting-sort-filter- chart. Introduction to PowerPoint-understand various views of presentation, animations, transitions, header, footer etc.
Unit-4	Internet – ISP-Word wide web (www)-web browser-search engine- creating& using an email account like gmail or any other- checking email and composing Email-Attaching documents-Usage of CC & BCC. Understanding IP address-Bandwidth -Storing and retrieving file through google drive –sharing files and folders-google docs - language translation -voice to text, text to voice application-Google Meet-Zoom-Social media merits and demerits. Online educational websites (Moocs- nptel - Swayam Central- spoken-tutorial.org)-Video tutorials-Step to use Government portals like aadhaar-Election commission website-Eservices(eservices.tn.gov.in) etc-– Job Portals - Online Bill payment- Online fund transfer usingUPIgateway.
Unit-5	Internet Safety concerns: (Digital Footprints, Threats, Virus, Worm, Trojan Horse, Spam, Malware,Adware,Spyware,Snooping)-SecurityMeasures:(Antivirus,Firewall)-Cyber Crime:(Phishing,

	Pharming,Spoofing,Hacking,Cracking,IdentityTheft)CyberSafety(ITAct,CyberLaws).
ReferenceBooks: VikasB. Agarwal Jyoti P. Mirani, *Computer Fundamentals* -Publisher: Nirali Prakashan (1 August 2019) LambertJoan, Lambert Steve, *Windows 10 Step By Step*, Publisher :PHI Learning PvtLtd Mike Mc Grath and Michael, Office 2016 In Easy Steps, Price Publisher: BPB Publications Adesh K. Pandey, Internet Fundamentals JamesKL, TheInternet: AUsersGuide Jaago Teens, *Cyber Safety For Everyone* - BPB Publications (October 12, 2019) Refer website's and You tube tutorials .	
Outcomes	➢ Skillstoworkefficientlywithwindows,word,excel,powerpointpresentation. ➢ Skills to use internet for various purpose with safe and secure.

IV-Semester					
T/OL	**Course Code: 11841F**	**FRENCH**	**T**	**Credits:3**	**Hours:3**

Course Objectives	1. Apply connecting words (cause, but, concession, condition, hypothèse, conséquence) to improve the spoken as well as written communication skills 2. Differentiate the various past tenses in "Les Temps du Passé" and their unique usage 3. Summarize the literary texts 4. Identify and apply the different grammatical tenses of "les temps du passé" in sample exercises to practice 5. Critically assess the literary texts through an analysis of its themes, narrative techniques, characters and its cultural significance

Unit I	Décadi et son grand-pèreLe Petit chose Le passé simple	**(9) Hours**
Unit II	L'égoïste puniEstula Temps du passé – Emplois (le passé composé, l'imparfait, le passé simple, le plus-que-parfait)	**(9) Hours**
Unit III	Une Saison dans la vie d'EmmanuelL'expression de la cause L'expression de la conséquence	**(9) Hours**
Unit IV	Une mauvaise nouvelleL'expression du but L'expression de la concession	**(9) Hours**
Unit V	La visite de la grand-mèreLe Horla L'expression de la condition et de l'hypothèse	**(9) Hours**
		Total : 45 Hours

References

K.Madana gobalane & N.C.Mirakamal, *Lefrançaisparlestextes*, Chennai, Samhita Publications –Goyal Publisher & Distributors Pvt Ltd,2017

Course Outcomes		**Knowledge Level**
CO-1	Demonstrate the usage of connecting words in a giventext	K2
CO-2	Understand and differentiate the various types of past tenses in "*Les Temps du Passé*"	K2 and K4
CO-3	Summarize the literary texts after a thorough analysis	K2 and K4
CO-4	Identify and apply the different grammatical tenses of"*les temps du passé*"	K3
CO-5	Analyze and critically assess the literary texts with regard to the themes and literary techniques	K4 and K5

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	S	M	L	S	M	L	S	S	M	S	L
CO2	S	M	M	L	M	M	L	S	S	S	M	L
CO3	M	S	S	M	M	M	M	S	M	M	S	L
CO4	S	M	M	L	M	M	L	S	S	S	M	L
CO5	M	S	S	M	M	M	M	S	M	M	S	L

S-Strong M-Medium L-Low

IV-Semester					
E	**Course Code: 11842**	**GENERAL ENGLISH-IV**	**T**	**Credits:3**	**Hours:3**

Course Objectives

1. To help learners imbibe goal-setting attitude.
2. To enable them to understand the value of integrity
3. To help them deal with emotions.
4. To teach the learners to frame sentences using tenses.
5. To enhance reporting skills.

Unit I — **GOAL SETTING (UNICEF)** — **(9) Hours**

Life Story

From Chinese Cinderella – Adeline Yen Mah

Why I Write - George Orwell

Short Essay

On Personal Mastery – Robin Sharma

On the Love of Life – William Hazlitt

Unit II — **INTEGRITY** — **(9) Hours**

Short Story

The Taxi Driver – K.S. Duggal

Kabuliwala - Rabindranath Tagore

A Retrieved Reformation – O Henry

Extract from a play

The Quality of Mercy (Trial Scene from the Merchant of Venice - Shakespeare)

Unit III — **COPING WITH EMOTIONS** — **(9) Hours**

Poem

Pride – Dahlia Ravikovitch

Phenomenal Woman – Maya Angelou

Reader's Theatre

The Giant's Wife A Tall Tale of Ireland –William Carleton

The Princess and the God : A Tale of AncientIndia

Unit IV — **Language Competency Sentences** — **(9) Hours**

Simple Sentences

Compound Sentences

Complex Sentences

Direct and Indirect Speech

Unit V — **Report Writing** — **(9) Hours**

Narrative Report

Newspaper Report

Drafting Speeches

Welcome Address

Vote of Thanks

Total : 45 Hours

References

1 Oxford Practice Grammar , John Eastwood, Oxford University Press
2 Cambridge Grammar of English , Ronald Carter and Michael McCarthy
3 George Orwell Essays, Penguin Classics

Course Outcomes		Knowledge Level
CO-1	Determine their goals	PO1,PO7
CO-2	Identify the value of integrity.	PO1,PO2,PO10
CO-3	Deal with emotions.	PO4,PO6,PO9
CO-4	Frame grammatically correct sentences	PO4,PO5,PO6
CO-5	Write cohesive reports.	PO3,PO8

Mapping with Programme Outcomes:

	PO1	PO 2	PO3	PO 4	PO 5	PO 6	PO7	PO 8	PO 9	PO1 0
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	2	3	3	3	3	3	2	2	3

3– Strong, 2 – Medium , 1 – Low

Mapping with Programme Specific Outcomes:

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4
CO1	3	3	3	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
CO5	3	3	3	3
Weightage	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0

IV-Semester					
Core	**Course Code: 11843**	**AIRCRAFTINSTRUMENTS**	**T**	**Credits:4**	**Hours:4**
Course Objectives	1. It aims at enabling the student to understand Different type of instruments used in aircraft 2. To study various conventional types of Instruments with its construction and principle of operation. 3. To learn about direct reading and Remote reading Compass. 4. Acquire the knowledge of aircraft instruments 5. Provide students with an understanding of the scope and extent of avionics in modern aerospace vehicle systems.				
Unit I	**BASIC AIRCRAFT INSTRUMENTS** **(12) Hours** Instrument displays, panels and layouts – Quantitative displays – Circular scales, Straight scales, and Digital displays. Qualitative displays – Director Displays, LED and LCD displays. Description of operational range markings on instrument dial and colors. Description of International Standard Atmosphere and its assumptions. Description of Barometers – Advantages and Disadvantages.				
Unit II	**FLIGHT INSTRUMENTS** **(12) Hours** Description of basic air data system – Pitot-Static probes, Static vents and their installation on aircraft. Description of Pitot heater arrangement, Constructional features and principle of operation of 'Altimeter' and its 'Q' code settings. Constructional features and principle of operation of Air Speed Indicator, Constructional features and principle of operation of Vertical Speed Indicator, Constructional features and principle of operation of Machmeter.				
Unit III	**GYROSCOPIC FLIGHT INSTRUMENTS** **(12) Hours** Gyroscopic theory, types of gyroscopes and their application in instruments Description of driving force of gyroscopes. Constructional features and principle of operation of 'Directional Gyroscopes' / 'Direction Indicator'. Constructional features and principle of operation of 'Artificial Horizon' Constructional features and principle of operation of 'Turn and Slip Indicator'				
Unit IV	**ENGINE INSTRUMENTS** **(12) Hours** Constructional features and principle of operation of 'Pressure Gauges' (Bourdon tube type) Manifold pressure gauge, Torque Pressure Indicator, Engine pressure Ratio Indicator and Fuel Flow meters. Constructional features and principle of operation of 'Temperature Indicating System' (Oil temperature gauge – Wheatstone Bridge type and Ratio meter type). Description of Thermocouple type thermometers (CHT and EGT gauges). Description of Fuel Quantity indicating system (Capacitance type) and its operation.				
Unit V	**COMPASS** **(12) Hours** Description of magnetic properties and laws of magnetism. Earth as a magnet and Form of earth. Compass Terminology (Magnetic Variation, Deviation and Magnetic DIP). Description of 'Terrestrial magnetism'. Types of Compasses – Direct Reading (DR) and Remote Reading (RR). Constructional features of DR Compass and their function. Constructional features of RR Compass and their function. Advantages of RR Compass. Calibration of DR compass				
Total : 60 Hours					

Text book

1. Aircraft instrumentation and system, S Nagabhushana and L. K. Sudha, I. K. International Pvt Ltd,

References

1. Aircraft Instrument Second Edition EHJ Pallet.
2. Aircraft Instruments and Integrated System EHJ Pallet
3. Aircraft Instrument CA Williams
4. Auto flight Control EHJ Pallet & Shawn Coyle
5. Flight Instrument Sixth edition David Harries

Course Outcomes		**Knowledge Level**
CO-1	Acquire knowledge of various flight displays.	K2
CO-2	Have knowledge of the various aircraft's basic instruments.	K3
CO-3	Get an understanding of the different gyroscopic flight instruments.	K2
CO-4	Develop knowledge of the use of engine instruments.	K1
CO-5	Understanding about the various compass used in Aircraft.	K2

Mapping Course Outcome VS Programme Outcomes

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**P11**	**P12**
CO1	3	2	2	2	2	3	2	2	2	2	2	2
CO2	2	2	2	2	2	2	2	2	2	1	2	3
CO3	2	3	2	2	2	2	2	2	2	2	2	2
CO4	3	2	2	2	2	2	2	2	2	2	2	2
CO5	2	2	2	2	2	2	2	2	2	2	3	2
W.AV	**2.4**	**2.2**	**2**	**1.8**	**1.8**	**2.2**	**1.8**	**2**	**1.8**	**1.8**	2.2	**2.2**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	2	2	3	2
CO2	2	2	3	2	2
CO3	2	2	2	3	1
CO4	3	2	2	2	2
CO5	2	2	2	2	2
W.AV	**2.4**	**1.8**	**2.2**	**2.4**	**1.8**

S–Strong(3),M-Medium2,L-Low(1)

IV-Semester					
Core	**Course Code: 11844**	**AIRCRAFT RULES AND AIR WORTHINESS REGULATIONS**	**T**	**Credits: 4**	**Hours: 4**
Course Objectives	Introduction to aircraft rules as far as they relate to airworthiness and safety of aircraft Knowledge of mandatory documents like certificate of Registration Procedure for development and test flights and certification. Certificate of Flight release Certificate of Maintenance, Approved Certificates. Technical Publications, Aircraft Manual, Flight Manual, Aircraft Schedules				
Unit I	**AIRCRAFT ACTS & RULES, DGCA** **(12) Hours** Indian Aircraft Act -1934: Introduction & Different Powers of Central Government (Aircraft Manual (INDIA) Volume-1) - Aircraft Rules -1937: Short title and extent, Definitions and Interpretation (Aircraft Manual (INDIA) Volume-1)-Introduction to the Directorate General of Civil Aviation (DGCA)-Organization and Functions of DGCA -Civil Aviation Requirements (CAR),(CAR-Section 1-General,Series-A, part-1) 1 Sections and Details of Series (Subjects) in a CAR. 2 Aeronautical Information Circular (AIC) 3 Airworthiness Advisory Circulars (AAC) Aircraft Log books: recording and preservation of log books (CAR-Section 2-Airworthiness-Series 'x'-part-VI) -Units of Measurements to be used in air and ground operations (CAR-Section 1-General-Series B-Part I)				
Unit II	**REGISTRATION OF AIRCRAFT & APPROVAL OF ORGANISATION** **(12) Hours** Registration/Deregistration of Aircraft (Procedure, Validity, Registration markings, Registration fees. (CAR-Section 2-Airworthiness-Series F-part-I)-Airworthiness Certificate: Issue, Validation and Suspension of Airworthiness Certificate (CAR-Section-2-Airworthiness-Series F-part III)-Type Certificate: Requirements for validation of Type Certificate of Aircraft and its products (CAR-Section 6- Design Standards and Type Certification-Series A-part I,II)-Mandatory Modifications/Inspections (Section 2, Series-M- Part I,II)- Special Flight permit: (CAR-Section 2-Airworthiness-Series F-part-VII) -Approval of Organisation: Categories, Requirements, validity, Renewal of approval (CAR-Section 2-Airworthiness-Series E-part I)				
Unit III	**AME LICENSING** : **(12) Hours** Categories, Eligibility, Continued Validity of AME License. (CAR-66 ISSUE-II R 4-SECTION-A-Technical Requirements-SUBPART-A) -Issue of Authorisation to Aircraft Maintenance Engineers-(CAR-Section 2-Training & -Airworthiness-Series L-Part IX) -Cabin Crew Training (CAR-Section 7-Training & Licensing-Series M-Part I) -Flight Dispatchers Training Approval (CAR-Flight Crew Standards, Training & Licensing- Section 7-Training & Licensing-Series M-Part II)				

Unit IV	**AIRCRAFT AIR WORTHINESS: (12) Hours** -Flight testing of aircraft for which a C of A had been previously issued: Circumstance, Certification before Test flight, Procedure, Flight Test Report, Monitoring of Flight Performance, Evaluation, Certification (CAR-Section 2-Flight Testing of Aircraft-Series T-Part II) -Defect Recording, Reporting, Investigation, Rectification and Analysis (CAR-Section 2-Airworthiness-Series C-Part I) -Minimum Equipment List: (CAR-Section 2-Airworthiness-Series B-Part I) -Weight and Balance of Aircraft (CAR-Section 2-Airworthiness-Series X-Part 2) -Documents to be carried on board by Indian Registered Aircraft (CAR-Section 2-Airworthiness-Series X-Part VII) -Requirements for Issue of Taxy Permit (CAR-Section 2-Airworthiness-Series X-Part VIII) -Aircraft Equipment and Instruments for different types of Aircraft operations e.g Day Flying, Night Flying, High altitude, Overwater, etc. (CAR-Section 2-Airworthiness-Series I-Part II) -Purpose and operation of Flight Data Recorder (FDR),(CAR-Section 2-Airworthiness-SeriesI –Part V) - Cockpit Voice Recorder (CVR),(CAR- Section 2-Airworthiness Series-I Part-VI) - Ground Proximity warning System (GPWS),(CAR-Airworthiness-Section 2-Series I-Part VII) -Traffic Collision Avoidance System (TCAS), Emergency Locater Transmitter (ELT) -Provision of Medical supplies in Aircraft: -First aid kit, Medical kit, Universal Precaution kit and its general Requirement (CAR-Section 2-Airworthiness-Series X-Part III)
Unit V	**Aircraft Fuelling Procedures (12) Hours** (CAR-Section 2-Airworthiness-Series H-Part II) -Special Precautions to be taken in the fuelling zonen -Safety precautions against Static Electricity discharge, bonding, earthing, Fire Hazard, Storm, Rain -Servicing and Maintenance of Aircraft during Fuelling -Fuelling with Passengers aboard **Air Safety:** Flight safety Awareness and accident / incident Prevention **AIRCRAFT ACTS & RULES** • Indian Aircraft Act 1934 • Aircraft Rules – 1937 related to Registration Airworthiness, Maintenance and operation (CARSeries F- part 3, 5) • Civil Aviation Requirements (CAR), (series A part - I) 1. Section of CAR 2. Subjects, Procedure of issue and revision/ amendments, various circular issued by DGCA 3. Aeronautical information circular (AIC) 4. Air worthiness advisory circulars (AAC) • CAR – 21, Type certificate, modifications (CAR series M part I) • Aircraft log books, recording and preservation of logbooks (CAR series x part VI).
	Total : 60 Hours

Text book

1. Civil Aviation Requirement M

References

1. Aircraft Act. 1934 & Aircraft rules 1937 by DGCA.
2. Civil Aviation Requirement Section-2 by DGCA.
3. Civil Aviation Requirement 21.
4. Civil Aviation Requirement 145

Course Outcomes		Knowledge Level
CO-1	Introduction to aircraft rules as far as they relate to airworthiness and safety of aircraft	K1
CO-2	Knowledge of mandatory documents like certificate of Registration	K1
CO-3	Procedure for development and test flights and certification. Certificate of Flight release	K2
CO-4	Certificate of Maintenance, Approved Certificates. Technical	K4
CO-5	Publications, Aircraft Manual, Flight Manual, Aircraft Schedules	K5

Mapping Course Outcome VS Programme Outcomes

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PO 8	PO 9	PO10	P11	P12
CO 1	3	2	2	2	1	2	2	2	2	2	2	2
CO 2	2	3	2	1	2	2	2	1	2	1	2	2
CO 3	2	3	2	2	2	2	2	2	2	2	2	2
CO 4	2	2	1	2	2	2	2	2	2	2	2	2
CO 5	3	2	3	2	2	2	1	2	2	2	3	2
W.AV	**2.4**	**2.4**	**2**	**1.8**	**1.8**	**2**	**1.8**	**1.8**	**2**	**1.8**	**2.2**	**2**

S –Strong (3), M-Mediu2, L- Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO 1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2
CO2	2	2	2	2	2
CO3	2	1	2	3	2
CO4	2	2	2	2	3
CO5	2	2	2	2	3
W.AV	**2.2**	**1.8**	**2**	**3.1**	**2.4**

S –Strong (3), M-Mediu2, L- Low (1)

IV-Semester					
Core	**Course Code: 11845**	**AIRCRAFT MATERIALS & STRENGTH OF MATERIAL LAB– PRACTICAL**	**P**	**Credits:3**	**Hours:6**
Course Objectives	1. To determine experimental data include universal testing machines and torsion equipment. 2. To determine experimental data for spring testing machine, compression testing machine, impact tester, hardness tester. 3. To determine stress analysis and design of beams subjected to bending and shearing loads using several methods. 4. To determine Flexural strength of a beam. 5. To determine experimental stress with fatigue and compression Tests.				

1. Study OF Ferrous metals and non- ferrous metals.
2. Study of heat treatment process and its effects.
3. Study of Aircraft Hardware
4. Study of Plastic material and its uses in Aircraft Industry.
5. Study of Composite material and its uses in Aircraft Industry
6. Tension test
7. Bending test on (Steel / Wood) Cantilever beam.
8. Bending test on simple support beam.
9. Impact test
10. Spring test
11. Torsion test
12. Hardness test

Total : 30 Hours

Course Outcomes	**Knowledge Level**
1. Analyse and design structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain and elastic behaviour of materials.	K5
2. Understand the basic concepts of stress, strain, deformation, and material behaviour under different types of loading (axial, torsion, bending).	K4
3. Perform stress analysis and design of beams subjected to bending and shearing loads using several methods.	K3
4. Calculate the stresses and strains in axially-loaded members subject to flexural loadings.	K6
5. Ability to conduct compression tests and Fatigue of cast iron and steel.	K2

Mapping Course Outcome VS Programme Outcomes

CO	PO 1	PO2	PO 3	PO4	PO 5	PO6	PO7	PO8	PO 9	PO10	P11	P12
CO1	2	2	2	2	2	2	2	2	2	2	2	2
CO2	2	2	2	2	2	2	3	2	2	2	2	2
CO3	1	1	3	2	2	1	2	2	2	1	1	1
CO4	2	2	2	3	2	2	2	1	2	2	2	2
CO5	1	2	2	2	2	2	3	2	3	2	1	2
W.AV	**1.6**	**1.8**	2.2	**2.2**	**2**	**1.8**	**2.4**	**1.8**	2.2	**1.8**	**1.6**	**1.8**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	2	3	2
CO2	2	2	2	2	2
CO3	3	2	3	2	2
CO4	2	3	2	3	2
CO5	2	2	2	2	2
W.AV	**2.2**	**2.4**	**3.1**	**2.4**	**1.8**

S–Strong(3),M-Medium2,L-Low(1)

IV-Semester					
Allied	**Course Code: 11846**	**AEROENGINEERING THERMODYNAMICS**	**T**	**Credits:3**	**Hours:4**
Course Objectives	1. To determine the Mode of heat transfer and Enthalpy and law of conservation of mass. 2. To understand the cycle of Refrigeration and Air Standard cycles 3. To define the concept of ideal gases and the Theory of combustion 4. To understand the working of Air compressor 5. To discuss the aircraft propulsion system and Gas turbine				
Unit I	**BASIC CONCEPTS** **(9) Hours** Introduction- systems and surroundings property and Thermodynamic equilibrium, work and form of work Heat and modes of heat transfer, internal energy, zeroth law, first and second law of thermodynamics. Enthalpy, Entropy, law of conservation of mass, law of conservation of momentum, steady flow processes, Energy equation and Allied problems.				
Unit II	**IDEAL GASES** **(9) Hours** Introduction- Boyle's law, Charle's law, Gas equation Universal gas constant, Joules law specific heats of gases, Allied problems. **REFRIGERATION CYCLES:** Refrigeration process, Reversed heat, engine vapour compression absorption cycles, Gas cycle refrigeration- liquefaction of gases, Production of solid ice (Tonnage Problems) Air Conditioning fundamentals, Types. **AIR STANDARD CYCLES** Introduction- Efficiency of Air standard cycle and engine Carnot cycle, Otto cycle, Diesel cycle, Dual cycle Brayton cycle and Allied problems				
Unit III	**PROPERTIES OF GASES AND GAS MIXTURES** **(9) Hours** Avogadro's law, ideal gases, Gas compression, Properties of mixture of gases, Dalton's law of partial pressures, internal energy, Enthalpy and specific heats of gas mixtures. **FUELS AND COMBUSTION** Types of fuel, calorific values of fuels, combustion of fuels, and calculation of minimum air required for combustion. Determination of excess air supplied.				
Unit IV	**AIR COMPRESSORS** **(9) Hours** Working of reciprocating air compressor, Terminology Isothermal efficiency, Multistate compression Intercooler power and efficiency of compressor. Allied problems, Introduction to rotary compressors, centrifugal compressors, Axial flow compressors, simple problems				
Unit V	**AIRCRAFT PROPULSION SYSTEM** **(9) Hours** Piston Engine, Gas turbine Engine, Future propulsion systems **GAS TURBINES** Classification of gas turbines constant pressure, closed cycle gas turbines, open cycle gas turbines. Advantages and disadvantages of closed cycle, Thermal efficiency of gas turbines, Jet propulsion, Rocket propulsion.				

Text book

1. E.Rathakrishnan, Fundamentals of Engineering Thermodynamics, 2 nd Edition, Prentice – Hall of India Pvt. Ltd, 2006

References

1. Thermodynamics & Thermal Engineering Kothandaraman.
2. Engineering Thermodynamics – Nag.
3. Fundamentals of Electric propulsion – Ion & Hall Thrusters (Author DAN- M GOEBELL&IRACATZ)
4. Nag.P.K., "Engineering Thermodynamics", 4 th Edition, Tata McGraw-Hill, New Delhi, 2008.

Holman.J.P., Thermodynamics, 3rd Edition. McGraw-Hill, 1995.

Course Outcomes		**Knowledge Level**
CO-1	Determine the Mode of heat transfer and Enthalpy and law of conservation of mass	K5
CO-2	Understand the cycle of Refrigeration and Air Standard cycles	K2
CO-3	Define the concept of ideal gases and the Theory of combustion	K1
CO-4	Understand the working of Air compressor	K2
CO-5	Discuss the aircraft propulsion system and Gas turbine	K5

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	2	2	2	2	2	1	3	2	2	2	1	1
CO2	2	2	1	2	1	2	2	1	1	1	2	2
CO3	2	2	2	2	1	1	2	1	2	2	2	1
CO4	2	1	2	2	1	2	2	2	2	2	2	2
CO5	2	3	2	2	2	1	2	2	1	3	2	2
W.AV	**2**	**2**	**1.8**	**2**	**1.4**	**1.4**	**2.2**	**1.6**	**1.8**	**2**	**1.8**	**1.6**

S–Strong(3),M-Medium 2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	2	2
CO2	2	2	2	2	2
CO3	1	1	2	1	2
CO4	2	2	1	2	3
CO5	1	2	2	2	3
W.AV	**2**	**1.8**	**2**	**1.8**	**2.4**

S–Strong(3),M-Medium 2,L-Low(1)

IV-Semester					
Allied	**Course Code:11847**	**SOFTWAREMULTI-SIMLAB-PRACTICAL**	**P**	**Credits:2**	**Hours:4**

Course Objectives	The student should be made: • To visualize the effects Rectifier. • To visualize the effects Amplifier &Oscillator. • To Implement AM & FM modulation and demodulation. • To visualize the effects communication signal using filter circuit.

List of Experiments

1. Study of Simulation software using simple circuits.
2. Rectifier circuits (Half wave, Full wave, Bridge rectifier with filters)
3. Power Supply design with regulators, LM7805, LM7812
4. Waveform generator using BC147 Transistors (Astable multivibrator)
5. Waveform generator using BC147 Transistors (Monostable Multivibrator)
6. Clipper and Clambers. (Positive edge and Negative edge)
7. Op-Amp application-I.
   (Inverter Amplifier, Difference Amplifier)
8. Op-Amp applications-II
   (RC Phase Shift Oscillator, Wein Bridge Oscillator)
9. AM Modulation and Demodulation
10. FM Modulation and Demodulation
11. Low Pass Filter, High Pass Filter And Band Pass Filter

Total : 30 Hours

Course Outcomes	**Knowledge Level**
• Simulate and analyze performance of Rectifier.	K4
• Simulate and analyze Waveform generator.	K3
• Simulate and analyze Amplifier &Oscillator circuits.	K4
• Simulate & validate the various modulation and band filters of a communication system	K4

Mapping Course Outcome VS Programme Outcomes

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PO 8	PO 9	PO10	P11	P12
CO 1	2	2	2	2	2	2	1	2	2	2	2	2
CO 2	1	3	2	2	1	1	2	2	2	2	2	2
CO 3	2	2	2	2	2	1	2	2	3	1	1	2
CO 4	2	3	2	1	2	2	2	1	2	2	2	2
CO 5	2	2	2	2	1	2	2	2	2	2	2	2
W.AV	1.8	2.4	2	1.8	1.6	1.6	1.8	1.8	2.2	1.8	1.8	2

S–Strong(3),M-Mediu2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2
CO2	2	2	3	2	2
CO3	3	1	2	3	3
CO4	2	2	2	2	2
CO5	2	2	2	2	2
W.AV	2.4	1.8	2.2	2.2	3.1

S–Strong(3),M-Mediu2,L-Low(1)

இரண்டாம் ஆண்டு - நான்காம் பருவம்				
பாடக்குறியீட்டு எண்:	பள்ளியில் தமிழ் பயிலாத மாணாக்கர்களுக்கான அடிப்படைத் தமிழ்ப் பாடங்கள்	T/P	C	H/W
	இலக்கியமும் மொழிப் பயன்பாடும்	P	2	2

நோக்கம்	➢ மாணவர்கள் தமிழின் சிறப்புகள் அறிதல். ➢ பிழையின்றித் தமிழ் பேசுவதற்குப் பயிற்சி அளித்தல்
அலகு1	தமிழ் நீதி இலக்கியக் கருத்துக்களை அறிதல் திருக்குறள் (**அறன் வலியுறுத்தல்**) – **10** குறட்பாக்கள் ஆத்தி சூடி – முதல் **20** பாடல்கள் மூதுரை – முதல் **15** பாடல்கள்
அலகு2	தமிழின் சிறப்புகளை அறிதல் – (வாய்மொழித் தேர்வு) தமிழ்மொழியின் தொன்மை – சிறப்பு – தமிழ் இலக்கியங்கள் – சங்கப்புலவர்கள் தமிழ்க்காப்பியங்கள் – புதுக்கவிஞர்கள் – குறித்த செய்திகளை அறிதல்
அலகு3	சொற்களின் பயன்பாடு. அருஞ்சொற்பொருள் அறிதல் – பிரித்து எழுதுதல் – சேர்த்து எழுதுதல் – எதிர்ச்சொல் அறிதல், ஓரெழுத்து ஒரு மொழி அறிதல்
அலகு4	பிழையின்றித் தமிழ் பேசுவதற்குப் பயிற்சி அளித்தல் (வாய்மொழித் தேர்வு) **1.** பழமொழிகள், உவமைகள், மரபுத்தொடர்கள் ஆகியவை குறித்து அறிந்து பேசும் திறன்களை வளர்த்தல். **2.** வரவேற்புரை, நன்றியுரை ஆற்றுவதற்குப் பயிற்சி அளித்தல் **3.** கதைசொல்லும் திறன்களை வளர்த்தல்.(நீதிக் கதைகள் கூறல்)
அலகு5	மொழிபெயர்ப்பு ஆங்கிலத்திலிருந்து தமிழில் மொழிபெயர்த்தல் **1.** ஆங்கிலச் சொற்களை மொழி பெயர்த்தல் **2.** ஆங்கிலத் தொடர்களைத் தமிழில் மொழிபெயர்த்தல்
பயன்கள்	➢ அச்சமின்றி தெளிவாக தங்களது கருத்துக்களை மாணவர்கள் எடுத்துரைக்க வழி அறிதல். ➢ சொற்களின் பயன்பாடு, தயக்கமின்றி பேசக் கற்றுக்கொள்வதால் மாணவர்கள் தன்னம்பிக்கை பெறுதல்

இரண்டாம் ஆண்டு - நான்காம் பருவம்				
பாடக்குறியீட்டு எண்:	பள்ளியில் மேல்நிலைப் படிப்பு வரை தமிழ் பயின்று கல்லூரியில் பகுதி 1-இல் தமிழ் பயிலாத மாணாக்கர்களுக்கான சிறப்புத் தமிழ்ப்பாடங்கள்	T/P	C	H/W
	பழந்தமிழ் இலக்கியங்களும் இலக்கியவரலாறும்	P	2	2

நோக்கம்	➢ மாணவர்கள் தமிழ் மொழியினைக் கற்பதால் அரிய இலக்கியங்களை அறியச் செய்தல் ➢ **வாழ்வியல் அறங்களுக்கு வழிகாட்டுதலாக இருத்தல்**
அலகு1	**சங்க இலக்கியம்** 1. நற்றிணை – 'நயனும், நண்பும், நாணும் 'எனத் தொடங்கும்பாடல் (குறிஞ்சி - 392) 2. குறுந்தொகை – 'நெய்தல் இருங் கழி' எனத் தொடங்கும் நெய்தற் பத்து பாடல். (நெய்தல்) 3. ஐங்குறுநூறு – 'வானம் பாடி வறம்' எனத் தொடங்கும் கிழவன் பருவம் பாராட்டுப் பத்து பாடல். (முல்லை) 4. அகநானூறு – 'கடல்கண் டன்ன' எனத் தொடங்கும் பாடல் (மருதம் - 176) 5. புறநானூறு – 'உண்டால் அம்ம இவ்வுலகம்' எனத் தொடங்கும் பாடல் 182. பிறர்க்கென முயலுநர்! பாடியவர்: கடலுள் மாய்ந்த இளம்பெரு வழுதி.
அலகு2	**காப்பிய இலக்கியம்** சிலப்பதிகாரம் – அடைக்கலக் காதை (மதுரைக் காண்டம்)
அலகு3	**நீதி இலக்கியம்** 1. திருக்குறள் – அறிவுடைமை – 10 குறட்பாக்கள் 2. நாலடியார் – மேன்மக்கள் (முதல் பாடல்) 3. நான்மணிக்கடிகை – 'அஞ்சாமை அஞ்சுக' எனத் தொடங்கும் பாடல் எண்: 27 4. இனியவை நாற்பது – 'எவது மாறாஇளக்கிளைமை' எனத் தொடங்கும் பாடல் எண்: 3 5. இன்னா நாற்பது – 'ஆற்றல் இலாதான் பிடித்த படை' எனத் தொடங்கும் பாடல் எண்: 07
அலகு4	**இலக்கியவரலாறு** 1. சங்க காலம் – எட்டுத்தொகை, பத்துப்பாட்டு. 2. காப்பிய இலக்கிய வரலாறு – ஐம்பெருங் காப்பியங்கள் – ஐஞ்சிறு காப்பியங்கள் 3. சிற்றிலக்கியங்கள் தோற்றமும் வளர்ச்சியும் 4. புதுக்கவிதை தோற்றமும் வளர்ச்சியும்.

அலகு I	**இலக்கணம்** 1. சொல்வகை – பெயர், வினை, இடை, உரி 2. அணி இலக்கணம் – உவமை அணி, உருவக அணி தற்குறிப்பேற்ற அணி, உயர்வு நவிற்சி அணி. 3. புதுக்கவிதை இலக்கணம்– படிமம் குறியீடு.
பயன்கள்	➢ அரசுப் பணி பெறுவதற்கான வாய்ப்பினை நல்குதல். ➢ நடைமுறைத் தமிழ் இலக்கியத்தை அறைய உதவுதல்

Semester-IV				
Course code:	**NME**	**T/P**	**C**	**H/W**
	Small Business Management	**T**	**2**	**2**

Objectives	➢ To understand the policy initiatives and infrastructural support for establishing a small scale enterprises ➢ To analyze the opportunities for starting a small enterprise.
Unit-I	Small Scale enterprises–An Introduction and overview–Definition–Scope and importance – relative advantages of small scale enterprises vis - a – vis –Large and medium scale industries – Efforts to development of SSE- Meaning and concept of entrepreneurship, the history of entrepreneurship development, role of entrepreneurship in economic development, agencies in entrepreneurship management and future of entrepreneurship.
Unit-II	Policy and institutional infrastructure for small enterprises – Development agencies for small enterprise–small enterprises growth and environmental factors in fluency–funding agencies and their role in Developing SSE.- Meaning of entrepreneur, the skillsrequiredtobeanentrepreneur,theentrepreneurialdecisionprocess,androle Models ,mentors and support system.
Unit-III	Establishing the small scale enterprises–opportunities scanning–Choice of enterprise–Market assessment for SSE–Choice of technology and selection of site– Financing then ew/small enterprise– Preparation of business plan–Ownershipstructureandorganizationalframework-Businessideas,methodsofgenerating Ideas ,and opportunity recognition
Unit-IV	Operating the small-scale enterprise – Financial management issues in SSE – Operation management issues in SSE – Marketing management issues in SSE-Importance of new venture financing, types of owner ship securities, venture capital, typesofdebtsecurities,Determiningidealdebt-equitymix,andfinancialinstitutions And banks
Unit-V	Performance appraisal and growth strategies – Management performance assessment andcontrol–Growthandstabilizationstrategiesforsmallenterprises–Managing family enterprises–Related Cases-Exit strategies for entrepreneurs, bankruptcy, and Succession and harvesting strategy
Unit-VI	Dynamic Component for Continuous Internal Assessment only: ContemporaryDevelopmentsRelatedtotheCourseduringtheSemesterconcerned.

REFERENCES:

MathurS.P.(1979)Economics of small-scale industries.
Siropolis.(1986)Entrepreneurship and small Business Management Vasant Desai.(1979)
Organization and management of small scale industries.

Outcomes	➢ The student should be able find out a suitable idea for starting a small enterprise ➢ The student should be able to visualize the importance of small scale Enterprises in economic development.

<table>
<tr><th colspan="6">V-Semester</th></tr>
<tr><td>Core</td><td>Course Code: 11851</td><td>PISTONENGINEAND PROPELLER</td><td>T</td><td>Credits:4</td><td>Hours:4</td></tr>
<tr><td colspan="2">Course Objectives</td><td colspan="4">1. Understand the basic operating principles of reciprocating engines, which are primarily used in aviation.
2. Know how to read the performance of an aircraft piston engine by taking into account the factors that affect the shaft power that can be developed by such an engine.
3. To provide full information on the type of fuels used for IC engines and fuel supply systems.
4. Understand the basic components and working principle of ignition system.
5. Understand the basic operating principles of the propeller, including the methods used to calculate the thrust, the power required and the efficiency.</td></tr>
<tr><td>Unit I</td><td colspan="5">INTRODUCTION & CONSTRUCTION: (12) Hours
Development, classification and characteristics of piston engines. Constructional features of Crank case, crank shaft, cylinder, piston, Connecting rod, cam shaft, valve and valve operating mechanism and their function. Principles of valve timing diagram and engine firing order.
TERMS, DEFINITION AND POWER CALCULATION:
Description of terms related to piston engine, Operating principles - 2 stroke, 4 stroke, Otto and Diesel cycle, Compression ratio. Engine efficiencies. Power Calculation, and factors affecting engine performance.</td></tr>
<tr><td>Unit II</td><td colspan="5">ENGINE ACCESSORY SECTION: (12) Hours
Description of accessory section and propeller reduction gears. General description of induction and exhaust manifold. Supercharger and Turbo charger. Description of engine starter motor, Engine coolingsystems - air and liquid
ENGINE LUBRICATING SYSTEM:
Need for lubrication. Classification and characteristics of lubricating oil. Principal components of lubricating system and their function.</td></tr>
<tr><td>Unit III</td><td colspan="5">ENGINE FUEL SYSTEM: (12) Hours
Aviation fuels and its characteristics. Alternative fuels in aviation.Fuel additives. Principle of operation of Float type carburetor. carburetor icing and prevention. Maintenance of float type carburetor. Principle of operation and maintenance of fuel injection system.</td></tr>
<tr><td>Unit IV</td><td colspan="5">IGNITION AND STARTING SYSTEM: (12) Hours
Principles of ignition. Magneto – Type, Characteristics and operation. Description of ignition shielding, ignition switch and wiring. Magneto timing procedure. Magneto maintenance. Description of spark plugs and its servicing including pressure testing.</td></tr>
<tr><td>Unit V</td><td colspan="5">PROPELLER: (12) Hours
Propeller theory, terms and definition. Forces acting on propeller in flight. General description of fixed and variable pitch propeller. Propeller controls and operations of pitch changing mechanism. Description of wooden and composite blade propellers.</td></tr>
</table>

Text book

1. Fundamentals of Internal Combustion Engines by P.W. Gill, J.H. Smith & E.J. Ziurys

References

1. Airframe and power plant mechanics – power plant hand FAA
2. Aircraft piston engines – by Herschel smit
3. Heywood J.B., "Internal combustion Engine Fundamentals", McGraw Hill, 1988
4. Jet Engine Manual by E. Mangham and A Peace.

Course Outcomes		**Knowledge Level**
CO-1	Competent to understand the basics of Piston engine operation.	K2
CO-2	Understanding the basic parts of a Piston engine.	K3
CO-3	For learning about the purpose of Carburetor's and fuel injection systems in a piston engine.	K2
CO-4	Understand engine starting, ignition systems and the requirements	K3
CO-5	To gain an understanding of the propeller system and its purpose.	K2

Mapping Course Outcome VS Programme Outcomes

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**P11**	**P12**
CO1	2	2	2	2	2	2	2	2	2	2	2	2
CO2	2	2	2	2	2	2	2	2	2	2	2	3
CO3	3	2	2	2	2	2	2	2	2	2	2	2
CO4	2	2	2	2	2	2	2	2	2	2	2	3
CO5	2	2	3	2	2	2	2	2	2	2	2	2
W.AV	**2.2**	**2**	**2.2**	**1.6**	**2**	**1.8**	**1.8**	**1.8**	**2**	**1.8**	**2**	**2.4**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	2	2	2	2
CO2	2	2	2	2	2
CO3	2	2	2	2	2
CO4	2	2	2	1	2
CO5	3	2	2	3	3
W.AV	**2.4**	**1.6**	**2**	**2**	**2.2**

S–Strong(3),M-Medium2,L-Low(1)

V-Semester					
Core	**Course Code: 11852**	**GAS TURBINE ENGINE**	**T**	**Credits:4**	**Hours:4**

Course Objectives	1. To explain the Gas Turbine with various operating cycles. 2. Explain different alternate fuels, gas turbines and about jet propulsion 3. To understand the various classifications of gas turbine. 4. To explain the different performance analysis of gas turbine engines 5. To be able to analyze overall performance of gas turbine power plant
Unit I	**INTRODUCTION** **(12) Hours** Principle of Jet Propulsion, Types of gas turbine engines, Principles and operation Ram Jet and scram Jetengines, Factors affecting the thrust and performance of gas turbine engine.
Unit II	**TURBINE ENGINE** **(12) Hours** Construction and working, Description of Air intake, Compressor Diffuser, combustion chamber, turbine andexhaust nozzles, subsonic and supersonic inlets-Thrust Augmentation devices, Noise suppression system, Thrust reversal mechanisms. Thrust calculation procedure for a turbojet engine and fan engine problems
Unit III	**TURBOPROP ENGINE** **(12) Hours** Construction and operational features of a Turbo prop engine. Force acting on a propeller. Turbo propellersworking principle and functions of propeller control unit. Propeller horse power calculations**..**
Unit IV	**FUEL SYSTEMS** **(12) Hours** Types and characteristics of Jet Fuel, Description of fuel control unit and its operation. Electronic engine controls and FADEC systems**.**
Unit V	**ENGINE SYSTEMS** **(12) Hours** Lubrication system **:** Types of lubricants , lubrication system unit and their functions . Starting system: Types of engine starts, working principle of air turbine and combustion starters, APU, GPU. Ignition system and its operation.

Text book

1. Gas Turbine Materials by G, Lueas and J.F. Pollock

References

1. Aircraft power plants by Kroes wild – 1994 (Chapter 11,12,13,14,16)
2. Gas Turbine theory – Kohen & Rogers.
3. Gas turbines – V. Ganeshan Modern Compressible flows – John D
4. Heat engines, by Vasandan & Kumar - - Metropolitan Book Co Pvt Ltd – 2000
5. Gas Turbine for Aircraft by A.W. Judge.

Course Outcomes		Knowledge Level
CO-1	Explain the basic principle of each cycle of the gas turbines.	K2
CO-2	Understanding the principles of the construction and operation of the gas turbines.	K3
CO-3	To understand how to build and operate a turbo propeller engine.	K1
CO-4	Understanding the impact of emission on conventional and unconventional fuels	K2
CO-5	Understand the engine start system of the gas turbines of the aircraft.	K2

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	3	2	2	2	2	2	3	2	2	2	2	2
CO2	2	2	2	2	2	2	2	2	2	2	2	3
CO3	3	3	2	2	2	2	2	2	2	2	2	2
CO4	2	2	2	2	2	2	2	2	2	2	2	2
CO5	2	2	3	2	2	2	2	2	2	2	3	2
W.AV	**2.4**	**2.2**	**1.8**	**1.8**	**2**	**2**	**2.2**	**1.6**	**1.8**	**1.8**	**2.2**	**2.2**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	3	2
CO2	2	2	2	2	2
CO3	3	2	2	1	2
CO4	2	2	3	1	1
CO5	3	2	2	2	3
W.AV	**2.4**	**1.8**	**2.2**	**1.8**	**2**

S–Strong(3),M-Medium2,L-Low(1)

V-Semester					
Elective– I	**Course Code: 11853A**	**BASICS OF AVIATION INDUSTRY**	**T**	**Credits:4**	**Hours:4**

Course Objectives	1. Describe the airline industry today in its regulatory and business context 2. Explain how airlines, ANSPs and airports operate 3. Describe the duties and responsibilities of key airline personnel 4. Explain safety and security issues affecting the aviation industry 5. Discuss challenges and opportunities affecting the aviation industry
Unit I	**(12) Hours** The Evolution of Aviation - Growth Drivers - Issues and Challenges - Global Aviation Industry- Aviation Industry in India - An Overview - Aircraft Types and Structures - Aircraft Manufacturers
Unit II	**(12) Hours** Airports - Civil, Military - Training - Domestic/International - Passenger/Cargo Terminals - World Airlines - World's Major Airports
Unit III	**(12) Hours** IATA / ICAO - National Aviation Authorities & Role of State and Central Governments - Airports Authority of India.
Unit IV	**(12) Hours** Airport Services - Standard Operations - Ramp Services & Airside Safety - Freight Warehouse Management- airport operations- airport management.
Unit V	**(12) Hours** Various Crisis at Airport - SOP for Bomb Threat - Mitigating Hijack Crisis Situation - Response to Acts of Unlawful Interference: Developing Plans – Investigation Methods & Procedures – Troubleshooting the issues – Handling Situational Awareness.
	Total;60 Hours

Text book

1. Airport Planning and Management – Seth Young, Alexander T. Wells, McGraw Hill Education, 2011

References

1. Flight: The Complete History of Aviation – Reg Grant, DK publisher, 2017.
2. Aisle Be Demand – Rishi Piparaiya, Jaico Publishing House, 2013.
3. Aviation law – Philip H
4. Tourisom : The International Business – Mill R C

Course Outcomes		**Knowledge Level**
CO-1	Describe the airline industry today in its regulatory and business context	K2
CO-2	Explain how airlines, ANSPs and airports operate	K3
CO-3	Describe the duties and responsibilities of key airline	K5

	personnel	
CO-4	Explain safety and security issues affecting the aviation industry	K5
CO-5	Discuss challenges and opportUnit Ies affecting the aviation industry	K4

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO1 0	P11	P12
CO 1	2	1	2	2	2	1	3	2	3	2	2	2
CO 2	2	2	1	3	1	2	2	2	2	2	3	3
CO 3	2	2	2	2	2	1	2	1	2	2	2	2
CO 4	1	1	1	1	1	2	1	2	2	2	2	2
CO 5	2	3	2	2	2	1	2	2	2	3	3	2
W.A V	**1.8**	**1.8**	**1.6**	**2**	**1.6**	**1.4**	**2**	**1.8**	**2.2**	**2.2**	**2.2**	**2.2**

S –Strong (3), M-Mediu2, L- Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	3	2
CO2	2	2	2	2	2
CO3	3	1	2	1	2
CO4	2	2	3	1	1
CO5	2	2	2	2	3
W.AV	**2.4**	**1.8**	**2.4**	**1.8**	**2**

S –Strong (3), M-Mediu2, L- Low (1)

V-Semester					
Elective– I	**Course Code: 11851B**	**AIRCRAFT COMMUNICATION AND NAVIGATIONSYSTEM**	**T**	**Credits:4**	**Hours:4**
Course Objectives	• To familiarize about basic radio theory. • To familiarize communication systems used in the aircraft. • To educate about various navigation systems used in the aircraft • To educate about various radio air safety equipment's used in the aircraft • To educate basic radar and weather radar used in the aircraft.				
Unit I	**GENERAL: (12) Hours** Description of radio waves, terms like wave length and frequency, frequency bands, Carrier waves Groundwave, Sky wave and Space wave and their characteristics. Antenna, Amplifiers and types, microphones and its types , modulation and its various types, functions of a radio transmitter block diagram of radio transmitter and its function, functions of a radio receiver, block diagram of radio receiver and super heterodyne receiver and its operation..				
Unit II	**COMMUNICATION SYSTEMS: (12) Hours** Description, theory of operation of Aircraft VHF (Very High Frequency) communication system, HF (High Frequency) and Satellite communication system. Testing of a communication radio, Aircraft Selcal systems, Audio control systems.				
Unit III	**NAVIGATION SYSTEMS: (12) Hours** Description, theory of operation of Automatic Direction Finder (ADF), Radio magnetic Indicator(RMI), Very High Omni Range(VOR), Instrument landing system(ILS), Distance Measuring Equipment, Marker beacon system. Principle of operation of Inertial Navigation system (INS), Global Positioning System (GPS) and Doppler Navigation system, Microwave landing system (MLS) and advantages				
Unit IV	**RADIO EQUIPMENT (OPERATIONS): (12) Hours** Description and operation of ATC transponder, various modes like A,C, S and its operation Traffic alert and collision avoidance system(TCAS), Radio altimeter system, Ground proximity Warning system(GPWS), Emergency Locator transmitter(ELT) its types, Cockpit voice recorder(CVR) and Installation of Radio equipment.				
Unit V	**WEATHER RADAR SYSTEM: (12) Hours** Radar, radar bands, description of principal units of analog radar system, Aircraft weather radar system , its units and its operation , wave guides, flat plate antenna , Radome, Safety precautions while handling aircraft weather radar system..				
					Total : 60 Hours

Text book

1. Aircraft instruments and avionics Max F. Henderson, Jeppesen

References

1. Aircraft Electricity & Electronics by Thomas K Eismin
2. Aircraft radio Systems by James Powell
3. Aircraft instruments and integrated system E H J Pallett, Pearson.
4. Aircraft instrumentation and system,
5. S Nagabhushana and L. K. Sudha, I. K. International Pvt Ltd,

Course Outcomes		Knowledge Level
CO-1	To understand about basic radio theory.	K2
CO-2	To acquire the knowledge about communication systems used in aircraft.	K3
CO-3	To acquire knowledge on the various navigation systems.	K3
CO-4	To analysis on radio air safety equipment.	K4
CO-5	To acquire knowledge on basic radar and weather radar used in the aircraft	K3

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO1 0	P11	P12
CO1	3	3	2	2	1	2	2	2	1	1	1	3
CO2	2	3	2	2	1	1	2	2	2	1	2	2
CO3	2	2	2	2	2	1	1	1	2	2	2	2
CO4	2	2	2	2	1	2	1	2	1	1	1	2
CO5	2	2	2	2	2	1	2	2	2	2	2	3
W.AV	**2.2**	**2.4**	**2**	**2**	**1.4**	**1.4**	**1.8**	**1.8**	**1.6**	**1.4**	**1.6**	**2.4**

S –Strong (3), M-Mediu2, L- Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2
CO2	2	1	2	1	1
CO3	2	1	2	1	2
CO4	2	2	1	2	1
CO5	3	2	2	2	2
W.AV	**2.4**	**1.4**	**1.8**	**1.6**	**1.6**

S –Strong (3), M-Mediu2, L- Low (1)

V-Semester					
Elective– I	**Course Code: 11853C**	**ADDITIVE MANUFACTURING**	**T**	**Credits:4**	**Hours:4**
Course Objectives	1. To encourage the development of additive manufacturing through a variety of business opportunities applications 2. To learn about different software tools, processes and techniques for creating physical objects that satisfy product development or prototype requirements using additive manufacturing. 3. To understand vat polymerization and direct energy deposition processes. 4. Understand the fusion and material extrusion processes of powder beds. 5. To develop an understanding of the applications of binders, material jetting and sheet lamination processes				
Unit I	**INTRODUCTION:(12) Hours** Overview - Need - Development of Additive Manufacturing (AM) Technology: Rapid Prototyping- Rapid Tooling - Rapid Manufacturing - Additive Manufacturing. AM Process Chain- ASTM/ISO 52900 Classification - Benefits. Applications: Building Printing - Bio Printing - Food Printing- Electronics Printing. Business OpportUnit Ies and Future Directions – Case studies: Automobile, Aerospace, Healthcare.				
Unit II	**DESIGN FOR ADDITIVE MANUFACTURING (DfAM):(12) Hours** Concepts and Objectives - AM Unique Capabilities - Part Consolidation – Topology Optimization- Generative design - Lattice Structures - Multi-Material Parts and Graded Materials - Data Processing: CAD Model Preparation - AM File formats: STL-Problems with STL- AMF Design for Part Quality Improvement: Part Orientation - Support Structure - Slicing - Tool Path Generation – Design rules for Extrusion based AM.				
Unit III	**VAT POLYMERIZATION AND DIRECTED ENERGY DEPOSITION:(12) Hours** Photo polymerization: Stereo lithography Apparatus (SLA)- Materials -Process – top down and bottom up approach - Advantages - Limitations - Applications. Digital Light Processing (DLP) - Process - Advantages - Applications. Continuous Liquid Interface Production (CLIP)Technology. Directed Energy Deposition: Laser Engineered Net Shaping (LENS)- Process - Material Delivery - Materials -Benefits -Applications.				
Unit IV	**POWDER BED FUSION AND MATERIAL EXTRUSION:(12) Hours** Powder Bed Fusion: Selective Laser Sintering (SLS): Process - Powder Fusion Mechanism - Materials and Application. Selective Laser Melting (SLM), Electron Beam Melting (EBM): Materials - Process - Advantages and Applications. Material Extrusion: Fused Deposition Modeling (FDM)- Process-Materials -Applications and Limitations.				
Unit V	**OTHER ADDITIVE MANUFACTURING PROCESSES: (12) Hours** Binder Jetting: Three-Dimensional Printing - Materials - Process - Benefits-Limitations - Applications. Material Jetting: Multi jet Modeling- Materials - Process - Benefits - Applications. Sheet Lamination: Laminated Object Manufacturing (LOM)- Basic Principle- Mechanism: Gluing or Adhesive Bonding - Thermal Bonding- Materials-Application and Limitation.				

Total : 60 Hours

Text book

1. Michael E. Mortenson, "Geometric Modeling", Wiley, NY, 1997

References

1. Ian Gibson, David Rosen, Brent Stucker, Mahyar Khorasani "Additive manufacturing technologies". 3rd edition Springer Cham, Switzerland. (2021). ISBN: 978-3-030-56126-0
2. Andreas Gebhardt and Jan-Steffen Hötter "Additive Manufacturing: 3D Printing for Prototyping and Manufacturing", Hanser publications, United States, 2015, ISBN: 978-1- 56990-582-1.
3. Milan Brandt, "Laser Additive Manufacturing: Materials, Design, Technologies, and Applications", Woodhead Publishing., United Kingdom, 2016, ISBN: 9780081004333.
4. Kevin N. Otto, Kristin L. Wood, "Product Design", Pearson Education, 2004.
5. David F. Rogers, J. A. Adams, "Mathematical Elements for Computer Graphics", TMH, 2008.

Course Outcomes		Knowledge Level
CO-1	Identify the development of AM technologies and how they have spread over time. Different companies, and developing business opportunities.	K2
CO-2	Develop an understanding of the AM conversion process from concept to finished product technology.	K3
CO-3	Explain the vat polymerization and direct energy deposition processes and their applications.	K4
CO-4	Acquire knowledge on process and applications of powder bed fusion and material extrusion.	K2
CO-5	Perform an evaluation of the advantages, limitations and uses of binder jetting, material jetting and sheet lamination techniques.	K3

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO 1	3	2	2	2	2	2	2	2	2	2	2	2
CO 2	2	3	2	2	2	2	2	2	2	2	2	2
CO 3	2	3	2	2	2	2	2	2	2	2	2	2
CO 4	2	2	2	2	2	2	2	2	2	2	2	2
CO 5	3	2	3	2	2	2	2	2	2	2	3	2
W.AV	**2.4**	**2.4**	**2**	**1.8**	**1.8**	**2**	**1.8**	**1.8**	**2**	**1.8**	**2.2**	**2**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	2
CO2	2	2	2	2	1
CO3	2	2	2	2	1
CO4	2	2	2	1	2
CO5	2	2	2	2	2
W.AV	2.2	1.8	2	**2**	**1.6**

S–Strong(3),M-Medium2,L-Low(1)

V-Semester					
Elective II	**Course Code: 11854 A**	**AIRPORT AND AIRTRAFFIC SERVICE**	**T**	**Credits:4**	**Hours: 4**
Course Objectives	1. Explain international procedures and practices governing the movement of air traffic 2. To impart knowledge about air traffic systems. 3. To gain more knowledge on flight information systems. 4. To gain knowledge on aircraft lighting and support services. 5. To impart knowledge about ground handling operations.				
Unit I	**AIRPORTGENERAL: (12) Hours** Airport Definition- History and Development of Airport, Principles of Airport Layout, Categories of Airport, Principles of Airport Management, Functions of Airport, Aerodrome Reference Point ,Meaning of Green Field Airport, Environmental Factors, Air Freedom Rights, Functions of - ICAO, IATA, DGCA, AA				
Unit II	**RUNWAY&TAXIWAY: (12) Hours** Runway Configuration, Runway Orientation, Runway Markings, Relationship between Aircraft and Airport, Aeroplane Parts , Aircraft Characteristics, FieldLength Regulations, Weight Components, Taxiway Configuration, Taxiway Markings, Stop way and Clearway, Load Classification Number.				
Unit III	**AIRPORTOPERATIONS: (12) Hours** Lay out of Apron, Holding Apron, Terminal Apron, Aircraft Parking Configuration, Terminal Configuration, Terminal Passenger Flows, Ramp Safety, Ramp Ground Support Equipments, Definition of Gate and Gate Capacity, Airport Congestion and Delay, Airport Slot, Sources of Airport Revenue, Airport Charges, Hub and Spoke Strategies, Long Haul and Short Haul Operations.				
Unit IV	**AIRPORTLIGHTINGANDSUPPORTSERVICES: (12) Hours** Visual Approach Slope Indicator (VASI), Precision Approach Path Indicator (PAPI), Approach Lighting System, Runway Lighting System, Taxiway Lighting System, Obstruction Lighting System, Aerodrome Beacon, Airport Lighting, Airport Security System, Purpose of X-Ray Unit , Lounge Area Requirements, Precaution taken during Fuelling , Airport Recue Services, Goods Prohibited for Carriage by Air				
Unit V	**AIRTRAFFICCONTROL&NAVIGATIONALAIDS: (12) Hours** ATC- General, Need for Air Traffic Control, Air Traffic Control Network, Air Traffic Control Aids, ATC and Surveillance Facilities, Air Traffic Services- Objectives and its Features, Air Space Classes, ATS Routes, Controlled Airspace and Uncontrolled Air Space, Terms Used in ATC Operations, Visual Flight Rules (VFR) and Instrument Flight Rules (IFR), Role of Meteorology in Aviation , Role of Telecommunication in Aviation, Flight Plan and its Content, Briefing Centre and its functions, Brief Description and use of NDB,VOR,DME , Marker Beacon and ILS.				
					Total : 60 Hours

Text book

1. The Airport Business – Dogains R.
2. Airport Operations – Ashford, Station & More. Cleared for takeoff behind the

scene of Air Travel – Barlay.

References

1. Airport Engineering- Norman Ashford & Paul H Wright.
2. Airport Planning & Management- Seth B Young & Alexander T.Wells
3. Airport Planning & Design – S.K.Khanna-M.G.Arora- S.S.Jain
4. AIP (India) Vol. I & II, "The English Book Store", 17-1, Connaught Place, New Delhi.
5. Michael S. Nolan., "Fundamentals of Air Traffic Control", Cengage Learning.

Course Outcomes		**Knowledge Level**
CO-1	Describe the different components of airport and aircrafts.	K2
CO-2	Explain the airport runway and taxi way design.	K3
CO-3	The concepts of terminal services facilities are summarised.	K2
CO-4	Summarise the concepts of the airport lighting and support services.	K3
CO-5	Explain the inflight information systems and the rules of the air traffic system.	K2

Mapping Course Outcome VS Programme Outcomes

CO	**PO 1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO1 0**	**P11**	**P12**
CO1	2	2	2	2	2	3	2	2	2	2	2	2
CO2	2	2	2	2	2	2	2	1	2	2	2	2
CO3	2	2	2	2	2	2	2	2	2	2	3	2
CO4	2	2	2	2	2	2	2	2	2	2	2	2
CO5	2	2	3	2	2	2	2	2	2	2	3	2
W.AV	**2. 2**	**2. 2**	**2**	**1. 8**	**2**	**2.2**	**2**	**1.6**	**2**	**1.8**	**2.4**	**2**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	2	2	3	2	1
CO2	3	2	2	2	2
CO3	2	2	2	3	2
CO4	3	2	2	2	2
CO5	2	2	2	3	2
W.AV	**2.4**	**1.8**	**2.2**	**2.4**	**1.8**

S–Strong(3),M-Medium2,L-Low(1)

V-Semester					
ElectiveII	**Course Code: 11854B**	**AIR CARGO MANAGEMENT**	**T**	**Credits:4**	**Hours:4**
Course Objectives	1. To equip the student with knowledge and skills used in Air Cargo Management with systematic process involved in this process. 2. The aim of this course is to familiarize students with the operations and management of different types of cargo, terminologies used in cargo operation, air cargo rates and documentations, packaging, IATA cargo handling and acceptance, dangerous goods.				
Unit I	**Introduction to Logistics:(12) Hours** Logistics- Meaning- Scope and Significance- Functions of Logistics System – Transportation, Warehousing, Order processing, Information handling and procurement- Logistics management objectives- Customer service- Expectation and Fulfillment levels - Customer service for competitiveness - Service phases and attributes - Value added logistical services - Role of Government in logistics - Warehousing, Transportation and Packaging and Inventory valuation.				
Unit II	**Supply chain management:(12) Hours** Supply chain management: Meaning – Supply chain linkages- Role of logistics in supply chain -E business solution to supply chain – Warehousing :- Functions of warehouse – Types - Site selection – Layout – Costing - Material handling system - Material storage system - Virtual warehouse - Warehouse decision models. Material handling systems:- Role of material handling in logistics - Material handling equipment systems - Material storage - storage principles and design – Benefits - Storage methods - Inventory Management :- Meaning- Functions - Reasons for carrying inventories - Inventory controls. Introduction to Documentary Credit, international sales contract, advantages of documentary credit, requirements of buyer and seller, different types of documentary credit				
Unit III	**Transportation:** Transportation:- Transportation infrastructure - Freight management, Introduction and functions of the freight forwarders, Evolving Role of Freight Forwarder - Factors influencing freight cost - Transportation networks - Route planning - Containerization- Logistical Packaging: Packaging as utilization – Designs - Packaging materials - Packaging cost - Logistics information:– Needs, design and characteristics. Distribution and Logistics : Role of Logistics in distribution – Channel of Distribution – Requirements of Channel members – Channel members and their strategies – Logistics out sourcing – Third Party Logistics (3PL) and Fourth Party Logistics (4 PL) Services Contract.				
Unit IV	**Air Cargo Management:(12) Hours** Introduction to Cargo, mode and means of transportation, air cargo operation in India. Significance of air transportation in Logistics: Utility created by air transportation in Logistics – Air Transportation as a means of conquering				

	time and space – Features and facilities offered by Air Cargo-ways- Factors influencing growth in Air Logistics- Air Suitability for different Cargo-Innovative schemes/facilities to popularize air cargo – Logistics in India-Share of airways in cargo movement in India and world wide conventions covering the movement of dangerous goods by air. Publication of air cargo tariffs, different types of air freight rates, types of other charges, Documentations: Custom clearing documents, accompany documents, shipper's letter of instruction, delivery order, transport documents, the airway bill of lading.
Unit V	**Documentation for Air Cargo Transport:(12) Hours** Shipper's Export Declaration, Certificate of Origin, Export license, Commercial Invoice, Certificate of origin, Bill of lading, Insurance certificate, Export Packing list, Import License, Consular invoice, Air way bills- format, boxes, contents, completion of Air waybill, mandatory information, Types of Air waybills (MAWB/HAWB) , Inspection certification, dock receipt, warehouse receipt and destination control statement- Unit Load devices, types, aircraft loading procedure- Load Control, Air Cargo Loading Limitations, Cargo needing special attention in handling live animals. Introduction about Insurance Claim and Scope of Liability, principles and rules governing liability, the liability of freight forwarder, carriage of Goods by Sea, the Hague rules, Hamburg rules, Warsaw convention, Montreal convention
	Total : 60 Hours

Text book

1. International Air Transport Association (IATA) – Cargo John G. Wensveen. (2007).
2. Air Transportation: a management Perspective, 6th Edition, Ashgate.

Clearwater Drive, 2000, Air Cargo Guide, Oak Brook, IL 60521

References

1. V.V.Sople – Logistics Management – Pearson.
2. Alan Rushton and John Oxley – Hand book of Logistics and Distribution – Kogen page.
3. Coyle etal – The Management of Business Logistics, Thompson Learning.
4. Bowersox – Logistical Management – Mc Graw Hill, 2000.
5. Chi Chu,C.Leung, Van Hui & Cheung, 4th Party Cyber Logistics for Air Cargo, Spring,2004
6. (2014). Air Cargo Industry Master Operating Plan: A description of the air cargo industry transportation business process.

Course Outcomes		**Knowledge Level**
CO-1	Understand the basic concepts of Logistics Management	K1,K2
CO-2	Learn SCM, Warehouse functions and Inventory Management	K2,K2
CO-3	Understand the concept transportation	K1, K2
CO-4	Learn the importance of Air Cargo Transportation and the Functions	K1, K5
CO-5	Understand the different types of documentation for Air cargo transportation	K4,K5

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO 1	2	2	2	2	2	2	1	2	2	2	2	2
CO 2	1	2	3	1	1	1	2	1	2	2	2	2
CO 3	2	2	2	2	2	1	2	2	2	2	1	2
CO 4	2	2	2	1	1	2	2	1	2	2	2	2
CO 5	2	2	2	2	1	2	2	2	2	2	2	2
W.AV	**1.8**	**2**	**2.2**	**1.6**	**1.4**	**1.6**	**1.8**	**1.6**	**2**	**2**	**1.8**	**2**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2
CO2	2	2	2	2	2
CO3	1	1	2	2	3
CO4	2	2	2	3	2
CO5	2	1	2	2	3
W.AV	**2**	**1.6**	**2**	**2.2**	**2.4**

S–Strong(3),M-Medium2,L-Low(1)

V-Semester					
ElectiveII	**Course Code: 11854C**	**AIRTRAVELMANAGEMENT**	**T**	**Credits:4**	**Hours:4**
Course Objectives	1. To enable the students to learn the modes of transportations 2. To learn the different types of travel documents required for air travel 3. To acquire knowledge in Travel information manual 4. To describe the development of Air transport and its planning 5. To understand the concept of Air freight and distribution channel				
Unit I	**TRANSPORTATION AND MARKET SEGMENTATION(12) Hours** Air Transportation Industry - Land Transportation Industry -Sea Transportation Industry - Multi-modal Transportation - Marketing and Marketing mix – Application of Marketing Principles to Airline management-Airline Business and its Customers – Market segmentation -PESTE Analysis.				
Unit II	**TRAVEL DOCUMENTS AND MARKETING STRATEGIES(12) Hours** Passport – VISA's - Airlines Ticket or Authorization - Health Documents - Michel Porter's Five Factors and their Application to Airline – Cost leadership –Focus strategies- Airline Business and Market Strategies – Common Mistake- Concept of Product and Relation to Airline – Fleet and schedules Related Product Features-Customer Service and Controlling Product Quality-Air Freight Product.				
Unit III	**TRAVEL INFORMATION MANUAL(12) Hours** Referring the TIM - Passport Requirements: Different Nations - VISA Requirements: Different Nations - Tax, Currency, Customs, Immigration requirements - Referring the OAG - Aircraft Types and Codes - World Terminals -Calculation of Flying time, Ground Time and Elapsed Time.				
Unit IV	**DEVELOPMENT OF AIR TRANSPORT AND PLANNING(12) Hours** Introduction – Growth of air transport, Airport organization and associations, Classification of airports airfield components, Air traffic Zones and approach areas. Context of Airport system planning – Development of Airport Planning process – Ultimate consumers – Airline decision – Other Airport operations.				
Unit V	**AIR FREIGHT MARKET AND DISTRIBUTION CHANNELS(12) Hours** Building Block in Airline Pricing Policy-Uniform and Differential Pricing- The Structure of Air Freight Policy- Distribution Channel Strategies-Travel Agency Distribution System- Selling & Distribution Channel in Air Freight Market- Brand Building Strategies in Airline Industry- Relationship Marketing and Components of Marketing Strategies.				
					Total : 60 Hours

Text book

1. Sethi, Praveen "Strategies for the Future of Travel and Tourism" Rajat Publication, 1999
2. Sethi, Praveen, "Handbook of Effective Travel and Tourism", Rajat Publication,1999
3. Bhatia, A.K., "International Tourism, Fundamentals and Practices", Sterlings Publishers, 1991 Krishan, K., Kamra, Chand Mohinder, "Basic of Tourism; Theroy Operation and Practice

References

1. 1.Airline Operations & Management - Gerald N. Cook, Bruce Billig, Routledge, 2017
2. Airline Industry: The Official Guide to Airline Management – Elnora Singleton – Routledge, 2015.
3. Travel & Tourism Management – Barkat A.M.A, Prentice Hall India Learning Pvt Ltd, 2015.
4. Kandari, O.P. Chandra Ashish, "Tourism Development; Principles and Practices", Shree Publishers, 2004
5. Gill, S. Pushpinder, "Tourism Planning and Management", Anmol Publications, 2003

Course Outcomes		**Knowledge Level**
CO-1	Understand the modes of transportation	K 2
CO-2	Gain knowledge about maintenance documentations	K 2
CO-3	Apply the knowledge in production planning and control	K 3
CO-4	Make use of various maintenance control centres	K 3
CO-5	Analyse various Quality Assurance and Quality control	K 4

Mapping Course Outcome VS Programme Outcomes

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**P11**	**P12**
CO 1	2	2	2	2	2	1	3	2	2	2	1	1
CO 2	2	2	1	2	1	2	2	1	1	1	2	2
CO 3	2	2	2	2	1	1	2	1	2	2	2	1
CO 4	2	1	2	2	1	2	2	2	2	2	2	2
CO 5	2	3	2	2	2	1	2	2	1	3	2	2
W.A V	**2**	**2**	**1.8**	**2**	**1.4**	**1.4**	**2.2**	**1.6**	**1.8**	**2**	**1.8**	**1.6**

S –Strong (3), M-Mediu2, L- Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	2	3	1	2
CO2	2	2	2	1	2
CO3	1	1	2	1	2
CO4	2	2	1	2	1
CO5	1	2	2	2	2
W.AV	**2**	**1.8**	**2**	**1.4**	**1.8**

S –Strong (3), M-Mediu2, L- Low (1)

V-Semester					
ElectiveIII	**Course Code: 11855A**	**HELICOPTER THEORY**	**T**	**Credits:4**	**Hours:4**
Course Objectives	1. To familiarize with the principals involved in helicopters. 2. To Understand aerodynamics of rotor blades. 3. To educate on controls in helicopter. 4. To understand the Transmission system of helicopter. 5. To familiarize with the general concepts and fundamentals of the helicopter construction.				
Unit I	**Helicopter Aerodynamics (12) Hours** Helicopter configuration & its main parts, Dissymmetry of lift, Blade flapping and conning, Coriolis effect, Translational lift, Ground effect and auto rotation, pitch angle, Thrust-collective pitch, Gyroscopic precession and torque.				
Unit II	**Main Rotor System (12) Hours** Main rotor head and rotor blades, Blade alignment, tracking, static and dynamic balancing, Blade sweeping, Electronic balancing, Dampener maintenance, counterweight adjustment, Autorotation adjustment**.**				
Unit III	**Mast and Flight Controls (12) Hours** Mast, Stabilizer bar, Dampeners, Swash plate, Flight control systems-Collective, cyclic, pushpull tubes, Torque tubes, Bell cranks, Mixer box, Gradient unit, Control boosts, Maintenance and Inspection, Control rigging				
Unit IV	**Tail rotor and Transmission System (12) Hours** Tail rotor drive shaft, tail gear box, rotor blades, pitch change mechanism & its operation. Engine transmission couplings, Drive shaft, Clutch mechanism and freewheeling units**.**				
Unit V	**Airframe and Related Systems (12) Hours** Tubular construction, Sheet metal construction, Bonded construction, stress and loads, Wheel and skid gear, Visibility, Structural components and materials, Fuselage maintenance, Airframe systems, Special purpose equipment				
					Total : 60 Hours

Course Outcomes		**Knowledge Level**
CO-1	Understand the modes of transportation	K 2
CO-2	Gain knowledge about maintenance documentations	K 2
CO-3	Apply the knowledge in production planning and control	K 3
CO-4	Make use of various maintenance control centres	K 3
CO-5	Analyse various Quality Assurance and Quality control	K 4

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO 1	3	2	2	2	2	2	3	2	2	2	2	2
CO	2	2	2	2	2	2	2	2	2	2	2	3
2												
CO 3	3	3	2	2	2	2	2	2	2	2	2	2
CO 4	2	2	2	2	2	2	2	2	2	2	2	2
CO 5	2	2	3	2	2	2	2	2	2	2	3	2
W.AV	**2.4**	2.2	1.8	1.8	2	2	2.2	1.6	1.8	1.8	2.2	2.2

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	3	1
CO2	2	2	2	2	1
CO3	3	2	2	2	1
CO4	2	2	3	2	2
CO5	3	2	2	3	2
W.AV	**2.4**	**1.8**	**2.2**	**2.4**	**1.4**

S–Strong(3),M-Medium2,L-Low(1)

V-Semester					
Elective III	**Course code: 11855B**	**AVIONICS**	**T**	**Credits:4**	**Hours:4**

Course Objectives	1. Introduction of the basic avionics and the need for civil and military aircraft 2. Provide information on the Avionics Architecture and various Databases 3. To get a better understanding of the different avionics subsystems 4. Understanding the concept of navigation systems. 5. To learn how to operate an autopilot system
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
	Total : 60 Hours

Text book

1. Aircraft instruments and avionics Max F. Henderson, Jeppesen

References

1. Albert Helfrick.D., "Principles of Avionics", Avionics Communications Inc., 2004
2. Collinson.R.P.G. "Introduction to Avionics", Chapman and Hall, 1996.
3. Middleton, D.H., Ed., "Avionics systems, Longman Scientific and Technical", Longman Group UK Ltd., England, 1989.

Pallet.E.H.J., "Aircraft Instruments and Integrated Systems", Pearsons, Indian edition 2011.

Course Outcomes		Knowledge Level
CO-1	Built Digital avionics architecture.	K2
CO-2	Design Navigation system.	K3
CO-3	Use data bus interfaces to integrate avionics systems.	K2
CO-4	Develop an analysis of the performance of various cockpit display technologies.	K1
CO-5	Design of autopilot for small aircraft	K2

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO 1	2	2	2	2	2	2	2	2	3	2	2	3
CO 2	2	2	2	2	2	2	2	2	2	2	2	2
CO 3	3	2	2	2	2	2	2	2	2	2	2	2
CO 4	2	2	2	2	2	2	2	2	2	2	2	2
CO 5	3	2	3	2	3	2	2	2	2	3	3	2
W.AV	**2.2**	**2**	**2**	**1.8**	**2.2**	**1.8**	**2**	2	2.2	**2.2**	2	**2.2**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	3	2	2
CO2	3	3	2	2	3
CO3	2	2	2	2	2
CO4	2	2	2	2	2
CO5	2	3	2	1	3
W.AV	**2.2**	**2.4**	**2.2**	**1.8**	**2.4**

S–Strong(3),M-Medium2,L-Low(1)

V-Semester					
Elective III	**Course Code: 11855C**	**WIND TUNNEL TECHNIQUE**	**T**	**Credits:4**	**Hours:4**
Course Objectives	1. To learn the Types of low-speed Wind tunnels and non-dimensional numbers with its applications. 2. To learn the Types of high-speed Wind tunnels and with its calibration methods. 3. To Understand the Special Wind tunnels and with its calibration methods with its design methods. 4. To describe flow visualization techniques and data acquisition methods. 5. To understand the functions of various instruments associated with wind tunnel				
Unit I	**LOW SPEED WIND TUNNELS(12) Hours** Classification –non-dimensional numbers-types of similarities - Layout of open circuit and closed-circuit subsonic wind tunnels – design parameters-energy ratio - HP calculations - Calibration methods.				
Unit II	**HIGH SPEED WIND TUNNELS(12) Hours** Blow down, in draft and induction tunnel layouts and their design features - Transonic, and supersonic tunnels- peculiar features of these tunnels and operational difficulties - sample design calculations and calibration methods.				
Unit III	**SPECIAL WIND TUNNEL TECHNIQUES (12) Hours** Types of Special Wind Tunnels – Hypersonic, Gun and Shock Tunnels – Design features and calibration methods- Intake tests – store carriage and separation tests - wind tunnel model design for these tests.				
Unit IV	**WIND TUNNEL INSTRUMENTATION(12) Hours** Instrumentation and sensors required for both steady and unsteady measurements – Force measurements using three component and six component balances – calibration of measuring instruments – error estimation and uncertainty analysis.				
Unit V	**FLOW VISUALIZATION and NON-INTRUSIVE FLOW DIAGNOSTICS (12) Hours** Smoke and Tuft grid techniques – Dye injection special techniques – Oil flow visualization and PSP techniques - Optical methods of flow visualization – PIV and Laser Doppler techniques – Image processing and data deduction				
					Total : 60 Hours

Text Books:

1. NAL-UNI Lecture Series 12:" Experimental Aerodynamics", NAL SP 98 01 April 1998
2. Rae, W.H. and Pope, A., "Low Speed Wind Tunnel Testing", John Wiley Publication, 1984.

References

1. Bradsaw "Experimental Fluid Mechanics".
2. Lecture course on Advanced Flow diagnostic techniques 17-19 September 2008 NAL, Bangalore
3. Pope, A., and Goin, L., "High Speed Wind Tunnel Testing", John Wiley, 1985.
4. Rathakrishnan, E., “Instrumentation, Measurements, and Experiments in Fluids,” CRC Press – Taylor & Francis, 2007.
5. Short term course on Flow visualization techniques, NAL , 2009

Course Outcomes		**Knowledge Level**
CO-1	Understand the uses of various types of tunnels and its losses	K 2
CO-2	Experiment with calibration of different types of high-speed tunnels	K 2
CO-3	Make use of various special tunnels and its applications	K 3
CO-4	Make use of various measurement techniques of instruments of wind tunnel	K 3
CO-5	Can use various techniques for aerodynamic data generation	K 4

Mapping Course Outcome VS Programme Outcomes

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO 7**	**PO 8**	**PO9**	**PO1 0**	**P11**	**P12**
CO 1	3	2	2	2	1	2	2	2	2	2	2	2
CO 2	2	3	2	1	2	2	2	1	2	1	2	2
CO 3	2	3	2	2	2	2	2	2	2	2	2	2
CO 4	2	2	1	2	2	2	2	2	2	2	2	2
CO 5	3	2	3	2	2	2	1	2	2	2	3	2
W.A V	2.4	2.4	2	1. 8	1.8	2	1.8	1.8	2	1.8	2.2	2

S –Strong (3), M-Mediu2, L- Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	2	2	3	2
CO2	2	2	2	2	2
CO3	2	1	2	1	2
CO4	2	2	2	2	2
CO5	2	2	2	2	1
W.AV	**2.2**	**1.8**	**2**	**2**	**1.8**

S –Strong (3), M-Mediu2, L- Low (1)

V-Semester					
Core	**Course Code: 11856**	**AERO ENGINE LABORATORY**	**P**	**Credits:4**	**Hours:8**
Course Objectives	1. To describe various types of propulsion system with their merits and challenges. 2. To describe the performance and operating characteristics of Internal Combustion Engines. 3. To describe combustion process phenomena in IC engines. 4. To study testing on exhaust nozzles and noise suppressors for a gas turbine engine. 5. To be familiar with the working concept of inlets, nozzles and combustion chamber with their applications in a propulsion system.				

PISTON ENGIEN LAB

1. Cylinder compression check.
2. Magneto installation and timing procedure.
3. Valve timing check for a four stroke engine.
4. Ground running of aero engine –procedure.

GAS TURBINE ENGINE LAB

1. General inspection procedure of turbine engine.
2. Turbine tip clearance adjustment procedure.
3. Removal and Fitment of burners.
4. Study on Thrust Augmentation devices for a gas turbine engine.
5. Study on exhaust nozzles and noise suppressors for a gas turbine engine.
6. Study of Thrust reversal mechanism of Turbojet engine and its effect on landing roll of an Aeroplane.
7. Study of Turbo prop engine configuration and its advantages / disadvantages over reciprocating engines.
8. Study of Jet engine efficiency at higher altitudes and its relative reduction in fuel consumption

Total : 30 Hours

Course Outcomes	**Knowledge Level**
1. Establish the various types of internal combustion engines and their cycles of operation.	K3
2. Provide an understanding of the process of induction of air and fuel.	K4
3. Give an indication of the effect of different operating variables on engine performance.	K1
4. Able to acquire knowledge on fundamental concepts of low speed and high speed jets and experimental techniques pertains to measurements.	K1
5. Be able to describe the process of combustion and the parameters that affect combustion in jet engines.	K2

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	2	2	2	2	2	2	2	2	3	2	2	2
CO2	2	3	3	2	2	1	2	3	2	2	1	2
CO3	3	2	2	2	1	1	2	2	2	1	2	2
CO4	2	2	2	2	2	2	1	2	3	2	1	3
CO5	2	2	2	2	2	2	2	2	2	2	2	2
W.AV	**2.2**	**2.2**	**2.2**	**2**	**1.8**	**1.6**	**1.8**	**2.2**	**2.4**	**1.8**	**1.6**	**2.2**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	2	2
CO2	2	2	2	1	1
CO3	1	2	3	1	2
CO4	2	2	2	2	1
CO5	1	3	2	2	2
W.AV	**1.6**	**2.2**	**2.2**	**1.6**	**1.6**

S–Strong(3),M-Medium2,L-Low(1)

VI-Semester					
Core	**Course Code: 11861**	**AIRCRAFT MAINTENANCE, GROUND HANDLING AND SUPPORT EQUIPMENT**	**T**	**Credits: 4**	**Hours: 4**
Course Objectives	1. To understand the fundamentals of Aircraft Maintenance 2. To Acquire Knowledge on Landing Gear Maintenance 3. To Learn about the Aircraft Structural Repairs 4. To Understand the Ground Handling Procedures. 5. To Learn the Ground Equipments and functions				
Unit I	**GENERAL** **(12) Hours** Maintenance concept, inspection periodicity for types of aircraft like Annual Inspection. 100 Hrs Inspection. Inspection schedule and operational life of components. Continuous airworthiness maintenance Daily pre- flight and post flight inspection and maintenance of record				
Unit II	**MAINTENANCEOFLANDINGGEARS** **(12) Hours** Inspection and maintenance of landing gear - struts, wheel assembly, and brake system. Landing gear retraction test and its procedure. Special inspection after heavy handling, lightening strike and turbulent weather				
Unit III	**AIRCRAFTSTRUCTURALREPAIRS** **(12) Hours** Basic Principles of sheet metal repair, Maintaining the original strength and determination of rivet dia, and number of rivets for repair, Classification of structural damage, special tools and devices for sheet metal, Metal working machines, Forming operations, Rivet layout, Riveting tools, Driving Rivets, Rivet failure, Removing Rivets, Specific Repair Types – Skin repair, Stringer repair, Bulkhead repairs, Longer on Repair, Spar repair, Rib and Web repair, Leading Edge and Trailing edge repair..				
Unit IV	**GROUNDHANDLING** **(12) Hours** Fire safety – classification of fire and extinguishing agents, Movement of Aircraft - Towing operation and precautions taxing and taxing signals, Aircraft tie down - Normal Tie down procedure, securing Light aircraft ,Multi engine aircraft, Helicopters, Sea-planes and aircraft on skis Aircraft Tie down for storm condition -precautions against wind storm damage. Jacking aircraft & jacking precautions. Aircraft fueling operation and precautions.				
Unit V	**GROUND EQUIPMENTS** **(12) Hours** Description and Maintenance of ground support equipments – Electrical power unit, Air start unit,Hydraulicpowerunit,Preoilingequipment,Airconditioningandheatingunit,Aircraftjacks,TowBars.				
					Total : 60 Hours

Text book

1. P.S.Senguttuvan –Fundamentals of Airport Transport Management – McGraw Hill 2003 3.
2. Aviation Maintenance Management – Harry A. Kinnison – McGraw Hill

References

1. Aircraft basic Science – Kroes & Rardon – 1993
2. Aircraft maintenance and repair – Kroes – Delp – 1993.
3. Airframe handbook – FAA –ACC 65 – 15A -1994
4. Airframe & Power plant mechanics – General Hand book AC 65-9A
5. Airport operation by Noman J. Ashford-McGraw Hill 2003

Course Outcomes		Knowledge Level
CO-1	Students understand the fundamentals of Aircraft Maintenance	K2
CO-2	Students Acquire Knowledge on Landing Gear Maintenance	K3
CO-3	Students Learn about the Aircraft Structural Repairs	K2
CO-4	Students Understand the Ground Handling Procedures.	K4
CO-5	Students Learn the Ground Equipments and functions	K2

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	3	3	2	2	1	2	2	2	1	1	1	3
CO2	2	3	2	2	1	1	2	2	2	1	2	2
CO3	2	2	2	2	2	1	1	1	2	2	2	2
CO4	2	2	2	2	1	2	1	2	1	1	1	2
CO5	2	2	2	2	2	1	2	2	2	2	2	3
W.AV	**2.2**	**2.4**	**2**	**2**	**1.4**	**1.4**	**1.8**	**1.8**	**1.6**	**1.4**	**1.6**	**2.4**

S –Strong (3), M-Medium 2, L- Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	2
CO2	2	1	2	2	1
CO3	2	1	2	2	1
CO4	2	2	1	1	2
CO5	3	2	2	2	2
W.AV	**2.4**	**1.4**	**1.8**	**1.8**	**1.6**

S–Strong(3),M-Medium 2,L-Low(1)

VI-Semester					
Core	**Course Code: 11862**	**AERO ENGINE MAINTENANCE**	**T**	**Credits:4**	**Hours:4**

Course Objectives	1. To make the students to familiarize with the Aircraft engine maintenance procedure and practice. 2. To acquire knowledge of basics of Aeronautics and engine components. 3. To learn the concepts of Piston engines ground run. 4. To make students aware of aircraft engine maintenance and repair. 5. To help the students to understand aircraft engines run up checks
Unit I	**ENGINEANDCOMPONENTS** **(12) Hours** Concepts of maintenance and overhaul- general overhaul procedure- Inspection of engine parts visual, magnetic, dimensional checks- things to be checked in a reciprocating engine common check on parts like cylinder head, cylinder barrel, piston, valves, crank case assembly and its system components.
Unit II	**PROPELLERS** **(12) Hours** Inspection for propeller mounts, blade damages and oil leak. Variable pitch propeller only) Static and dynamic balancing of propellers- Purpose and procedure – Purpose and procedure for propeller track and run out checks. Permissible repairs on wooden propellers.
Unit III	**RECIPROCATINGENGINEGROUNDRUN** **(12) Hours** Importance of ground run, ignition system check, acceleration and deceleration checks, engine shut down and post stopping procedure
Unit IV	**GASTURBINATEENGINEMAINTENANCE** **(12) Hours** Division of engine cold section and hot section. Inspection of compressor section and blades, effects of foreign object damage, causes of blade damage, combustion section inspection and repairs inspection and repair of turbine, turbine blades and its replacement- inspection of exhaust section
Unit V	**ENGINERUNUPCHECK– TURBINEENGINE** **(12) Hours** Preparation of engine run up, initial warm up and full throttle checks, assessment of engine performance from various parameters viz, EPR, EGT, Fuel flow RPM etc.
	Total : 60 Hours

Course Outcomes		**Knowledge Level**
CO-1	Use the maintenance procedures for aircraft engines	K2
CO-2	Identify the propeller components and faults	K1
CO-3	Configure reciprocating engine ground running and shutting down procedure	K3
CO-4	Use the maintenance procedures for aircraft gas turbine engines	K2
CO-5	Configure gas turbine engine ground running and shutting down procedure	K2

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO 1	2	2	2	2	2	3	2	2	2	2	2	2
CO 2	2	2	2	2	2	2	2	2	2	2	2	2
CO 3	2	3	2	2	2	2	2	2	2	2	2	2
CO 4	2	2	2	2	2	2	2	2	2	2	2	2
CO 5	2	2	3	2	2	2	2	2	2	2	3	2
W.AV	**2**	**2.2**	**2**	**1.8**	**1.8**	**2.2**	**2**	**1.8**	**1.6**	**1.8**	**2.2**	**2**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	2	2
CO2	2	2	2	2	2
CO3	2	2	2	1	2
CO4	3	2	2	2	2
CO5	2	2	3	1	2
W.AV	**2.4**	**1.8**	**2.4**	**1.6**	**2**

S–Strong(3),M-Medium2,L-Low(1)

VI-Semester					
Core	**Course Code: 11863**	**AIRCRAFT AND ENGINE MAINTENANCE LAB-PRACTICAL**	**P**	**Credits:4**	**Hours:8**
Course Objectives	1. To impart knowledge on basics of aircraft structural design 2. Compute the buckling of plates, joints and fittings. 3. Understanding the operation of instruments that are employed in aircraft engines.. 4. Provide information on the maintenance and repair of both piston and jet engine engines and procedures 5. Able to perform reciprocating engine runs.				
AIRCRAFT LAB: 1. Flaring and bending of aluminium pipe. 2. Lap and Butt Joint by riveting. 3. Simple airframe skin patch repair. 4. Sheet Metal forming. 5. Under carriage wheel alignment check. 6. Study on Composite material repair **ENGINE LAB:** 1. Engine propeller track check. 2. Piston engine Cleaning and Visual Inspection 3. Measurement of piston ring side clearance and end gap. 4. Jet Engine – Identification of components and defects 5. Jet Engine - Starting and Ground running procedure					
Total : 30 Hours					

Course Outcomes	Knowledge Level
Learn the aircraft structures.	K1
For appropriate applications on the basis of characteristics, identify suitable materials.	K3
The safety rules and regulations should be incorporated.	K4
Do the quality control and calibration.	K5
Specify, interpret and evaluate data to make the best possible decision.	K5

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO1 0	P11	P12
CO 1	2	2	1	2	2	2	1	2	2	1	2	2
CO 2	2	2	2	1	2	2	2	1	2	2	2	3
CO 3	2	2	2	2	1	1	2	2	2	1	2	2
CO 4	2	2	2	1	2	2	1	1	2	2	2	2
CO 5	2	2	2	2	1	1	2	2	3	2	2	2
W.A V	**2**	**2**	**1.8**	**2**	**1,6**	**1.6**	**1.6**	**1.6**	**2.2**	**1.6**	**2**	**2.2**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	3	2
CO2	2	2	3	2	2
CO3	2	2	2	1	1
CO4	3	2	2	2	2
CO5	2	1	3	2	1
W.AV	**2.2**	**1.8**	**2.4**	**2**	**1.6**

S–Strong(3),M-Medium2,L-Low(1)

VI-Semester					
ElectiveIII	**Course Code: 11864A**	**INDUSTRIAL MANAGEMENT**	**T**	**Credits:4**	**Hours:4**

Course Objectives	1. Understanding the strategies to minimize operation cost while maintaining or improving quality 2. Gaining skills in allocating resources effectively including labour, material and equipment 3. Develop the ability to set long term goals and demise plans to achieve them 4. Acquire leadership skills to motivate and manage teams for optimal performance 5. Focus on meeting customer needs and expectation to maintain a competitive edge
Unit I	**(12) Hours** Introduction to management, functions of management, Mintzberg management roles, management by objectives, planning, strategic planning, operation planning, modern trends in management.
Unit II	**(12) Hours** Principles, Characteristics and functions of organization, organizational structure. Authority and power. Co-ordination, manpower planning, recruitment and selection process, Training.
Unit III	**(12) Hours** Decision making-principles and process. Motivation importance and methods. Supervision- roles and duties of supervisor. Managerial communication-importance, process, barriers to communication.
Unit IV	**(12) Hours** Time management-techniques and ways, office management- office correspondence and planning. Management of records. Production management, structure of production planning and control.
Unit V	**(12) Hours** Inventory control, inventory management, inventory records, Ergonomics-objectives, man-machine system. Ergonomics principles in the design of work system. Work study -purpose, techniques and procedures.
	Total : 60 Hours

Course Outcomes		**Knowledge Level**
CO-1	Improve the decision-making skills to address complex industrial issues	K2
CO-2	Proficient in maintaining and improving product or service quality	K3
CO-3	Improve the ability to analyze complex industrial challenges and effective solutions.	K2
CO-4	Develop the skills needed to lead and manage team, department and organizations	K4
CO-5	Improve continuous learning and to know the importance of staying updates with evolving industrial trends and technologies.	K2

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO 1	3	1	1	1	1	2	1	1	1	1	1	1
CO 2	2	3	2	2	1	1	1	2	1	1	2	2
CO 3	2	2	3	1	1	1	2	2	2	1	2	1
CO 4	1	2	1	1	1	2	1	2	1	1	1	1
CO 5	2	1	2	3	2	3	2	2	3	3	2	3
W.AV	**2**	**1.8**	**1.8**	**1.6**	**1.2**	**1.8**	**1.4**	**1.8**	**1.6**	**1.4**	**1.6**	**1.6**

S –Strong (3), M-Mediu2, L- Low (1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	2
CO2	2	2	2	2	2
CO3	1	2	2	1	1
CO4	1	1	2	2	2
CO5	2	3	3	2	1
W.AV	**1.8**	**2**	**2.2**	**2**	**1.6**

S –Strong (3), M-Mediu2, L- Low (1)

VI-Semester					
ElectiveIII	**Course Code: 11864B**	**AIRCRAFT MAINTENANCE MANAGEMENT**	**T**	**Credits:4**	**Hours:4**

Course Objectives	1. To enable the students to learn the importance of Aircraft Maintenance. 2. To learn the different type of documents used during maintenance. 3. To acquire knowledge in production planning and control 4. To describe flow visualization techniques and data acquisition methods. 5. To understand the functions of various instruments associated with wind tunnel
Unit I	**INTRODUCTION(12) Hours** Goals and Objectives of Maintenance -Types of Maintenance – Reliability, Redesign. - Establishing Maintenance Programme- Introduction of Maintenance Steering Group - Process and Task Oriented Maintenance - Maintenance Intervals Defined.
Unit II	**Documentation and Maintenance:(12) Hours** Types of Documentation- Regulatory Documents - Airlines Generated Documents - ATA Document Standards- Maintenance and Engineering Organization.
Unit III	**Production Planning and Control (PPC):(12) Hours** Forecasting- Production Planning &Control -Feedback for Planning - Organization of PPC - Technical Publications- Functions of Technical Publication - Technical Training – Training for Aviation Maintenance .
Unit IV	**MAINTENANCE CONTROL CENTRE(12) Hours** Responsibilities- Line Maintenance Operations - Maintenance Crew Skill Requirement - Hamper Maintenance Activities - Maintenance Overall Shops (off aircraft).
Unit V	**QUALITY ASSURANCE AND QUALITY CONTROL(12) Hours** Requirement for Quality Assurance - Quality audit- ISO 9000 Quality standard - Reliability- Types of Reliability - Maintenance Safety – Safety Rules- Accident & Injury Reporting.
	Total : 60 Hours

Course Outcomes		**Knowledge Level**
CO-1	Understand the importance of Aircraft Maintenance.	K 2
CO-2	Gain knowledge about maintenance documentations	K 2
CO-3	Apply the knowledge in production planning and control	K 3
CO-4	Make use of various maintenance control centres	K 3
CO-5	Analyse various Quality Assurance and Quality control	K 4

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	3	1	1	1	1	2	1	1	1	1	1	1
CO2	2	3	2	2	1	1	1	2	1	1	2	2
CO3	2	2	3	1	1	1	2	2	2	1	2	1

CO4	1	2	1	1	1	2	1	2	1	1	1	1
CO5	2	1	2	3	2	3	2	2	3	3	2	3
W.AV	**2**	**1.8**	**1.8**	**1.6**	**1.2**	**1.8**	**1.4**	**1.8**	**1.6**	**1.4**	**1.6**	**1.6**

S–Strong(3),M-Medium 2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	2	2	2	2
CO2	2	2	2	2	3
CO3	1	2	2	1	2
CO4	1	1	2	2	2
CO5	2	3	3	1	2
W.AV	**1.8**	**2**	**2.2**	**1.6**	**2.2**

S–Strong(3),M-Medium 2,L-Low(1)

VI-Semester					
ElectiveIII	**Course Code: 11864C**	**HUMAN VALUES AND ETHICS**	**T**	**Credits:4**	**Hours:4**
Course Objectives	1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education. 2. To help students initiate a process of dialog within themselves to know what they 'really want to be' in their life and profession 3. To help students understand the meaning of happiness and prosperity for a human being. 4. To facilitate the students to understand harmony at all the levels of human living, and live accordingly 5. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life				
Unit I	**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education** Understanding the need, basic guidelines, content and process for Value Education, Self-Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfilment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfil the above human aspirations: understanding and living in harmony at various levels.				
Unit II	**Understanding Harmony in the Human Being - Harmony in Myself** Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya.				
Unit III	**Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship** Understanding harmony in the Family- the basic unit of human interaction , Understanding values in human-human relationship; meaning of Nyaya and program for its fulfilment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)-from family to world family!.				

Unit IV	**Understanding Harmony in the Nature and Existence - Whole existence as Co-existence** Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.
Unit V	**Implications of the above Holistic Understanding of Harmony on Professional Ethics** Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b) At the level of society: as mutually enriching institutions and organizations.

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Course Outcomes		Knowledge Level
CO-1	Understand the significance of value inputs in a classroom, distinguish between values and skills, understand the need, basic guidelines, content and process of value education, explore the meaning of happiness and prosperity and do a correct appraisal of the current scenario in the society	K 2
CO-2	Distinguish between the Self and the Body, understand the meaning of Harmony in the Self the Co-existence of Self and Body.	K 2
CO-3	Understand the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human-human relationships and explore their role in ensuring a harmonious society	K 2
CO-4	Understand the harmony in nature and existence, and work out their mutually fulfilling participation in the nature.	K 2
CO-5	Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.	K 2

Mapping Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO 1	3	2	2	2	2	3	2	2	2	2	2	2
CO 2	2	2	2	2	2	2	2	2	2	1	2	3
CO 3	2	3	2	2	2	2	2	2	2	2	2	2
CO 4	3	2	2	2	2	2	2	2	2	2	2	2
CO 5	2	2	2	2	2	2	2	2	2	2	3	2
W.AV	**2.4**	**2.2**	**2**	**1.8**	**1.8**	**2.2**	**1.8**	**2**	**1.8**	**1.8**	**2.2**	**2.2**

S–Strong(3),M-Medium2,L-Low(1)

Mapping Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	2
CO2	2	2	3	2	2
CO3	2	2	2	2	1
CO4	3	2	2	2	2
CO5	2	2	2	2	1
W.AV	**2.4**	**1.8**	**2.2**	**2.2**	**1.6**

S–Strong(3),M-Medium2,L-Low(1)

VI-Semester			
11865A/11865B - Project/ Dissertation	**PR/ D**	**Credits:8**	**Hours:10**
Project/ Dissertation			

UG Programme

Passing minimum

- A candidate shall be declared to have passed in each course if he/she secures not less than 40% marks in the End Semester Examinations and 40% marks in the Internal Assessment and not less than 40% in the aggregate, taking Continuous assessment and End Semester Examinations marks together.
- The passing minimum for CIA shall be 40% out of 25 marks (i.e.10 marks) in Theory/ Practical Examinations.
- The passing minimum for University Examinations shall be 40% out of 75 marks (i.e. 30 marks) for Theory /Practical papers.
- The candidates not obtain 40% in the Internal Assessment are permitted to improve their Internal Assessment marks in the subsequent semesters (2 chances will be given) by writing the CIA tests or by submitting assignments.
- Candidates, who have secured the pass marks in the End-Semester Examination and in the CIA but failed to secure the aggregate minimum pass mark (E.S.E + C I.A), are permitted to improve their Internal Assessment mark in the following semester and/or in University examinations.
- A candidate shall be declared to have passed in the Dissertation/Project report/Internship report if he/she gets not less than 40% marks in the Internal Assessment and End Semester Examinations and not less than 40% in the aggregate, taking Continuous assessment and End Semester Examinations marks together.
- A candidate who gets less than 40% in the Dissertation / Internship/ Project Report must resubmit the thesis. Such candidates need to take again the Viva-Voce on the resubmitted report/thesis.

18.2 Grading of the Courses

The following table gives the marks, Grade points, Letter Grades, and classifications meant to indicate the overall academic performance of the candidate.

Conversion of Marks to Grade Points and Letter Grade (Performance in Course / Paper)

RANGE OF MARKS	GRADE POINTS	LETTER GRADE	DESCRIPTION
90 - 100	**9.0 – 10.0**	**O**	**Outstanding**
80 - 89	**8.0 – 8.9**	**D+**	**Excellent**
75 - 79	**7.5 – 7.9**	**D**	**Distinction**
70 - 74	**7.0 – 7.4**	**A+**	**Very Good**
60 - 69	**6.0 – 6.9**	**A**	**Good**
50 - 59	**5.0 – 5.9**	**B**	**Average**
40 - 49	**4.0 – 4.9**	**C**	**Satisfactory**
00 - 39	**0.0**	**U**	**Re-appear**
ABSENT	**0.0**	**AAA**	**ABSENT**

a) Successful candidates passing the examinations and earning a GPA between 9.0 and 10.0 and marks from 90 – 100 shall be declared to have Outstanding (O).

b) Successful candidates passing the examinations and earning GPA between 8.0 and 8.9 and marks from 80 - 89 shall be declared to have Excellent (D+).

c) Successful candidates passing the examinations and earning GPA between 7.5 – 7.9 and marks from 75 - 79 shall be declared to have Distinction (D).

d) Successful candidates passing the examinations and earning GPA between 7.0 – 7.4 and marks from 70 - 74 shall be declared to have Very Good (A+).

e) Successful candidates passing the examinations and earning GPA between 6.0 – 6.9 and marks from 60 - 69 shall be declared to have Good (A).

f) Successful candidates passing the examinations and earning GPA between 5.0 – 5.9 and marks from 50 - 59 shall be declared to have Average (B).

g) Successful candidates passing the examinations and earning GPA between 4.0 – 4.9 and marks from 40 - 49 shall be declared to have Satisfactory (C).

h) Candidates earning GPA between 0.0 and marks from 00 - 39 shall be declared to have Re-appear (U).

i) Absence from an examination shall not be taken as an attempt.

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively **by** Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA).

These two are calculated by the following formulate

GRADE POINT AVERAGE (GPA) = $\Sigma_i C_i G_i / \Sigma_i C_i$

GPA = Sum of the multiplication of grade points by the credits of the courses

Sum of the credits of the courses in a Semester

18.3 Classification of the final result

The final result of the candidate shall be based only on the CGPA earned by the candidate.

a) Successful candidates passing the examinations and earning CGPA between 9.5 and 10.0 shall be given Letter Grade (O+) and those who earned CGPA between 9.0 and 9.4 shall be given Letter Grade (O) and declared to have First Class –Exemplary*.

b) Successful candidates passing the examinations and earning CGPA between 7.5 and 7.9 shall be given Letter Grade (D), those who earned CGPA between 8.0 and 8.4 shall be given Letter Grade (D+) and those who earned CGPA between 8.5 and 8.9 shall be given Letter Grade (D++) and declared to have First Class with Distinction*.

c) Successful candidates passing the examinations and earning CGPA between 6.0 and 6.4 shall be given Letter Grade (A), those who earned CGPA between 6.5 and 6.9 shall be given Letter Grade (A+), and those who earned CGPA between 7.0 and 7.4 shall be given Letter Grade (A++) and declared to have First Class.

d) Successful candidates passing the examinations and earning CGPA between 5.0 and 5.4 shall be given Letter Grade (B) and those who earned CGPA between 5.5 and 5.9 shall be given Letter Grade (B+) and declared to have passed in the Second Class.

e) Successful candidates passing the examinations and earning CGPA between 4.0 and 4.4 shall be given Letter Grade (C) and those who earned CGPA between 4.5 and 4.9 shall be given Letter Grade (C+) and declared to have passed in the Third Class.

f) Absence from an examination shall not be taken as an attempt.

Final Result

CGPA	Grade	Classification of Final Result
9.5 – 10.0 9.0 and above but below 9.5	**O+** **O**	First Class – Exemplary*
8.5 and above but below 9.0 8.0 and above but below 8.5 7.5 and above but below 8.0	**D++** **D+** **D**	First Class with Distinction*
7.0 and above but below 7.5 6.5 and above but below 7.0 6.0 and above but below 6.5	**A++** **A+** **A**	First Class
5.5 and above but below 6.0 5.0 and above but below 5.5	**B+** **B**	Second Class
4.5 and above but below 5.0 4.0 and above but below 4.5	**C+** **C**	Third Class
0.0 and above but below 4.0	**U**	Re-appear

CUMULATIVE GRADE POINT AVERAGE (CGPA) = $\Sigma_n \Sigma_i C_{ni} G_{ni} / \Sigma_n \Sigma_i C_{ni}$

CGPA = Sum of the multiplication of grade points by the credits of the entire programme

Sum of the credits of the course for the entire Programme

Where '**Ci**' is the Credit earned for Course i in any semester; '**Gi**' is the Grade Point obtained by the student for Course i and 'n' refers to the semester in which such courses were credited.

CGPA (Cumulative Grade Point Average) = Average Grade Point of all the Courses passed starting from the first semester to the current semester.

Note: * The candidates who have passed in the first appearance and within the prescribed Semesters of the UG Programme (Major, Allied, and Elective courses alone) are eligible for this classification.