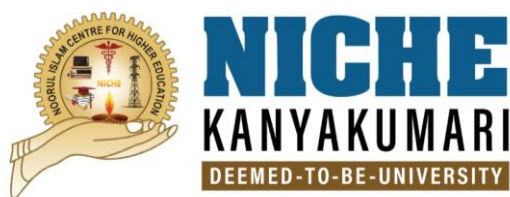


NOORUL ISLAM CENTRE FOR HIGHER EDUCATION
(Deemed to be University Under Section 3 of the UGC Act, 1956)
Kumaracoil, Thuckalay

DEPARTMENT OF AIRCRAFT MAINTENANCE ENGINEERING



B.E. AIRCRAFT MAINTENANCE ENGINEERING
CURRICULUM AND SYLLABI

REGULATION 2021



NOORUL ISLAM CENTRE FOR HIGHER EDUCATION

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B.E. AIRCRAFT MAINTENANCE ENGINEERING CURRICULUM & SYLLABUS REGULATION 2021

Vision of the University

To be recognized by the Government and society at large as an institution able to deliver excellence with relevance in the field of higher education and research focusing on the needs of the nation in tune with the technological revolution to cope with the knowledge explosion and global competence.

Mission of the University

To develop the institution as a Centre of Excellence, keeping pace with the advances in the field, so as to provide quality higher education to the students and instill in them high standards of discipline and ethics so that they become enlightened individuals in the service of humanity and to carry out focused research in the frontier areas of science and technology.

Faculty of Aeronautical Engineering Department of Aircraft Maintenance Engineering

Vision of the Department

To create a society where any human being enjoys the fullness of life. To inculcate skills and leadership qualities in future engineers and professionals to ensure technical development by developing high caliber trained Aircraft Maintenance Engineers in the field of Aviation, to take up challenges of the Aviation Industry

Mission of the Department

To guide and empower students by enhancing their talents with highly developed educational infrastructure and excellent faculties to fit right in the competitive world; with the right education to make them successful Engineers to become leaders to Modern & Advances Aviation Industry

Description of the programme

The Department of Aircraft Maintenance Engineering offers a distinctive and integrated course designed to equip students with the knowledge and practical skills essential for a career in the aviation industry. Our curriculum is comprehensive, covering a spectrum of subjects ranging from aerodynamics to aircraft systems, maintenance procedures, regulations, and safety protocols. The integration with DGCA approved AME course ensures that graduates meet the regulatory standards set by DGCA. One of the standout features of our program is the three-month training module conducted at Air India, Trivandrum. This hands-on experience provides students with a unique opportunity to apply their theoretical knowledge in a real-world aviation environment.

Programme Educational Objectives - PEO	
PEO-01	To develop the ability to use theoretical and practical knowledge along with the regulatory standards to identify, analyze and solve complex aircraft maintenance issues innovatively.
PEO-02	To conduct suitable experiments, analysis, data interpretation and synthesis of information to reach valid conclusions based on manufacturer's instructions and safety protocols.
PEO-03	To cultivate critical thinking to solve problems with due consideration for ethical standards, safety regulations, and environmental, cultural and societal policies.
PEO-04	To exhibit leadership, communication, and collaboration skills in multidisciplinary teams.
PEO-05	To engage in lifelong learning to stay abreast of advancements in aviation technologies, regulatory changes, and industry practices.

Graduate	
GA-1	Innovative Engineering Solutions Develop creative and innovative solutions to complex engineering problems, incorporating the latest technologies and approaches to address current and future challenges.
GA-2	Global Perspective in Engineering Understand and apply engineering solutions in a global context, recognizing the diversity of global issues, standards, and the impact of engineering decisions on different cultures and communities.
GA-3	Sustainable Development and Green Engineering Design and implement engineering solutions that prioritize sustainability, resource efficiency, and environmental protection, contributing to a sustainable future.
GA-4	Social Responsibility and Community Engagement Demonstrate a commitment to social responsibility by engaging with and contributing to local communities, understanding societal needs, and addressing social challenges through engineering.
GA-5	Adaptability and Lifelong Learning Exhibit a proactive approach to continuous learning and adaptability, keeping pace with technological advancements and industry changes, and engaging in professional development activities.
GA-6	Entrepreneurship and Innovation Foster an entrepreneurial mindset, identifying opportunities for innovation and creating value through new technologies, products, and processes that meet market needs.
GA-7	Interdisciplinary Collaboration Work effectively in interdisciplinary teams, integrating knowledge from various fields to develop comprehensive solutions to complex engineering problems.

GA-8	Ethical Leadership and Integrity Lead with integrity and ethical principles, ensuring transparency, fairness, and respect in all professional and personal
GA-9	Digital and Data Literacy Utilize advanced digital tools and data analytics techniques to solve engineering problems, optimize processes, and make informed decisions based on data-driven insights.
GA-10	Safety, Health, and Risk Management Prioritize safety, health, and risk management in engineering practices, ensuring the well-being of individuals and communities while minimizing potential risks and hazards.
GA-11	Effective Communication and Negotiation Skills Communicate ideas, solutions, and technical information effectively to a variety of audiences, and engage in negotiation to resolve conflicts and reach consensus.
GA-12	Impact Assessment and Policy Making Assess the impact of engineering projects on society and the environment, and contribute to policy-making processes that promote sustainable and responsible engineering practices.

Programme Outcome – POs

Programme Outcome – PO	
PO-A	Graduates will be familiarized with the basic and principal elements of the course
PO-B	Ability to apply the separate elements of knowledge in a logical and comprehensive manner to reach valid conclusions.
PO-C	Capable of applying his/her knowledge in a practical manner using manufacturer's instructions.
PO-D	The problem solving skills with due consideration to human factors will be developed.
PO-E	Graduates will develop to apply his knowledge in a practical manner using detailed procedures.
PO-F	The skills to work in a multidisciplinary team will be incorporated.
PO-G	The verbal and written communicative skills of the graduates to will be enriched.
PO-H	The roles and responsibilities of an aircraft maintenance engineer in the society will be unfolded.

PO-I	Analyzing the social and environmental aspects of engineering activities will be improved.
PO-J	Graduates will be able to apply professional ethics, accountability and equity in the work place and in society.
PO-K	Ability to use economics and maintenance practices in the industry is explained.
PO-L	Graduates will be enabled to understand and apply the modern maintenance issues and practices continually.
PO-M	Graduates will be empowered to develop supplementary and valuable practices for maintenance issues.

Mapping of Graduate Attributes and Programme Educational Objectives(PEO)

GAs PEOs	G A- 01	GA- 02	GA- 03	GA- 04	GA- 05	GA- 06	GA- 07	GA- 08	GA- 09	GA- 10	GA- 11	GA- 12
PEO-01	H	A	A	N	A	H	A	A	A	H	N	A
PEO-02	A	M	A	N	A	A	A	A	H	H	N	A
PEO-03	A	H	H	H	A	N	A	H	N	H	A	H
PEO-04	N	A	N	A	N	N	H	H	N	N	H	A
PEO-05	A	A	A	N	H	A	N	A	A	A	H	A

H- Highly Associated

A-N Associated

Not – Not Associat

Mapping of Graduate Attributes and Programme Outcomes (PO)

GAs PEOs	G A- 01	GA- 02	GA- 03	GA- 04	GA- 05	GA- 06	GA- 07	GA- 08	GA- 09	GA- 10	GA- 11	GA- 12
PO-A	A	N	N	N	H	N	N	N	A	N	N	N
PO-B	H	N	N	N	A	N	N	N	H	N	N	N
PO-C	A	A	N	N	A	N	N	N	A	H	N	N
PO-D	H	N	N	H	A	N	A	N	N	H	N	A
PO-E	H	N	N	N	A	N	N	N	A	H	N	N
PO-F	N	N	N	A	N	N	H	N	N	N	A	N
PO-G	N	N	N	A	N	N	N	N	N	N	H	N
PO-H	N	A	N	H	N	N	N	A	N	N	N	N
PO-I	N	N	H	H	N	N	N	N	N	N	N	A
PO-J	N	N	N	A	N	N	N	H	A	N	N	N
PO-K	N	N	N	N	A	H	N	N	A	N	N	N
PO-L	A	N	N	N	H	N	N	N	N	N	A	A
PO-M	H	N	N	N	A	H	N	N	N	N	A	N

H- Highly Associated

A- Associated

Not – Not Associated

Mapping of Programme Educational Objective (PEOs) and Programme Outcomes (POs)

PEO PO	PEO-01	PEO-02	PEO-03	PEO-04	PEO-05
PO-A	A	N	N	N	N
PO-B	H	H	N	N	N
PO-C	H	H	N	N	N
PO-D	A	H	H	N	N
PO-E	H	A	N	N	A
PO-F	N	N	N	H	N
PO-G	N	N	A	H	N
PO-H	N	N	N	A	N
PO-I	N	N	H	N	N
PO-J	N	N	H	N	N

H- Highly Associated

A- Associated

Not – Not Associated

Duration of the program: 4 years/8 Semesters

Total credits: 161

CURRICULUM & SYLLABI**SEMESTER I**

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	EG3101	Technical English	3	1	0	4
2.	MA3101	Engineering Mathematics – I	3	1	0	4
3.	BS3101	Engineering Physics	3	0	0	3
4.	BS3102	Engineering Chemistry	3	0	0	3
5.	CS3101	Fundamentals of Computing and Python Programming	3	0	0	3
PRACTICALS						
6.	CS3171	Fundamentals of Computing and Python Programming Laboratory	0	0	4	2
7.	BS3171	Physics and Chemistry Laboratory	0	0	4	2
TOTAL			15	2	8	21

SEMESTER II

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	EG3102	Communicative English	3	0	0	3
2.	MA3102	Engineering Mathematics – II	3	1	0	4
3.	BE3101	Basic Electrical and Electronics Engineering	3	0	0	3
4.	BE3102	Basic Civil and Mechanical Engineering	3	0	0	3
5.	AC3201	Elements of Aeronautics	3	0	0	3
6.	ME3101	Engineering Graphics	3	0	2	4
PRACTICALS						
7.	BE3171	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1
8.	BE3172	Basic Civil and Mechanical Engineering Laboratory	0	0	2	1
TOTAL			18	1	4	22

SEMESTER III

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	MA3201	Engineering Mathematics - III	3	1	0	4
2.	AC3202	Aviation Legislation - I	3	0	0	3
3.	AC3203	Maintenance Practices	3	0	0	3
4.	AC3204	Human Factors	3	0	0	3
5.	AC3205	Fundamentals of Aircraft Engineering	3	0	0	3
6.	ME3201	Engineering Mechanics	3	0	0	3
PRACTICAL						
7.	AC3271	Maintenance Practices Lab-I	0	0	3	1
8.	AC3272	Fundamentals of Aircraft Engineering Lab	0	0	3	1
9.	ME3274	Mechanical Engineering Laboratory	0	0	3	1
TOTAL			18	1	9	22

SEMESTER IV

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	MA3203	Numerical Methods	3	0	0	3
2.	BS3201	Environmental Studies	2	0	0	2
3.	AC3206	Electrical Fundamentals-I	3	1	0	4
4.	AC3207	Materials and Hardware-I	3	0	0	3
5.	AC3208	Turbine Aero plane Aerodynamics, Structures and Systems-I	3	1	0	4
6.	AC3209	Aviation Legislation - II	3	0	0	3
PRACTICAL						
7.	AC3273	Electrical Fundamentals Lab -I	0	0	3	1
8.	AC3274	Turbine Aero plane Aerodynamics, Structures and Systems Lab -I	0	0	3	1
TOTAL			17	2	6	21

SEMESTER V

SL. No.	SUBJECT CODE	SUBJECT	L	T	P	C
I. THEORY						
1.	MS3201	Professional and Business Ethics	2	0	0	2
2.	AC3211	Electrical Fundamentals-II	3	1	0	4
3.	AC3212	Materials and Hardware-II	3	0	0	3
4.	AC3213	Turbine Aeroplane Aerodynamics, Aircraft Structures and Systems-II	3	1	0	4
5.	AC3214	Electronic Fundamentals	3	0	0	3
6.	*****	Elective- I	3	0	0	3
II. PRACTICAL						
7.	AC3275	Electrical Fundamentals Lab-II	0	0	3	1
8.	AC3276	Turbine Aeroplane Aerodynamics, Structures and Systems Lab-II	0	0	3	1
9.	AC3277	Aircraft Engine and Systems Lab-I	0	0	3	1
10.	AC32P1	Summer Internship-I	0	0	0	2
TOTAL			17	0	9	24

SEMESTER VI

SL. No.	SUBJECT CODE	SUBJECT	L	T	P	C
I. THEORY						
1.	AI32D1	Fundamentals of Artificial Intelligence	3	0	0	3
2.	AC3215	Introduction to Industrial Management	3	0	0	3
3.	AC3216	Digital Techniques Electronic Instrument Systems– I	3	1	0	4
4.	*****	Elective II	3	0	0	3
5.	*****	Elective III	3	0	0	3
II. PRACTICAL						
6.	AC3278	Electronic Fundamentals Lab	0	0	3	1
7.	AC3279	Airframe Maintenance Lab	0	0	3	1
8.	AC3280	Aircraft Engine and Systems Lab-II	0	0	3	1
9.	AC32P2	Summer Internship-II	0	0	0	2
TOTAL			15	1	9	21

SEMESTER VII

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	MS3202	Principles of Management	2	0	0	2
2.	AC3217	Digital Techniques Electronic Instrument Systems II	3	0	0	3
3.	AC3218	Air Traffic Control and Systems	3	0	0	3
4.	AC3219	Aircraft Design	3	0	0	3
5.	*****	Elective IV	3	0	0	3
PRACTICAL						
6.	AC3281	Digital Techniques Electronic Instrument Systems Lab	0	0	2	1
7.	AC3282	Aircraft propellor Aerodynamics, structures and systems lab	0	0	2	1
TOTAL			14	0	4	16

SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	AC32P5	On Job Training (AMO) (OJT)	0	0	28	14
TOTAL			0	0	28	14

SEMESTER – I

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	EG3101	Technical English	3	1	0	4
2.	MA3101	Engineering Mathematics – I	3	1	0	4
3.	BS3101	Engineering Physics	3	0	0	3
4.	BS3102	Engineering Chemistry	3	0	0	3
5.	CS3101	Fundamentals of Computing and Python Programming	3	0	0	3
PRACTICALS						
6.	CS3171	Fundamentals of Computing and Python Programming Laboratory	0	0	4	2
7.	BS3171	Physics and Chemistry Laboratory	0	0	4	2
TOTAL			15	2	8	21

EG3101	Technical English	L	T	P	C
		3	1	0	4

OBJECTIVES

1. To develop the linguistic, communicative and critical thinking competencies of First Year Engineering students
2. To enhance the understanding of the complex grammatical structures of the English language to students.
3. To improve the language proficiency of students in English with emphasis on Vocabulary, Grammar, Listening, Speaking, Reading, and Writing skills.
4. To introduce the students to the basic phonetics of English and make them grasp the various sounds of the English language to improve their pronunciation

Course Outcomes		Cognitive Skill
CO-01	The students will be able to improve their vocabulary relating to Engineering and Technology, and use articles and prepositions effectively in sentences.	R
CO-02	The students will be able to learn grammatical items like tense, voice, compound nouns etc. and thereby enhance their linguistic competence.	U
CO-03	The students will be able to learn definitions of technical terms, relative pronouns etc. which will develop their language competence.	A
CO-04	The students will be able to acquire the essentials of writing skills relating to CV, Resume, Formal and Business Letters.	U
CO-05	The students will be able to learn English phonemes such as Vowels, Diphthongs and Consonants which will be instrumental in improving their pronunciation and speaking skills.	R

R-Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S-Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-K	PO-L	PO-M
CO-01	S	M	M	S	S	M	S	S	S	M	M	S	S
CO-02	M	S	M	M	S	S	M	S	M	S	M	M	S
CO-03	S	M	M	S	M	M	S	M	S	M	M	S	M
CO-04	M	S	M	M	S	M	S	M	M	S	M	M	S
CO-05	S	M	S	S	M	S	M	S	S	M	S	S	M

S-Strong, M-Medium, L-Low, N-Not relevant

Unit I:

9

Word formation with prefixes and suffixes – Articles – Conjunctions – Prepositions – Expansion of Abbreviations and Acronyms – Writing Checklists – Writing Instructions.

Unit II:

9

Tense – Voice – Punctuation – Expansion of Compound Nouns – Writing Recommendations – Paragraph Writing – Types, Structures and Features of a Paragraph – Creating Coherence – Organizing Principles of Paragraphs in Documents.

Unit III:

9

Discourse Markers – Gerunds and Present Participles – Relative Pronouns – Conditional Clauses – Definitions of Technical Terms – Transcoding: Bar Chart - Flow Chart - Pie Chart - Tree Diagram - Tabular Column.

Unit IV:**9**

Concord – Clauses – Phrases – Numerical Adjectives – CV/Resume Writing – Virtual Communication: E-Mail Writing – Essay Writing: Basic Format of an Essay - Types – Examples.

Unit V:**9**

Basic Phonetics: Phonemes – Vowels, Diphthongs and Consonants – Classification: Pure Vowels/ Monophthongs – Vowel Glides /Diphthongs.

L: 45 + T:15 = TOTAL: 60 HOURS

EXTENSIVE READING:

Shiv Khera, *You Can Win*, Milan, Delhi, 2004

NOTE:

The book given under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

COURSE OUTCOMES:

On completion of the course, students will be able to

- learn grammatical items in a better manner for improving their grammatical competence.
- develop their writing skills.
- enhance their language proficiency.

TEXT BOOK

1. Khaleel Rahuman A., Deepa P., Sheila J., Mathi Vathani J. , Technical English, R. K. Publishers, 2023.

REFERENCES:

1. Nagarajan S., Senthil C. S., Engineering English I & II, Sri Krishna Publications, 2004.
2. Jewelcy Jawahar , Rathna P., English Work Book for First Year B.E./ B.Tech., VRB Publishers, Chennai, 2008.

MA3101	ENGINEERING MATHEMATICS – I	L	T	P	C
		3	1	0	4

OBJECTIVE:

The course objective is to develop the required skill of the students in the area of Engineering Mathematics with special emphasis on the characteristic equation of matrices, differential calculus, Beta and Gamma functions and to develop basic knowledge to the students in double and triple integration.

Course Outcome – Cos		Cognitive Skill
CO-01	Understand the characteristic equation and find eigen values and Eigen vector of a real matrix. Compute the eigen value and eigen vector using properties. Verify Cayley Hamilton theorem and its applications. Apply orthogonal transformation of a symmetric matrix.	U, A, E, R
CO-02	Define the definitions and formula for curvature, radius of curvature, circle of curvature. Apply the formula and solve problems using the required formulas also find the evolute of the curves.	U, A, E, An
CO-03	Know about the differentiation formulae and apply on partial derivatives, total derivatives and Jacobians. Verify the functions be maximum or minimum and Lagrange's multiplier method. Express the Taylor's expansion for two variables.	U, A, E, R
CO-04	Know the Fundamental concepts of improper integrals, Beta and gamma function and their properties. Develop the skill in the relation between Beta and Gamma Functions. Calculate definite integral values using Beta and Gamma Functions.	U, A, An, E
CO-05	Evaluate the double and multiple integrals and can apply these concepts to find areas of regions on a plane or in space. Graph Cartesian and polar equations. Convert Cartesian coordinates into polar coordinates.	U, A, An, E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L
CO-01	S	M	S	M	S	S	S	S	M	S	S	M
CO-02	S	M	M	M	S	S	M	S	M	M	M	M
CO-03	S	M	M	M	S	S	M	M	M	S	S	M
CO-04	S	M	S	M	S	M	S	S	M	S	S	M
CO-05	S	M	S	M	S	M	S	S	M	S	S	M

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT-I MATRICES

9

Characteristic equation - Eigen values and Eigen vectors of a real matrix - Properties of Eigen values and Eigen vectors (without proof)- Cayley Hamilton theorem (statement only), verification and its applications - Orthogonal and Symmetric matrices and their properties (excluding proof)- Orthogonal transformation of a symmetric matrix to diagonal form.

UNIT-II DIFFERENTIAL CALCULUS

9

Curvature - Cartesian co-ordinates and parametric form - Centre and radius of curvature, Circle of curvature - Evolutes.

UNIT-III FUNCTIONS OF SEVERAL VARIABLES**9**

Partial derivatives - Total derivatives - Jacobians - Properties - Maxima and minima for functions of two variables - Lagrange Multiplier method- Taylor's expansion.

UNIT-IV IMPROPER INTEGRALS**9**

Evaluation of improper integrals- Beta and Gamma functions - Properties - Relation between Beta and Gamma functions - Evaluation of integrals using Beta and Gamma functions.

UNIT-V MULTIPLE INTEGRALS**9**

Evaluation of double and triple integrals - Area enclosed by plane curves as double integral in cartesian and polar co-ordinates - Change of order of integration- Transformation of Cartesian coordinates into polar coordinates.

TOTAL: 45 + 15 = 60 HOURS**OUTCOMES:**

At the end of the course, the students will be familiar with various concepts of calculus which are essential for engineering. They also become acquainted with the basic ideas of multiple integrals and their usage.

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics"- 40th Edition , Khanna Publishers, Delhi 2007

REFERENCES:

1. M.Immaculate Mary , K.Uma Samundesvari," Engineering Mathematics - I" Revised Edition, R.K Publishers, 2016.
2. Veerarajan T, " Engineering Mathematics (for first year)", Fourth Edition, Tata McGraw- Hill Publishing Company Ltd.,New Delhi , 2007.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Seventh Edition, Wiley India, 2007.
4. P.Kandasamy , K.Thilagavathy , K.Gunavathy" Engineering Mathematics" Vol,1 ,S.Chand & Company Ltd.2002.
5. B.V. Ramana,"Higher Engineering Mathematics" Second Edition Tata McGraw- Hill, Publishing Company Ltd.,New Delhi, 2006 .

BS3101	ENGINEERING PHYSICS	L	T	P	C
		3	0	0	3

OBJECTIVES

The course objective is to provide basic ideas about the principles of physics related to properties of matter, wave optics, heat, quantum concepts and materials. engineering problems.

Course Outcome	Cognitive Skill
-----------------------	------------------------

CO-01	Students will be able to understand and apply knowledge about the properties of materials.	R,U,A
CO-02	Students will be able to understand the types of oscillations and the wave nature of light in interference, diffraction and polarization phenomenon.	R,U,A,E
CO-03	Students will be able to state and explain the various laws of thermodynamics, understand entropy and its application.	R,U,A,An, ,E
CO-04	Students gain basic knowledge about quantum mechanics and will be able to solve time dependent and time independent Schrodinger equation for simple potentials.	R,U,A,E,S
CO-05	Students will be able to know the different types of crystal structures and also gain basic knowledge about nanomaterials and biomaterials.	R,U,A,E

R-Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S-Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D
CO-01	S	S	S	S
CO-02	S	S	S	M
CO-03	S	S	S	S
CO-04	S	M	S	S
CO-05	S	S	M	M

S-Strong, M-Medium, L-Low, N-Not relevant

Unit I Properties of Matter

9

Elasticity – Poisson's ratio – Stress-strain diagram – factors affecting elasticity – bending of beams – cantilever depression – Young's Modulus - theory and experiment of Young's modulus determination (uniform and non-uniform bending) – Shear Modulus – twisting couple – hollow cylinder – torsion pendulum – determination of rigidity modulus - Bulk Modulus - applications of elastic behaviours of materials.

Unit II Oscillations and Wave optics

9

Oscillations - Rectilinear motion - Oscillations or Vibrations - Simple Harmonic Motion - Damped Harmonic motion - Real oscillatory system - Forced or Driven oscillation. Wave optics - Interference of light – Photons - Young's Double Slit Experiment - Huygens's Principle - Diffraction - Diffraction Grating - Polarization.

Unit III Thermal Physics

9

Transfer of heat energy (conduction, convection and radiation) - thermal expansion of solids and liquids – expansion joints – bimetallic strips -Thermal conductivity- Forbe's and Lee's disc

methods (theory and experiment)- thermal insulation in buildings -Laws of thermodynamics- heat exchanger -solar power- applications of solar power (solar water heater, photo voltaic cell).

Unit IV Quantum Physics

9

Matter waves- de-Broglie wavelength - Schrodinger's wave equation - time independent and time dependent equations- physical significance of wave function- uncertainty principle and its application- energy and momentum operators-particle in a one dimensional box- scanning electron microscope- transmission electron microscope-scanning tunneling microscope.

Unit V Material Physics

9

Single crystalline, polycrystalline and amorphous materials- Single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, miller indices – inter planar distances. Introduction and applications of Metallic glasses, Shape Memory Alloys (SMA), Nanomaterials, Biomaterials.

TOTAL: 45 HOURS

TEXT BOOKS

1. Engineering Physics I by Bindhu B, Sagi Rani C, Meenadevi V N, Ganapathi Raman R, RK Publishers 2015.
2. Engineering Physics II by Bindhu B, GeethaKumari R, SugirthaSunil N Y, RK Publishers 2016.
3. Engineering Physics by R K Gaur And S L Gupta, Dhanpat Rai Publications 2011.
4. A Text Book Oscillations, Waves & Acoustics by Dr. M. Gosh, Dr. D. Battacharya, S. Chand, Revised Edition.

REFERENCES:

1. Engineering Physics by Rajendran V, McGraw-Hill, New Delhi, 2013
2. Engineering Physics by Arumugam M, Anuradha Publications, 2014.
3. Principles of Physics by Halliday D, Resnick R and Walker J, Wiley 2015.
4. Physics for scientist and Engineers by Serway R A and Jewett J W, Cengage Learning 2010.
5. Engineering Physics by Bhattacharya D K and Poonam T, Oxford University Press 2015.
6. Engineering Physics by Pandey B K and Chaturvedi, Cengage Learning India 2012

BS3102	ENGINEERING CHEMISTRY	L	T	P	C
		3	0	0	3

OBJECTIVES:

To make the students conversant with the principles of the following topics:(i) Use of free energy in chemical equilibria (ii) Water chemistry (iii) Periodic properties (iv) Spectroscopic techniques and applications and (v) Organic reactions and synthesis of a drug molecule.

Course Outcome–Cos	Cognitive Skill
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CO-01	Students will be able to understand and apply knowledge about the properties of materials.	R,U,A
CO-02	Students will be able to understand the types of oscillations and the wave nature of light in interference, diffraction and polarization phenomenon.	R,U,A,E
CO-03	Students will be able to state and explain the various laws of thermodynamics, understand entropy and its application.	R,U,A,An, ,E
CO-04	Students gain basic knowledge about quantum mechanics and will be able to solve time dependent and time independent Schrodinger equation for simple potentials.	R,U,A,E,S
CO-05	Students will be able to know the different types of crystal structures and also gain basic knowledge about Nano materials and biomaterials.	R,U,A,E

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-K	PO-L
CO-01	S	M	S	L	S	S	S	S	S	M	S	S
CO-02	M	S	L	S	S	S	S	M	S	M	M	M
CO-03	S	S	S	M	S	S	S	M	M	M	S	S
CO-04	S	M	S	S	S	S	M	S	S	M	S	S
CO-05	S	L	M	S	S	S	M	S	S	M	S	S

S-Strong, M-Medium ,L-Low, N-Not Relevant

UNIT I USE OF FREE ENERGY IN CHEMICAL EQUILIBRIA

9

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.

UNIT II WATER CHEMISTRY

9

Water as a universal solvent – hard and soft water – reasons for hardness – disadvantages of hard water in washing and industrial purposes - estimation of hardness by EDTA method, problems; boiler feed water – characteristics- softening methods - external conditioning – demineralization (ion exchange) process, desalination by reverse osmosis method- internal conditioning (phosphate, calgon and carbonate conditioning methods); stages in domestic water treatment – disinfection by chlorination, ozone and UV treatments.

UNIT III PERIODIC PROPERTIES

9

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries.

UNIT IV SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

9

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.

UNIT V ORGANIC REACTIONS AND SYNTHESIS OF A DRUG MOLECULE

9

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

TOTAL: 45 HOURS

Suggested Text Books

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
5. Physical Chemistry, by P. W. Atkins
6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.

CS3101	FUNDAMENTALS OF COMPUTING AND PYTHON PROGRAMMING	L	T	P	C
		3	0	0	3

OBJECTIVES

- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures -- lists, tuples, dictionaries.
- To do input/output with files in Python.

Course Outcome–Cos		Cognitive Skill
CO-01	Students will be able to understand and apply knowledge about the properties of materials.	R,U,A
CO-02	Students will be able to understand the types of oscillations and the wave nature of light in interference, diffraction and polarization phenomenon.	R,U,A,E
CO-03	Students will be able to state and explain the various laws of thermodynamics, understand entropy and its application.	R,U,A,An, ,E

CO-04	Students gain basic knowledge about quantum mechanics and will be able to solve time dependent and time independent Schrodinger equation for simple potentials.	R,U,A,E,S
CO-05	Students will be able to know the different types of crystal structures and also gain basic knowledge about nanomaterial's and biomaterials.	R,U,A,E

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-K	PO-L
CO-01	N	M	S	L	M	M	L	S	S	S	S	M
CO-02	N	S	L	L	M	S	S	S	S	M	S	M
CO-03	M	L	S	M	L	L	M	S	S	M	M	M
CO-04	M	L	L	S	M	M	L	S	M	S	S	M
CO-05	M	L	L	L	M	S	L	S	M	S	S	M

S-Strong, M-Medium ,L-Low, N-Not Relevant

UNIT I ALGORITHMIC PROBLEMSOLVING

9

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA, EXPRESSIONS, STATEMENTS

9

Python interpreter and interactive mode; values and types: in, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROLFLOW, FUNCTIONS

9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES**9**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

UNIT V FILES, MODULES, PACKAGES**9**

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

TOTAL: 45 HOURS**TEXT BOOKS:**

1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist``, edition, Updated for Python 3, Shroff /O'Reilly Publishers, 2016
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

1. John V Guttag, —Introduction to Computation and Programming Using Python``, Revised and Revised and expanded Edition, MIT Press ,2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd.,2016.
3. Timothy A. Budd, —Exploring Python, Mc-Graw Hill Education (India) Private Ltd.,2015.
4. Kenneth A. Lambert, —Fundamentals of Python: First Programs, CENGAGE Learning, 2012. Charles Dierbach, —Introduction to Computer Science using Python: A Computational Problem Solving Focus, Wiley India Edition, 2013.
5. Paul Gries, Jennifer Campbell and Jason Montojo, —Practical Programming: An Introduction to Computer Science using Python 3, Second edition, Pragmatic Programmers, LLC, 2013

BS3171	PHYSICS & CHEMISTRY LABORATORY	L	T	P	C
		0	0	4	2

OBJECTIVE

The course objective is to teach students, the importance of physics through involvement in experiments and to have knowledge of the world due to constant interplay between observations and hypothesis.

Course Outcome – Cos		Cognitive Skill
CO-01	The students will be able to analyses the physical principle involved in various instruments and also relate the principle to new applications.	R,U,A,An,E
CO-02	Various experiments in the areas of optics, properties of matter and ultrasonic will nurture the students in all branches of engineering.	R ,U,A,An,E
CO-03	The students will be able to think innovatively and also improve the creative skills that are essential for engineering.	R,U,A,An,E

CO-04	The students will be able to gain knowledge of new concept in the solution of practical oriented problems and theoretical problems.	R,U,A,An, E
CO-05	The students will be able to understand measurement technology, usage of new instruments and real time applications in engineering studies.	R,U,A,An, E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-K	PO-L
CO-01	S	S	S	S	S	S	S	S	M	S	S	M
CO-02	S	S	S	M	S	S	M	S	M	M	M	M
CO-03	S	S	S	S	S	S	M	M	M	S	S	M
CO-04	S	M	S	S	S	M	S	S	M	S	S	M
CO-05	S	S	M	M	S	M	S	S	M	S	S	M

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS

Physics Laboratory (Any Five Experiments)

1. Determination of velocity of ultrasonic waves and compressibility of the given liquid by Ultrasonic interferometer. (Real and Virtual Lab)
2. Determination of rigidity modulus by Torsional pendulum. (Real and Virtual Lab)
3. Determination of coefficient of viscosity by Poiseulli's method.
4. Determination of Young's modulus by non-uniform bending method. (Real and Virtual Lab)
5. Determination of LASER parameters using LASER diode. (Real and Virtual Lab)
6. Determination of band gap of the semi-conductor. (Real and Virtual Lab)
7. Determination of wavelength of mercury spectrum by diffraction grating. (Real and virtual lab)
8. Determination of wavelength of light by Newton's rings. (Real and Virtual Lab)
9. Determination of angle of the prism using spectrometer. (Real and Virtual Lab)

CHEMISTRY LAB (Any FIVE experiments)

OBJECTIVE

The objective of the course is to develop the interest among the students regarding chemistry and their applications in engineering.

Course Outcomes

The student at the end of the course will

- CO1 learn and apply basic techniques used in chemistry laboratory for small/large scale water analyses/purification.
- CO2 be able estimate the ions/metal ions present in domestic/industry waste water.
- CO3 utilize the fundamental laboratory techniques for analyses such as titrations, separation/purification and spectroscopy.
- CO4 able to analyze and gain experimental skill.

List of Experiments

1. Determination of conductance of solutions
2. Potentiometric - determination of redox potentials and emfs
3. Synthesis of drug
4. Determination of Chloride content
5. Determination of hardness of water sample
6. Determination of Alkalinity of water sample
7. Virtual lab experiments

TOTAL: 45 HOURS

CS3171	FUNDAMENTALS OF COMPUTING AND PYTHON PROGRAMMING LAB	L	T	P	C
		0	0	4	2

OBJECTIVES

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python.

Course Outcome – Cos		Cognitive Skill
CO-01	The students will be able to analyses the physical principle involved in various instruments and also relate the principle to new applications.	R,U,A,An,E
CO-02	Various experiments in the areas of optics, properties of matter and ultrasonic will nurture the students in all branches of engineering.	R ,U,A,An,E
CO-03	The students will be able to think innovatively and also improve the creative skills that are essential for engineering.	R,U,A,An,E
CO-04	The students will be able to gain knowledge of new concept in the solution of practical oriented problems and theoretical problems.	R,U,A,An,E
CO-05	The students will be able to understand measurement technology, usage of new instruments and real time applications in engineering studies.	R,U,A,An,E

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-K	PO-L
CO-01	M	L	S	M	L	L	S	S	S	S	S	M
CO-02	L	L	M	M	S	M	L	S	S	M	S	M
CO-03	M	M	L	L	M	S	L	S	S	M	M	M
CO-04	S	L	L	M	M	M	L	S	M	S	S	M
CO-05	L	L	L	S	L	L	S	S	M	S	S	M

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF PROGRAMS:

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

PLATFORM NEEDED: Python 3 interpreter for Windows/Linux

TOTAL: 45 HOURS

SEMESTER – II

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	EG3102	Communicative English	3	0	0	3
2.	MA3102	Engineering Mathematics – II	3	1	0	4
3.	BE3101	Basic Electrical and Electronics Engineering	3	0	0	3
4.	BE3102	Basic Civil and Mechanical Engineering	3	0	0	3
5.	AC3201	Elements of Aeronautics	3	0	0	3
6.	ME3101	Engineering Graphics	3	0	2	4
PRACTICALS						
7.	BE3171	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1
8.	BE3172	Basic Civil and Mechanical Engineering Laboratory	0	0	2	1
TOTAL			18	1	4	22

EG3102	Communicative English	L	T	P	C
		3	0	0	3

OBJECTIVES

1. To widen and expand students' knowledge of English vocabulary
2. To develop skills of students in the areas of vocabulary, grammar, listening, speaking, Reading, and writing
3. To develop the knowledge, skills and strategies the student must possess to become proficient readers
4. To make the students learn the importance and purpose of communication skills and overcome the communication barriers by gaining confidence
5. To make the students understand how to apply technical information and knowledge in practical documents

Course Outcomes		Cognitive Skill
CO-01	The students will be able to understand the basic vocabulary items, sentence structures and error detection and correction which, in turn, will expand their knowledge of the English language.	R
CO-02	The students will be able to grasp the LSRW Skills and gain exposure to absorb Comprehension and Note-making.	U
CO-03	The students will get real time practice in speaking through Oral Presentation, Small Talk, Role Play, Debate, Group Discussion etc.	A
CO-04	The students will be able to improve their writing skills through exposure to Report Writing and Letter Writing.	U
CO-05	The students will be able to learn the Theory of Communication, the Importance of Communication, and be introduced to the various facets of Verbal and Non verbal Communication.	R

R-Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S-Synthesis

Mapping of Course Outcomes with Programme Outcomes

PO \ CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-K	PO-L
CO-01	S	M	M	S	S	M	S	S	S	S	S	S
CO-02	M	S	M	M	S	S	M	S	S	S	M	S
CO-03	S	M	M	S	M	M	S	M	S	S	M	M
CO-04	M	S	M	M	S	M	S	M	S	M	S	S
CO-05	S	M	S	S	M	S	M	S	S	M	S	S

S-Strong, M-Medium, L-Low, N-Not relevant

UNIT I VOCABULARY AND GRAMMAR

9

Parts of Speech – Sentence Structures – Technical Vocabulary – Synonyms – Antonyms – Homonyms – Homophones – Misspelled Words – One word Substitutes – Odd Words Out – Changing words from one form to another – Common Errors in English – Correction of Errors in Sentences.

UNIT II LISTENING AND READING

9

Reading Comprehension – Skimming – Scanning – Predicting the Content – Comprehension Questions – Inductive Reading – Close Reading – Note Making – Précis Writing.

UNIT III SPEAKING

9

Introducing Oneself – Exchanging Personal Information – Small Talk: Family, Friends, Studies, Profession – Speaking: Greeting, Taking Leave – Product Description – Completing information – Gap Exercises – Presentation / Public Speaking Skills – Group Discussion – Debate – Role Play.

UNIT IV TECHNICAL WRITING

9

Report Writing – Characteristics of a Report – Categories of Reports – Letter Writing (Formal Letters) : Job Application Letter with Resume – Letter Seeking Permission – Letter of Invitation – Letter Declining an Invitation – Letter of Complaint – Letter of Requisition.

UNIT V TECHNICAL COMMUNICATION

9

The Theory of Communication – Definition and Scope – Nature, Importance and Types – Different Communication Models – Barriers to Communication – Effective Communication (Verbal / Non-verbal).

L: 45 + T:15 = TOTAL: 60 HOURS

EXTENSIVE READING:

CanField Jack, *Chicken Soup for the Soul*, Westland, Chennai, 1999.

NOTE:

The book given under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

Course Outcomes:

On completion of the course, students will be able to

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, Writing and speaking skills.

REFERENCE BOOKS:

1. Communication Skills. Oxford University Press.
2. Wood, F. T. (2007). Remedial English Grammar. Macmillan.
3. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
4. The Four Skills for Communication – Josh Sreedharan – Foundation Books
5. Communicative English – E. Suresh Kumar and P. Sreehari – Orient Black swan

MA3102	ENGINEERING MATHEMATICS – II	L	T	P	C
		3	1	0	4

Aim: To impart the fundamental knowledge of Engineering Mathematics to the students in order to achieve a well-founded knowledge about the principles of Mathematics.

Objective: To develop basic knowledge to the students in differential equations and vector calculus. This subject is further broadened to the functions of complex variables and complex integration. A thorough knowledge about Laplace transforms is also covered to aid the students solve the differential equations.

Course Outcome – Cos		Cognitive Skill
CO-01	The students will be able to solve ordinary differential equations	An , E , S
CO-02	The students will be able to solve complex variables	E
CO-03	The students will be able to synthesize complex integration	S
CO-04	The students will be able to solve Vector Calculus	E , S
CO-05	The students will be able to Synthesize Laplace transforms	S

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	M	S	M	S	S	N	M	M	S	S	M	M	M
CO-02	S	M	L	N	L	M	S	L	L	S	M	M	S
CO-03	S	L	S	S	L	L	S	S	M	M	S	S	M
CO-04	S	L	M	S	N	L	S	S	M	S	S	M	S
CO-05	S	L	M	M	M	L	N	S	M	M	M	S	N

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I ORDINARY DIFFERENTIAL EQUATIONS

9

Linear differential equations of second order with constant and variable coefficients- Cauchy's and Legendre's linear equations – Method of variation of parameters.

UNIT II COMPLEX VARIABLES

9

Functions of a complex variable – Analytic function – Necessary conditions- Cauchy-Riemann equations in cartesian and polar co-ordinates - Sufficient conditions(excluding proof) –Properties of analytic function – Harmonic and its conjugate – Construction of analytic function by Milne Thomson method – Conformal mappings $w = z + c$, cz , $1/z$ and Bilinear transformation

UNIT III COMPLEX INTEGRATION

9

Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Laurent's expansion – Singular points – Residues – Cauchy's Residue theorem – Evaluation of real definite integral using contour integration(excluding poles on the real axis) - = and

$$\int_{-\infty}^{\infty} \frac{f(x)}{g(x)} dx$$

UNIT IV VECTOR CALCULUS

9

Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT V LAPLACE TRANSFORMS

Laplace transform –Existence condition– Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Transform of Periodic functions. Inverse Laplace transform – Convolution, Initial and Final value theorems (statement only) – Solutions of linear ordinary differential equation of second order with constant coefficients using Laplace transform techniques.

TOTAL 60 HOURS

TEXT BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics"- 40th Edition, Khanna Publishers, Delhi 2007.

REFERENCES:

2. M.Immaculate Mary, K.Uma Samundesvari, Engineering Mathematics – II" First Edition, Anuradha Publications, ,2013.
3. Erwin Kreyszig, "Advanced engineering Mathematics", Seventh Edition, Wiley India, 2007.
4. Veerarajan T, "Engineering Mathematics (for first year)", Tata McGraw- Hill Publishing Company Ltd.,New Delhi,2007.
5. P.Kandasamy , K.Thilagavathy , K.Gunavathy" Engineering Mathematics" S.Chand & Company Ltd.2002.
6. B.V. Ramana,"Higher Engineering Mathematics" Second Edition Tata McGraw- Hill, Publishing Company Ltd.,New Delhi, 2006.

BE3101	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basic solutions of AC and DC circuits.
- To study the basic principle and operation of AC and DC machines.
- To study the fundamental operations of measuring instruments.
- To study the layout of power system
- To understand the fundamental operation and characteristics of Electron devices
- To understand the implementation of Boolean expression using logic gates.
- To become familiar with basic concepts of Communication system.

Course Outcome – Cos		Cognitive Skill
CO-01	The Students will be able to solve ordinary differential equations	An , E , S
CO-02	The Students will be able to solve complex variables	E
CO-03	The Students will be able to synthesize complex integration	S
CO-04	The Students will be able to solve Vector Calculus	E , S
CO-05	The Students will be able to Synthesize Laplace transforms	S

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	M	S	M	S	S	N	M	M	S	S	M	M	M
CO-02	S	M	L	N	L	M	S	L	L	S	M	M	S
CO-03	S	L	S	S	L	L	S	S	M	M	S	S	M
CO-04	S	L	M	S	N	L	S	S	M	S	S	M	S
CO-05	S	L	M	M	M	L	N	S	M	M	M	S	N

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I ELECTRICAL CIRCUITS

9

Ohms Law, Kirchhoff's laws, Mesh and Nodal Analysis for DC Circuits.

Introduction to AC Circuits, Faraday's Law of Electromagnetic Induction, Lenz law, Inductor, Capacitor, Power factor, Waveforms and RMS value, Average Value, Peak factor and Form factor, Single phase circuits- Series and Parallel, Three phase balanced circuits. Fundamentals of wiring and earthing.

UNIT II ELECTRICAL MEASUREMENTS, MACHINES & POWER SYSTEM 9

Operating principles of Moving coil and Moving iron instruments (Ammeter and voltmeter), Dynamometer type watt meter and Energy meter, Errors in Measurements.

Construction, Principle of operation and Applications of DC Generators, DC Motors, Single phase transformers. Structure of power system.

UNIT III SEMICONDUCTOR DEVICES

9

Introduction to Semiconductors, PN Junction diode-Zener diode and its characteristics-Half wave and Full wave Rectifiers-Bipolar Junction transistor-CB,CE,CC Configuration and characteristics-JFET and MOSFET construction, operation ,characteristics (CS only) and uses.

UNIT IV DIGITAL ELECTRONICS

9

Number systems-binary arithmetic--Boolean algebra-laws and theorems-Simplification of Boolean expression- logic gates –Implementation of Boolean expression using logic gates-standard forms of Boolean expression.

UNIT V COMMUNICATION SYSTEMS

9

Block diagram of basic communication system-need for modulation-Types of modulation-Principles of Amplitude and Frequency modulation – pulse analog and digital modulation-AM and FM transmitter and receiver (Block diagram description only) –Satellite Communication Radar Systems-Data transmission and MODEM.

TOTAL: 45 HOURS

REFERENCES:

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, “Basic Electrical, Electronics and Computer Engineering”, Tata McGraw Hill, Second Edition, (2006).
2. V.N. Mittle “Basic Electrical Engineering”, Tata McGraw Hill Edition, New Delhi, 1990.
3. V.K.Mehta “Principles of Power System”, S.Chand & Company Ltd, New Delhi, 2001.
4. R.S.Sedha,”Applied electronics”S.Chand&Co.,2006.

BE3102	BASIC CIVIL AND MECHANICAL ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVE

To enable the students to understand the Basic Civil and Mechanical Engineering concepts.

Course Outcome – Cos		Cognitive Skill
CO-01	To gain the basic knowledge in Surveying and civil Engineering materials.	An , E , S
CO-02	Students can attain the basic knowledge in basic civil structures and building components.	E
CO-03	Can obtain the basic fundamental knowledge of Engineering Mechanics	S
CO-04	Students can expand their knowledge in knowing about IC engines and power plants	E , S
CO-05	Can increase the skill in basic manufacturing processes.	S

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	M	S	M	S	S	N	M	M	S	S	M	M	M
CO-02	S	M	L	N	L	M	S	L	L	S	M	M	S
CO-03	S	L	S	S	L	L	S	S	M	M	S	S	M
CO-04	S	L	M	S	N	L	S	S	M	S	S	M	S
CO-05	S	L	M	M	M	L	N	S	M	M	M	S	N

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS 9

Surveying: Objects – types – classification – principles – measurements of distances – angles – leveling – determination of areas – illustrative examples.

Civil Engineering Materials: Bricks – stones – sand – cement – concrete – steel sections.

UNIT II BUILDING COMPONENTS AND STRUCTURES 9

Foundations: Types, Bearing capacity – Requirement of good foundations.

Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Mechanics – Internal and external forces – stress – strain – elasticity – Types of Bridges and Dams – Basics of Interior Design and Landscaping.

UNIT III FUNDAMENTALS OF ENGINEERING MECHANICS 9

Statics – Basics Concepts, Fundamental principles & concepts: Newton's laws, gravitation, force, couple, moment (about point and about axis), Varignon's theorem, resultant of concurrent and non-concurrent coplanar forces, Problem formulation concept; 2-D statics, two and three force members, alternate equilibrium equations, 3-D statics.

UNIT IV BASIC CONCEPTS OF THERMAL ENGINEERING 9

Introduction to IC Engines, Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles, Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants, Principle of vapour compression and absorption system.

UNIT V BASIC MANUFACTURING PROCESSES 9

Foundry-Investment casting, Die casting, Centrifugal casting, Continuous casting, Stir casting, Squeeze casting. Metal fusion welding processes- Oxyfuel gas welding – Arc welding processes. Additive Manufacturing-3D Printing.

TOTAL: 45 HOURS

TEXT BOOKS:

1. Shanmugam G and Palanichamy MS, "Basic Civil and Mechanical Engineering", Tata McGraw Hill Publishing Co., New Delhi, (1996).
2. Ramamrutham S., "Basic Civil Engineering", Dhanpat Rai Publishing Co.(P)Ltd. (1999).

REFERENCES

1. Seetharaman S., "Basic Civil Engineering", Anuradha Agencies, (2005).

2. Venugopal K. and Prahu Raja V., “Basic Mechanical Engineering”, Anuradha Publishers, Kumbakonam,(2000).
3. Shantha Kumar S R J., “Basic Mechanical Engineering”, Hi-tech Publications, Mayiladuthurai,(2000).

ME3101	ENGINEERING GRAPHICS	L	T	P	C
		3	0	2	4

OBJECTIVES

- To develop skills for communication of concepts, ideas and design of Engineering Products.
- To expose them to existing national standards related to technical drawings

Course Outcome – Cos		Cognitive Skill
CO-01	To know and understand the conventions and the methods of engineering drawing.	An , E , S
CO-02	Interpret Engineering drawings using fundamental technical mathematics.	E
CO-03	Construct basic and intermediate geometry	S
CO-04	To improve their visualization skills so that they can apply these skills in developing new products.	E , S
CO-05	To improve their technical communication skill in the form of communicative drawings and comprehend the theory of projection	S

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	P O - B	PO -C	PO -D	PO -E	PO -F	PO -G	PO -H	P O -I	PO- J	PO -K	PO -L	PO- M
CO-01	M	S	M	S	S	N	M	M	S	S	M	M	M
CO-02	S	M	L	N	L	M	S	L	L	S	M	M	S
CO-03	S	L	S	S	L	L	S	S	M	M	S	S	M
CO-04	S	L	M	S	N	L	S	S	M	S	S	M	S
CO-05	S	L	M	M	M	L	N	S	M	M	M	S	N

S- Strong, M- Medium, L-Low, N- Not Relevant

Concepts and conventions: Use of drafting instruments, BIS conventions and specifications – Size, layout and folding of drawing sheets, Lettering and dimensioning. General principles of orthographic projection, First angle projection – Layout of views. **(Not for examination)**

General Plane Curves

Conic sections including the Rectangular Hyperbola (General method); Cycloid, Epicycloid, Hypocycloid and Involute.

UNIT II PROJECTION OF POINTS, LINES & PLANES

9

Projection of points, Projection of straight lines located in the first quadrant. Determination of true lengths and true inclinations. Projection of planes- parallel to any one reference plane, perpendicular to any one reference plane, Inclined to any one reference plane and inclined to both reference planes

UNIT III PROJECTION OF SOLIDS & SECTION OF SOLIDS

9

Prisms, pyramids, cylinder and cone, axis perpendicular to any one reference plane. Axis parallel to both the planes. Axis inclined to any one reference plane.

Sectioning of solids- Prisms, pyramids, cylinder and cone in simple vertical position by cutting planes inclined to one reference plane. Obtaining the true shape of section

UNIT IV DEVELOPMENT OF SURFACES & ISOMETRIC PROJECTION

9

Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone, Isometric view, Isometric scale to draw Isometric projection, Non-Isometric lines, construction of Isometric view from given orthographic views and to construct Isometric view of a Pyramid, Cone, Sphere.

UNIT V ORTHOGRAPHIC PROJECTION & PERSPECTIVE PROJECTION

9

Fundamental of projection along with classification, Projections from the pictorial view of the object on the principal planes for view from front, top and sides using first angle projection method and third angle projection method, full sectional view. Perspective Projection of Solids (Any one Method).

L: 45+P:15 = TOTAL: 60 HOURS

TEXT BOOKS:

1. Venugopal K and Prabhu Raja V, “Engineering Graphics”, New Age International Publishers, 2007.
2. Luzadder W J, “Fundamentals of Engineering Drawing”, Prentice Hall Book Co., New York, 1998
3. Bhat, N.D.& M. Panchal , Engineering Drawing, Charotar Publishing House,2008

REFERENCES:

1. Kumar M S, “Engineering Graphics”, Ninth Edition, DD Publications, Chennai, 2007.
2. Bureau of Indian Standards, “Engineering Drawing Practices for Schools and Colleges SP 46-2003”, BIS, New Delhi, 2003.
3. Shah, M.B. & B.C. Rana , Engineering Drawing and Computer Graphics, Pearson Education,2008

AC3201	ELEMENTS OF AERONAUTICS	L	T	P	C
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		3	0	0	3
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OBJECTIVES

- Understand the Historical evaluation of Airplanes
- Study the different component systems and functions
- Understand the basic properties and principles behind the flight
- Study the different structures & construction
- Study the various types of power plants used in aircrafts

Course Outcome – Cos		Cognitive Skill
CO-01	Learn the history of aircraft & developments over the years	An , E , S
CO-02	Ability to identify the types & classifications of components and control systems	E
CO-03	Understand the basic concepts of flight & Physical properties of Atmosphere	S
CO-04	An ability to differentiate the types of fuselage and constructions	E , S
CO-05	Different types of Engines and principles of Rocket	S

Mapping of Course Outcome with Programme Outcome

PO CO	PO -A	PO -B	PO -C	PO -D	PO -E	PO -F	PO -G	PO -H	P O -I	PO- J	PO -K	PO -L	PO- M
CO-01	M	S	M	S	S	N	M	M	S	S	M	M	M
CO-02	S	M	L	N	L	M	S	L	L	S	M	M	S
CO-03	S	L	S	S	L	L	S	S	M	M	S	S	M
CO-04	S	L	M	S	N	L	S	S	M	S	S	M	S
CO-05	S	L	M	M	M	L	N	S	M	M	M	S	N

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I HISTORY OF FLIGHT

9

Balloon flight-or nit hoppers-Early Airplanes by Wright Brothers, biplanes and monoplanes, Developments in aerodynamics, materials, structures and propulsion over the years.

UNIT II AIRCRAFT CONFIGURATIONS AND ITS CONTROLS

9

Different types of flight vehicles, classifications-Components of an airplane and their functions Conventional control, powered control- Basic instruments for flying-Typical systems for control actuation.

UNIT III BASICS OF AERODYNAMICS

9

Physical Properties and structures of the Atmosphere, Temperature, pressure and altitude relationships, Newton's Law of Motions applied to Aeronautics-Evolution of lift, drag and moment. Aerofoils, Mach number, Maneuvers.

UNIT IV BASICS OF PROPULSION

9

Basic ideas about piston, turboprop and jet engines – use of propeller and jets for thrust production- Comparative merits, Principle of operation of rocket, types of rocket and typical applications, Exploration into space.

UNIT V BASICS OF AIRCRAFT STRUCTURES

9

General types of construction, Monocoque, semi-monocoque and geodesic constructions, typical wing and fuselage structure. Metallic and non-metallic materials. Use of Aluminium alloy, titanium, stainless steel and composite materials. Stresses and strains-Hooke's law-stress-strain diagrams-elastic constants-Factor of Safety.

TOTAL: 45 HOURS

TEXT BOOKS

1. Anderson, J.D., Introduction to Flight, McGraw-Hill; 8th edition , 2015
2. Stephen.A. Brandt, Introduction to aeronautics: A design perspective, 2nd edition, AIAA Education Series, 2004.

REFERENCE

1. Kermode, A.C. Flight without Formulae, Pearson Education; Eleven edition, 2011

BE3171	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVES:

- To make basic electrical connection
- To measure the electrical parameters
- To obtain the characteristics of Electron devices
- To verify the operation of logic gates.

Course Outcome – Cos		Cognitive Skill
CO-01	Learn the history of aircraft & developments over the years	An , E , S
CO-02	Ability to identify the types & classifications of components and control systems	E
CO-03	Understand the basic concepts of flight & Physical properties of Atmosphere	S
CO-04	An ability to differentiate the types of fuselage and constructions	E , S
CO-05	Different types of Engines and principles of Rocket	S

Mapping of Course Outcome with Programme Outcome

PO CO	PO -A	PO -B	PO -C	PO -D	PO -E	PO -F	PO -G	PO -H	P O -I	PO- J	PO -K	PO -L	PO- M
CO-01	M	S	M	S	S	N	M	M	S	S	M	M	M
CO-02	S	M	L	N	L	M	S	L	L	S	M	M	S
CO-03	S	L	S	S	L	L	S	S	M	M	S	S	M
CO-04	S	L	M	S	N	L	S	S	M	S	S	M	S
CO-05	S	L	M	M	M	L	N	S	M	M	M	S	N

S- Strong, M- Medium, L-Low, N- Not Relevant

I. Electrical Engineering Lab

- 1 Study of Symbols, Cables and Earthing.
- 2 Residential house wiring using switches, fuse, indicator, lamp and energy meter.
- 3 Fluorescent lamp wiring.
- 4 Stair case wiring / Lamp control from three different places/ Doctor Room control/ Go down control
- 5 Measurement of electrical quantities – voltage, current, power & computation of power factor in RLC circuit.
- 6 Measurement of energy using single phase energy meter.
- 7 Fan Wiring.

II. Electronics Engineering Lab

1. Study of Electronic components and equipments – Resistor, colour coding, Measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
2. Characteristics of PN Junction diode
3. Characteristics of Zener diode
4. Voltage Regulator using Zener diode
5. Measurement of ripple factor of HWR and FWR.
6. Study of logic gates AND, OR, EX-OR and NOT, NAND and NOR.
7. Generation of Clock Signal.
8. Soldering practice – Components, Devices and Circuits – Using general purpose PCB.

TOTAL: 30 HOURS

BE3172	BASIC CIVIL AND MECHANICAL ENGINEERING LABORATORY	L	T	P	C
		0	0	2	1

OBJECTIVE

To provide exposure to the students with hands on experience on various basic Engineering practices in Civil & Mechanical Engineering.

Course Outcome – Cos	Cognitive Skill
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CO-01	Students can gain fundamental knowledge about Buildings and pipe line works.	An , E , S
CO-02	One can able to handle Carpentry and power tools.	E
CO-03	Can gain knowledge in basic welding and machining process.	S
CO-04	Can attain the practice of using gyroscope in dynamics.	E , S
CO-05	Can understand the fundamental knowledge in foundry, fitting, sheet metal and IC engines.	S

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	P O - B	PO -C	PO -D	PO -E	PO -F	PO -G	PO -H	P O -I	PO- J	PO -K	PO -L	PO- M
CO-01	M	S	M	S	S	N	M	M	S	S	M	M	M
CO-02	S	M	L	N	L	M	S	L	L	S	M	M	S
CO-03	S	L	S	S	L	L	S	S	M	M	S	S	M
CO-04	S	L	M	S	N	L	S	S	M	S	S	M	S
CO-05	S	L	M	M	M	L	N	S	M	M	M	S	N

S- Strong, M- Medium, L-Low, N- Not Relevant

CIVIL ENGINEERING PRACTICE

Buildings:

- (a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

- (a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in house hold fittings.
 (b) Study of pipe connections requirements for pumps and turbines.
 (c) Preparation of plumbing line sketches for water supply and sewage works.
 (d) Hands-on-exercise:
 Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.
 (e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

- (a) Study of the joints in roofs, doors, windows and furniture.
 (b) Hands-on-exercise:
 Wood work, joints by sawing, planing and cutting.

MECHANICAL

ENGINEERING

PRACTICE

Welding:

Preparation of arc welding of butt joints, lap joints and tee joints.

Basic Machining:

Simple Turning and Taperturning

Dynamics:

Experiment using Gyroscope/Four bar link mechanism.

Demonstration on:

- (a) Demonstration on foundry, fitting and sheet metal exercises.
- (b) Demonstration on the working principle of two stroke and four stroke I.C. engines.

TOTAL: 30 HOURS

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	MA3201	Engineering Mathematics - III	3	1	0	4
2.	AC3202	Aviation Legislation - I	3	0	0	3
3.	AC3203	Maintenance Practices	3	0	0	3
4.	AC3204	Human Factors	3	0	0	3
5.	AC3205	Fundamentals of Aircraft Engineering	3	0	0	3
6.	ME3201	Engineering Mechanics	3	1	0	4
PRACTICAL						
7.	AC3271	Maintenance Practices Lab-I	0	0	3	1
8.	AC3272	Fundamentals of Aircraft Engineering Lab	0	0	3	1
9.	ME3274	Mechanical Engineering Laboratory	0	0	3	1
TOTAL			18	2	9	23

MA3201	ENGINEERING MATHEMATICS - III	L	T	P	C
		3	1	0	4

OBJECTIVE

To develop the skill of the students in the areas of boundary value problems and Transform techniques. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. This course will also serve as a prerequisite for post graduate and specialized studies and research.

Course Outcome – Cos		Cognitive Skill
CO-01	Basic Understanding Of The Partial Differential Equations	U
CO-02	Remember Knowledge About The Fourier Series	U
CO-03	Apply The Techniques About The Boundary Value Problems	U
CO-04	Remember The Knowledge About The Fourier Transforms	U
CO-05	Knowledge On The Z-Transforms	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I PARTIAL DIFFERENTIAL EQUATIONS

9

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of standard types of first order partial differential equations – Lagrange's linear equation – Homogeneous linear partial differential equations of second and higher order with constant coefficients.

UNIT II FOURIER SERIES

9

Dirichlet's conditions – Fourier series – Change of interval - Odd and Even functions – Half range sine and cosine series – Parseval's identity – Harmonic Analysis.

UNIT III BOUNDARY VALUE PROBLEMS

9

Classification of second order linear partial differential equations – One dimensional wave and

heat equations – Assumptions – Fourier series solution – Steady state solution of two dimensional heat equation (insulated edges excluded) – Fourier series solution in Cartesian co-ordinates.

UNIT IV FOURIER TRANSFORMS

9

Fourier integral theorem(without proof) – Fourier transform – Sine and Cosine transforms – Properties - Inverse Fourier transform – Inverse sine and cosine transforms – Properties - Transforms of simple functions – Convolution theorem – Parseval's identity

UNIT V Z-TRANSFORMS

9

Z- Transform – Elementary properties – convolution theorem-Inverse Z-transform –Partial fraction Method, Inversion integral method and Convolution – Initial and Final value theorems –Formation of difference equations – Solution of difference equations using Z- transform

T: 15 + L: 45 = TOTAL: 60 HOURS

TEXT BOOK:

Grewal B.S., “Higher Engineering Mathematics” – 40th Edition , Khanna Publishers, Delhi 2011.

REFERENCES

- 1.Kandasamy P, Thilagavathy K, and Gunavathy K., “Engineering Mathematics Volume III”,First Edition, S.Chand & Company Ltd., New Delhi, 1996
2. Veerarajan T., “Engineering Mathematics (for Semester III), Third Edition, Tata McGraw – Hill Publishing Company Limited, New Delhi 2007.
- 3.Bali, N.P. and Manish Goyal, A Text Book of Engineering Mathematics, Seventh Edition, Lakshmi Publications Pvt. Ltd., New Delhi, 2009.

AC3202	AVIATION LEGISLATION-I	L	T	P	C
		3	0	0	3

OBJECTIVE

Introduce the concepts of International standard atmosphere, flying, structural aspects and stability criteria of airplanes.

Course Outcome – Cos		Cognitive Skill
CO-01	Basic understanding of the regulatory frame work	U
CO-02	Knowledge on CAR Section 1 – General: Series A	U
CO-03	Understanding CAR Section 1 – General: Series B & Series C	U
CO-04	Knowledge on CAR Section 2- Airworthiness: Series B & C	U
CO-05	Knowledge on CAR Section 2- Airworthiness: Series E	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I REGULATORY FRAME WORK

9

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

UNIT II CAR SECTION 1 – GENERAL: SERIES A, B & C

9

Series A: General Policy and Procedures Adopted by DGCA: Part I-Issuance of the Civil Aviation Requirements and revisions thereof etc. - Requirements to be complied with. Part II- Definitions; Part III-Procedure for holding examinations, proficiency checks etc. for Defense personnel to fulfill the requirements for grant of civil licenses. Part IV-Procedure for an appeal on orders issued under Rule 3B of the Aircraft Rules, 1937. Part V-Regulatory Document Management System. Series B: Part I-Units of Measurements to be used in air and ground operations. Part III-Procedure for seeking exemption from Civil Aviation Requirements. **Series C:** Part I- Establishment of a Safety Management System (SMS)

UNIT III CAR SECTION 2- AIRWORTHINESS: SERIES C&E

9

Series B: Approval of Cockpit Check List, MEL, CDL. Part I-Minimum Equipment List (MEL) Series C: Defect Recording, Monitoring, Investigation and Reporting: Part I-Defect recording, reporting, investigation, rectification and analysis.

Series E-Approval of Organizations: Part I-Approval of Maintenance organization, Part VI- Approval of organization - Cat. E - Aviation Fuel, Aviation Lubricants and special products, Part VIII-Acceptance of Foreign Approved Organization (FAO) - Aircraft Type Rating, Part XI-Acceptance of Foreign Approved Maintenance Organization (FAMO); Part XII, CAR 147 (Basic)-Approved Basic Maintenance Training Organization CAR 147-Approved Maintenance Training Organization (Type Training).

UNIT IV CAR SECTION 2- AIRWORTHINESS: SERIES F&I

9

Series F-Airworthiness and Continued Airworthiness: Part I-Registration / deregistration of aircraft, Part III- Issue/validation and suspension of Special Certificate of Airworthiness, Part VII-Special Flight permits, Part XIII-Airworthiness requirements for Gliders, Part XIV- Design, Manufacture, Registration and Operation of Micro light Aircraft. Part XV- Requirements for manufacture, registration and airworthiness control of hot air balloons, Part XX-Age of Aircraft to be imported for Scheduled / Non-Scheduled including Charter, General Aviation and other Operations, Load and trim sheet - requirements thereof (Refer- CAR Section 8/ Series D/Part I), Part XXIII - Issue/ Renewal and Suspension of Special Certificate of Airworthiness. Series I- Aircraft Instrument, Equipment and Accessories: Part II- Aircraft equipment and instruments for flying training organizations and aerial work operations, Part V-Flight Data Recorders, Combination Recorders, Data link Recorders, Airborne Image

Recorders, Airborne Image Recording System and Aircraft Data Recording System ,Part VI- Cockpit voice recorders and Cockpit Audio Recording System, Part VII-Ground Proximity Warning Systems (GPWS), Part VIII- Installation of Airborne Collision Avoidance System.

UNIT V CAR SECTION 2- AIRWORTHINESS: SERIES L, H, M, and O&R 9

CAR 66- Licensing of Aircraft Maintenance Engineers, Series L-Aircraft Maintenance Engineer – Part IX-Issue of authorization to Aircraft Maintenance Engineers, Part XI-Approval of Flight Engineer Examiners and Check Flight Engineers, Part XV-Procedure for issue/renewal/extension of Student Flight Engineer/Flight Engineer's license, Part XVI-Validation of Foreign Licenses of Aircraft Maintenance Engineers Series H-Requirements of Aircraft Fuel, Refueling of Aircraft and Calibration of Aircraft Fuels Part II-Aircraft fuelling procedures, Part III-Aviation fuel at airport - Storage, handling and quality control; Series M-Mandatory Modifications and Inspections: Part I-Mandatory Modifications/ Inspections; Series R-Airborne Communication, Navigation and Radar: Part II -Installation of Communication, Navigation and Radar equipment, Part IV- Installation of Mode 'A'/'C' and Mode 'S' Transponders

TOTAL: 45 HOURS

REFERENCES

1. EASA, "Module-10 Aviation Legislation", Aircraft Tech Book Co.
2. DGCA, CAR Section 1: General
3. DGCA, CAR Section 2: Airworthiness
4. DGCA, CAR Section 8: AIRCRAFT OPERATIONS
5. CAR 145, CAR M,CAR 66

AC3203	MAINTENANCE PRACTICES	L	T	P	C
		3	0	0	3

OBJECTIVE

To get familiarize with safe working practices and the tool handling methods to implement in workshops.

Course Outcome – Cos		Cognitive Skill
CO-01	Basic understanding of workshop practices	U
CO-02	Knowledge on the general purpose tools	U
CO-03	Demonstration of drilling, bending, forming & stretching tools	U
CO-04	Hands on training on electrical test equipment	U
CO-05	Knowledge on the concepts of engineering drawing	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I WORKSHOP PRACTICES

9

Safety Precautions-Aircraft and Workshop- Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. Instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.

Workshop Practices- Care of tools, control of tools, use of workshop materials; Calibration of tools and equipment, calibration standards. Dimensions, allowances and tolerances, standards of workmanship.

UNIT II GENERAL PURPOSE TOOLS

9

Layout and measuring tools- scribe- caliper- dial indicator- screw driver- clamps- vises- hammer- mallet- punches- wrenches- socket wrenches- torque wrench- impact driver- cutting tools- snips- hacksaws- files- chisels- saws- die grinder- notched- scroll shears- disk sander- grinding wheels.

UNIT III DRILLING, BENDING, FORMING & STRETCHING TOOLS

9

Drilling- Portable power drills- two hole drill motors- drill extension and adapters- drill press- drill bit sizes- twist drills- drill lubrication- reamers- taps and dies- bending and forming tools- bar folding machine- cornice brake- snip roll former- rotary machine- shrinking and stretching tools- drop hammer- spin forming- piccolo former- dollies and stakes- V-blocks- sand bags.

UNIT IV ELECTRICAL TEST EQUIPMENTS

9

Functions and uses- electrical and mechanical damping- the voltmeter- the ohmmeter- varmeter- wattmeter- frequency measurement/oscilloscope- horizontal/vertical deflection- digital multimeter- voltage/current measurement- capacitance/inductance measurement- series circuits- parallel circuits-

UNIT-V ENGINEERING DRAWING

9

Wiring diagrams and schematic diagrams; Identifying title block information; Microfilm, microfiche and computerized presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Drawing types and diagrams, their symbols, dimensions, tolerances and projections.

TOTAL: 45 HOURS

TEXT BOOKS:

1. EASA, "Module 07A Maintenance Practices", Aircraft technical Book Company.
2. "Civil Aircraft Inspection Procedure (CAP 459) Part II", Himalayan Books, 2010.
3. "Civil Aircraft Inspection Procedure (CAP 459) Part I", Himalayan Books, 2009.

4. A C Parkinson, “First Year Engineering Drawing”, Sterling Book House, 2006.

REFERENCES

1. CAP 715 - An Introduction to Aircraft Maintenance Engineering Human Factors for JAR 66
2. CAP 718 - Human Factors in Aircraft Maintenance and Inspection
3. FAA, “A & P Mechanics (General Handbook EA-AC 65-9A)”, Shroff Publishers, 2011
4. FAA, “A & P Mechanics (Airframe Hand Book EA-AC 65-15A)”, Shroff Publishers, 2011
5. FAA, “A & P Mechanics (Power Plant Hand Book EA-AC 65-12A)”, Shroff Publishers, 2011

AC3204	HUMAN FACTORS	L	T	P	C
		3	0	0	3

OBJECTIVE

To Introduce the concepts of International standard atmosphere, flying, Controls aspects and stability criteria of airplanes. To describe about various systems and instruments used in airplanes.

Course Outcome – Cos		Cognitive Skill
CO-01	Knowledge on human performance and limitations	U
CO-02	Understanding the social psychology of humans	U
CO-03	Understanding the physical environment and the tasks in the workplace	U
CO-04	Knowledge on the requirement of effective communication in the workplace	U
CO-05	Understanding the effects and mitigation methods of human error & the hazards in workplace	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I HUMAN PERFORMANCE AND LIMITATIONS

9

Need to take human factors into account; Incidents attributable to human factors/human error; ‘Murphy’s’ law; Vision; Hearing; Claustrophobia and physical access. Attention and perception; Memory; Information processing.

UNIT II SOCIAL PSYCHOLOGY**9**

Responsibility: individual and group; Motivation and de-motivation; Peer pressure; ‘Culture’ issues; Team working; Management, supervision and leadership; Factors Affecting Performance: Fitness/health; Stress: domestic and work related; Time pressure and deadlines; Alcohol, medication, drug abuse .Sleep and fatigue, shiftwork; Workload: overload and under load.

UNIT III PHYSICAL ENVIRONMENT AND TASKS**9**

Noise and fumes; Illumination; Climate and temperature; Complex systems. Working environment, Physical work; Repetitive tasks; Visual inspection; Motion and vibration.

UNIT IV COMMUNICATION**9**

Communication within and between teams; Dissemination of information. Keeping up to date, currency; Work logging and recording.

UNIT V HUMAN ERROR & HAZARDS IN WORKPLACE**9**

Dealing with emergencies. Types of error in maintenance tasks; Implications of errors (i.e accidents); Avoiding and managing errors. Recognizing and avoiding hazards; Error models and theories.

TOTAL: 45 HOURS**TEXT BOOK**

1.EASA, “Module -09 Human Factors”, Aircraft Technical Book Company.

REFERENCES

- 1.CAP 715 - An Introduction to Aircraft Maintenance Engineering Human Factors for JAR
- 2.CAP 716 Aviation Maintenance Human Factors (EASA Part 145)
- 3.CAP 718 - Human Factors in Aircraft Maintenance and Inspection

AC3205	FUNDAMENTALS OF AIRCRAFT ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVE

To introduce the concepts of International standard atmosphere, flying, Controls aspects and stability criteria of airplanes. To describe about various systems and instruments used in airplanes.

Course Outcome – Cos		Cognitive Skill
CO-01	To impart knowledge about basic equation and different layers in international standard atmosphere	U

CO-02	Knowledge on basic aircraft aerodynamics	U
CO-03	Apply the techniques to enhance the performance and stability of aircraft	U
CO-04	To have detailed knowledge on Aircraft Systems	U
CO-05	Knowledge on Aircraft Control Systems	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I BASIC FLUID EQUATIONS AND PHYSICS OF THE ATMOSPHERE 9

Definition of fluid, Newton's law of viscosity, Units and dimensions-Properties of fluids, mass density, specific volume, specific gravity, viscosity, compressibility and surface tension, Control volume- application of continuity equation and momentum equation, Incompressible flow, Bernoulli's equation and its applications International Standard Atmosphere (ISA),

UNIT II AIRCRAFT AERODYNAMICS 9

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

UNIT III THEORY OF AIRCRAFT PERFORMANCE AND STABILITY 9

Aerofoil contamination including ice, snow, frost. Relationship between lift, weight, thrust and drag; Glide ratio; Steady state flights, performance. Theory of the turn; Influence of load factor: stall, flight envelope; Lift augmentation. Structural limitations. Longitudinal Stability, Lateral Stability and Directional stability (active and passive).

UNIT IV AIRCRAFT SYSTEMS 9

Hydraulic systems – Study of typical systems – components – Hydraulic systems controllers – Modes of operation – Pneumatic systems – Working principles – Typical Pneumatic Power system – Brake system – Components, Landing Gear Systems – Classification – Shock absorbers – Retractive mechanism

UNIT V AIRCRAFT CONTROL SYSTEMS**9**

Conventional Systems – Power assisted and fully powered flight controls – Power actuated systems – Engine control systems – Push pull rod system – operating principles – Modern control systems – Digital fly by wire systems – Auto pilot system, Active Control Technology.

TOTAL: 45 HOURS**TEXT BOOKS:**

- 1.EASA, “Module - 08 Basic Aerodynamics”, Aircraft Technical Book Company.
- 2.A C Kermode, “Mechanics of Flight”, Pearson Education, 2009.
3. Anderson, J.D., Introduction to Flight, McGraw-Hill; 8th edition , 2015

REFERENCES

- 1.FAA, “A & P Technician Air Frame Text Book”, Jeppesen, 2003.
- 2.R.W.Prouty, “Helicopter Aerodynamics”, Sterling Book House.
- 3.L.J. Clancy, “Aerodynamics”, Himalayan Books, 2010

ME3201	ENGINEERING MECHANICS	L	T	P	C
		3	1	0	4

OBJECTIVE

This is a basic engineering course common to all branches to inculcate in the students, problem solving abilities and to enhance their analytical abilities.

Course Outcome – Cos		Cognitive Skill
CO-01	Understanding the Statics of Particles	U
CO-02	Knowledge on the application of Statics & Friction	U
CO-03	Detailed understanding of Centroid, Centre of Gravity and Moment of Inertia	U
CO-04	Knowledge on Particle Dynamics	U
CO-05	Knowledge on the Kinematics & Kinetics of Rigid Bodies	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N

CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I STATICS OF PARTICLES

10

Statics –Basics Concepts, Fundamental principles & concepts: Vector algebra, Newton’s laws, gravitation, force (external and internal, transmissibility), couple, moment (about point and about axis), Varignon’s theorem, resultant of concurrent and non-concurrent coplanar forces, static equilibrium, free body diagram, reactions. Problem formulation concept; 2-D statics, two and three force members, alternate equilibrium equations, constraints and static determinacy; 3-D statics.

UNIT II APPLICATION OF STATICS & FRICTION

9

Analysis of Structures- Trusses: Assumptions, rigid and non-rigid trusses; Simple truss (plane and space), analysis by method of joints. Analysis of simple truss by method of sections; **FRICTION:** Friction- Coulomb dry friction laws, simple surface contact problems, friction angles, types of problems, wedges. Sliding friction and rolling resistance

UNIT III CENTROID, CENTRE OF GRAVITY AND MOMENT OF INERTIA

8

Moment of Inertia- First moment of mass and center of mass, centroids of lines, areas, volumes, composite bodies. Area moments- and products- of inertia, radius of gyration, transfer of axes, composite areas. Rotation of axes, principal area-moments-of-inertia,. Second moment of mass, Mass moments- and products- of inertia, radius of gyration, transfer of axes, flat plates (relation between area- and mass- moments- and products- of inertia), composite bodies. Rotation of axes, principal mass-moments-of-inertia.

UNIT IV PARTICLE DYNAMICS

8

Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton’s 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

UNIT V KINEMATICS & KINETICS OF RIGID BODIES

10

Plane kinematics of rigid bodies- Rotation; Parametric motion. Relative velocity, instantaneous center of rotation. Relative acceleration, rotating reference frames. Rotating reference frames, 3-part velocity and 5-part acceleration relations, Coriolis acceleration. Plane kinetics of rigid bodies- Kinetics of system of particles and derivation of moment equation. Translation. Fixed axis rotation; General planar motion.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Beer F P and Johnson E R, “Vector Mechanics for Engineers, Statics and Dynamics”, Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi, 2006.
2. Tayal A K, “*Engineering Mechanics- Statics and Dynamics*” , Umesh Publications, Delhi, 2004
3. Irving H. Shames, Engineering Mechanics, Prentice Hall, New Delhi 1997.

REFERENCES

1. Bansal R K, "Engineering Mechanics", Laxmi Publications Pvt. Ltd., New Delhi, 2006.
2. Bhavikatti S S, "Engineering Mechanics", New Age International Pvt. Ltd., New Delhi, 2003.
3. Young D H and Timashenko S, "Engineering Mechanics", Tata Mcgraw-Hill, Fourth Edition, 2006.
4. JivanKhachane, RuchiShrivastava, "Engineering Mechanics: Statics and Dynamics", ANE Books, 2006.
5. Rajasekaran S and Sankarasubramanian G, "Engineering Mechanics-Statics and Dynamics", Vikas Publishing House Pvt. Ltd., New Delhi, 2006.
6. NPTEL courses: <http://nptel.iitm.ac.in/courses.php>, web and video resources on Engineering Mechanics

AC3271	MAINTENANCE PRACTICES LAB-1	L	T	P	C
		0	0	4	2

OBJECTIVE:

To inculcate the safety precautions-Aircraft and Workshop

Course Outcome – Co		Cognitive Skill
CO-01	Introduction to the safe working practices in aircraft workshops	U
CO-02	Demonstrate cutting metal to given dimension and making perfect square	U
CO-03	Demonstration of using hand tools and precision tools in machines.	U
CO-04	Understanding forging and heat treatment	U
CO-05	Hands-on practices in welding, brazing, soldering and bonding	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS

Safety Precautions-Aircraft and Workshop

1. Introduction of the safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals

Fitting Shop

2. Cutting a piece of metal of given dimension and making a perfect square.
3. Making a V fitting
4. Making a T fitting
5. Drilling and internal threading in a square piece of metal
6. Drilling and reaming practices
7. Buffing practices

Tools

8. Demonstration of hand tools and precision tools

Machine Shop

9. Exercise on turning (facing)
10. Exercise on step turning
11. Exercise on taper turning
- Forging and Heat Treatment
12. Making a chisel by forging
13. Demonstration of hardening, tempering and annealing Sheet Metal Shop
14. Exercise on forming, rolling and bending practices Welding, Brazing, Soldering and Bonding
15. Exercise on making a butt joint, lap joint, corner joint and T joint (Gas welding)
16. Exercise on making a butt joint and T joint (Arc welding)
17. Exercise on making a butt joint (TIG welding)
18. Exercise on making a lap joint (Soft soldering)
19. Exercise on making a lap joint (Brazing)

TOTAL: 45 HOURS

AC3272	FUNDAMENTALS OF AIRCRAFT ENGINEERING LAB	L	T	P	C
		0	0	2	1

OBJECTIVE: Demonstration of Lear Jet Aircraft.

Course Outcome – Cos		Cognitive Skill
CO-01	Knowledge on the cockpit and Cabin Layout of Lear Jet Aircraft	U
CO-02	Knowledge about the Engine Controls of Lear Jet Aircraft.	U
CO-03	To have a detailed knowledge and maintenance of indicator, Roc Indicator of Lear Jet Aircraft.	U
CO-04	To analyse the structure and functioning of Aileron, Elevator, Rudder of Lear Jet Aircraft	U
CO-05	Knowledge on the Pitot Tubes in Lear Jet Aircraft	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L

CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS

1. Demonstration of cockpit and cabin layout of Lear Jet Aircraft.
2. Demonstration of Flying controls column of Lear Jet Aircraft.
3. Demonstration of Engine controls of Lear Jet Aircraft.
4. Demonstration of Instrument panel, Mach meter, Altimeter, Angle of attack indicator, turn and bank indicator, ROC indicator of Lear Jet Aircraft.
5. Demonstration of Aileron, elevator, rudder of Lear Jet Aircraft.
6. Demonstration of flaps, spoilers/speed brakes, horizontal stabilizer, vertical stabilizer of Lear Jet Aircraft.
7. Demonstration of trim tabs, stall strip, wash in/ wash out, angle of incidence, dihedral of Lear Jet Aircraft.
8. Demonstration of Pilot tubes in Lear Jet Aircraft.
9. Demonstration of battery compartment of Lear Jet Aircraft.
10. Demonstration of landing gear components of Lear Jet Aircraft.
11. Demonstration of fuel tanks in Lear jet aircraft

TOTAL:45 HOURS

ME3274	MECHANICAL ENGINEERING LAB	L	T	P	C
		0	0	4	2

OBJECTIVE:

To study the components of I.C. engines, boilers, steam turbines and steam engines

Course Outcome – Cos		Cognitive Skill
CO-01	Basic understanding of the 4-stroke engine cut model	U
CO-02	Knowledge in the Variable speed test on multi-cylinder diesel engine	U
CO-03	Knowledge on the Performance and Energy Balance Test on a Steam Generator/ Steam Turbine	U
CO-04	Understanding in the centrifugal pump/submersible pump.	U
CO-05	Knowledge on the reciprocating pump	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N

1.	MA3203	Numerical Methods	3	1	0	4
2.	BS3201	Environmental Studies	2	0	0	2
3.	AC3206	Electrical Fundamentals-I	3	1	0	4
4.	AC3207	Materials and Hardware-I	3	0	0	3
5.	AC3208	Turbine Aeroplane Aerodynamics, Structures and Systems-I	3	1	0	4
6.	AC3209	Aviation Legislation - II	3	0	0	3
PRACTICAL						
7.	AC3273	Electrical Fundamentals Lab -I	0	0	3	1
8.	AC3274	Turbine Aeroplane Aerodynamics, Structures and Systems Lab -I	0	0	3	1
TOTAL			17	3	6	22

MA3203	NUMERICAL METHODS	L	T	P	C
		3	0	0	3

OBJECTIVE:

To have the basic concepts in numerical methods and find the solutions of large system of linear equations where analytical methods fail to give solution. To gain the ability to solve engineering problems characterized in the form of non-linear ordinary differential equation or partial differential equation.

Course Outcome – Cos		Cognitive Skill
CO-01	Able to acquire knowledge on Solution of equations	U
CO-02	Able to identify, interpolation	U
CO-03	Understand the basics of integration	U
CO-04	Remember the Knowledge about initial value problems	U
CO-05	Understanding the boundary value problems	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I SOLUTION OF EQUATIONS

9

Solution of non-linear equations-Method of false position, Newton Raphson method, Fixed point iteration method – Solution of linear system of Equations-Direct methods: Gaussian elimination and Gauss-Jordan methods – Iterative methods: Gauss Jacobi and Gauss – Seidel methods- Inverse of a matrix by Gauss-Jordan method.

UNIT II INTERPOLATION

9

Difference Operators-Forward and Backward – Differences of a polynomial -Missing terms- Interpolation for equal intervals- Newton's forward and Backward formula- Interpolation for unequal intervals-Newton's divided difference and Lagrange's formula – Interpolation with a cubic spline .

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION

9

Numerical differentiation using Newton's Forward, Backward, Newton's divided difference, and Lagrange's formula – Numerical integration by Trapezoidal, Simpson's 1/3 and 3/8 rules,

Romberg's method – Gaussian Quadrature -Two and three point formulae – Double integrals using trapezoidal and Simpson's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS

9

Solution of first order differential equations -Single step Methods : Taylor Series , Euler ,Modified Euler methods and Fourth order Runge-Kutta method . Multi-step methods : Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS

9

Finite difference solution of the second order ordinary differential equations. Classification of partial differential equation- Finite difference solution of one dimensional heat equation by implicit and explicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TOTAL: 45 HOURS

TEXT BOOK:

1. Venkatraman M.K, "Numerical Methods" Fifth Edition, National Pub. Company, Chennai 2005.

REFERENCES:

1. Kandasamy, P.Thilakavathy, K and Gunavathy, K. "Numerical Methods" Second Edition, S.Chand and Co. New Delhi. 2008
2. Balagurusamy, E., "Numerical Methods", First Edition Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 2009.
3. Gerald, C.F, and Wheatley, P.O, "Applied Numerical Analysis", Sixth Edition, Pearson Education Asia, New Delhi, 2006

BS3201	ENVIRONMENTAL STUDIES	L	T	P	C
		2	0	0	2

OBJECTIVES

- To understand the basic concepts in environmental science
- To gain the knowledge about structure and natural cycles of environment.
- To get an idea about control methods of pollution.
- To know the information about conservation methods of forest and wild life.

Course Outcome	Cognitive Skill
-----------------------	------------------------

CO-01	Student will be able to demonstrate a general understanding of interdisciplinary nature of environmental uses and able to characterize natural resources.	U, A, An
CO-02	Students will be able to explain the effects of air, water, soil, noise and thermal pollution environment and suggest ways to reduce them.	R, E ,A
CO-03	Students will be able to explain the effects of air, water, soil, noise and thermal pollution environment and suggest ways to reduce them.	R, U, A
CO-04	Students will be able to understand the effects of human population and know about the awareness programme.	R, A, E
CO-05	Students apply systems concept and methodologies to analyse and understand interaction between social and environmental process.	R, A, An

R-Remember,U-Understand,A-Apply,An-Analyze,E-Evaluate, S-Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-K	PO-L	PO-M
CO-01	S	M	S	M	M	S	S	S	M	S	S	M	S
CO-02	M	M	S	M	S	S	S	S	M	S	S	M	M
CO-03	M	M	S	M	S	S	S	S	M	S	S	M	M
CO-04	M	M	S	S	M	S	S	S	M	S	S	M	L
CO-05	M	M	S	S	L	S	M	S	M	S	S	L	M

S-Strong, M-Medium,L-Low,N-Not relevant

UNIT I NATURE OF ENVIRONMENT STUDIES AND NATURAL RESOURCES 9

Environment studies- definition – scope and importance- need for public awareness-Methods to create environmental awareness- Natural resources- Forest resources- energy resources- food resources- water resources – land resources - mineral resources.

UNIT II ECO SYSTEMS AND BIO-DIVERSITY 9

Concept and component of eco systems- producer, consumer, decomposer- structure and function of eco system- food chain and food web- energy flow model- aquatic eco system forest eco system- desert eco system- pyramid of biomass- ocean eco system- grass land eco system- Bio diversity in India- value of bio diversity- biodiversity threatens- biodiversity protection- In-situ and Ex-situ conservation.

UNIT III ENVIRONMENTAL POLLUTION

Meaning of environmental pollution- air pollution- acid rain – global warming- water pollution- water pollution control- soil pollution- urban waste and soil pollution- marine pollution- noise pollution- thermal pollution- solid and hazardous waste management- waste disposal methods- solid waste and India- natural disaster and disaster management.

UNIT IV HUMAN POPULATION AND ENVIRONMENT

9

Population growth- distribution of population- factors affecting variation in population theories of population- future of human population- family welfare programme- HIV and AIDS- environment and human health- human rights- value education- women and child welfare.

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT

9

Unsustainable to sustainable development- sustainable development in India- water conservation, watershed management and water harvesting- environmental ethics- role of engineer in environmental protection.

TOTAL: 45 HOURS

TEXT BOOKS

1. Cunningham & saigo: 'Environmental science: A global concern' 4th Ed.W.c. Brown Publishers. USA. 1997
2. Chauhan A.S, 'Environmental studies' 2nd revised ed.2004, Jain Brother Publishers, New Delhi

REFERENCES:

1. Benny Joseph : 'Environmental Science and Engineering', 2006, Tata McGraw- Hill Publication.
2. Siddique K.A. : Elements of Ecology and Environmental Pollution, 1st Ed. 2002, Kushal Publication, Varanasi. M

AC3206	ELECTRICAL FUNDAMENTALS-I	L	T	P	C
		3	1	0	4

OBJECTIVES:

1. To impart the fundamental knowledge of electricity and the basic components of electric circuits.
2. To develop basic knowledge to the students in static and dynamic electricity and the generation of electricity.

Course Outcome – Cos	Cognitive Skill
-----------------------------	------------------------

CO-01	Able to understand the basics of electron theory , electrical terminologies and power calculations	U
CO-02	Get the knowledge of static electricity, generation of electricity , lead acid battery and Nickel Cadmium Battery	U
CO-03	Acquire knowledge on KVL, KCL and ohms law and their applications. Basics of thermocouple and photocell	U
CO-04	Get the knowledge on the basic concept, construction, color coding, series, parallel connections and power dissipation in resistors.	U
CO-05	Acquire knowledge on the basic operations, types, factors affecting, parallel and series connections, capacitors in Ac circuit and testing of capacitors.	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I INTRODUCTION

12

Electron theory: Matter, elements, compounds, molecules, atoms, electrons, protons and neutrons, Structure and distribution of electrical charges within: atoms, molecules, ions, compounds; Electron shell and energy levels, Electron movement; Molecular structure of conductors, semiconductors and insulators. SI prefixes used for electrical calculations, Conventional flow and Electron flow. Electrical Terminologies and factors affecting them: Potential difference, Electromotive force, Voltage, Current, Resistance, Conductance, Charge. Power, Work and Energy: Power in an electrical circuit, Power formulas used in the study of electricity, Energy in an electrical circuit. Power formula; Calculations involving power, work and energy.

UNIT II STATIC ELECTRICITY & GENERATION OF ELECTRICITY

12

Static Electricity. Distribution of Electrostatic Charges; Electrostatic laws of Attractive and Repulsive Forces, Coulomb's Law; ESD Considerations, Conduction of Electricity; Batteries : Construction and basic chemical action in Primary Cells, Secondary Cells- Lead acid cells, Nickel Cadmium cells. Battery ratings, Life cycle of a battery, Sealed lead acid batteries, Cells connected in series and parallel; Internal resistance and its effect on a battery;

UNIT III DC CIRCUITS

12

Basics on the production of electricity by friction, pressure, magnetism and motion. Ohms Law, Series DC Circuits, Kirchoff's Voltage Law, Voltage Divider, Parallel DC Circuits, Kirchoff's Current Law, Current Divider, Series- Parallel DC Circuits, Determination of total resistance. Calculations using Kirchoff's current law, Kirchoff's voltage law and Ohm's law to find resistance, voltage and current in resistive DC circuits. Significance of the internal resistance of a supply. Construction, materials and operation of thermocouples; Operation of photo-cells.

UNIT IV RESISTANCE/ RESISTORS

12

Resistance of a Conductor, Factors affecting resistance, Specific Resistance, Resistor colour code, values and tolerances, preferred values, wattage rating, Positive and negative temperature co-efficient, Conductance, Types of resistors: Fixed resistor, Methods of construction Carbon composition resistor, Wire wound, Variable resistor-Construction of Rheostat, Potentiometer, Thermistor, voltage dependent resistor, Resistors in series and parallel; Calculation of total resistance using series, parallel and series parallel combinations. Dissipation of power by a resistor; Calculations of power in resistors. Construction and operation of Photo-conductive cells and Wheatstone bridge.

UNIT V CAPACITANCE/ CAPACITORS

12

Capacitance, Operation and function of Capacitor in direct current, Exponential charging and discharging of a capacitor. RC time constant, Voltage rating of a capacitor, Factors affecting capacitance, Capacitor type: Construction and operation of Fixed capacitors and variable capacitors. Capacitors in series and parallel, Calculations of capacitance and voltage in series and parallel circuits, Capacitors in alternating current, capacitive reactance, capacitive reactance in series and parallel, Phase of current and voltage in reactive circuits, Testing of capacitors.

TOTAL: 60 HOURS

TEXT BOOKS

1. EASA, "Module-03 Electrical Fundamentals", Aircraft Technical Book Company
2. Theraja, B.L. & Theraja, A.K., "A Text Book of Electrical Technology (Volume I)", S.Chand & Company Ltd., 2008
3. Dale Crane, "Basic Electricity for A&P Mechanics", Himalayan Books, 1975

REFERENCE BOOKS

1. Pallett, EHJ, "Aircraft Electrical Systems", Pearson Education, Third Edition.
2. Thomas K.Eismin, "Aircraft Electricity & Electronics", Mc Graw Hill, Fifth Edition
3. "Airframe & Power Plant Mechanics General Hand Book (EA-AC 65-9A)", Himalayan Books, 2008.
4. Bernard Grob, "Basic Electronics", Tata McGraw Hill, Eighth Edition.

AC3207	MATERIALS AND HARDWARE-1	L	T	P	C
		3	0	0	3

OBJECTIVE:

To impart knowledge on the characteristics, properties and applications of metals and non-metallic materials so as to identify and suitable material for various aircraft applications.

Course Outcome – Cos		Cognitive Skill
CO-01	Basic understanding of the ferrous and non- ferrous aircraft materials	U
CO-02	Knowledge in the composite aircraft materials	U
CO-03	Knowledge on the wooden structures	U
CO-04	Understanding in the fabric covering	U
CO-05	Knowledge on the corrosion and bearings	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

S

UNIT I FERROUS & NON-FERROUS AIRCRAFT MATERIALS

9

Aircraft Materials — Ferrous :Characteristics, properties and identification of common alloy steels used in aircraft; Heat treatment and application of alloy steels; Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance. Aircraft Materials — Non-Ferrous: Characteristics, properties and identification of common non-ferrous materials used in aircraft; Heat treatment and application of non-ferrous materials; Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance.

UNIT II COMPOSITE AIRCRAFT MATERIALS

9

Composite and non-metallic other than wood and fabric; Detection of defects/deterioration in composite and non-metallic material. Repair of composite and non-metallic material. Characteristics, properties and identification of common composite and nonmetallic materials, other than wood, used in aircraft; Sealant and bonding agents.

UNIT III WOODEN STRUCTURES

9

Construction methods of wooden airframe structures; Characteristics, properties and types of wood and glue used in aeroplanes; Repair of wooden structure. Types of defects in wood material and wooden structures; Detection of defects in wooden structure; Preservation and maintenance of wooden structure;

UNIT IV FABRIC COVERING

9

Characteristics, properties and types of fabrics used in aeroplanes; Inspections methods for fabric; Repair of fabric covering. Types of defects in fabric.

UNIT V CORROSION AND BEARINGS**9**

Corrosion: Chemical fundamentals; Formation by, galvanic action process, microbiological, stress; Types of corrosion and their identification; Causes of corrosion; Bearings: Purpose of bearings, loads, material, construction; Types of bearings and their application. Material types, susceptibility to corrosion.

TOTAL: 45 HOURS**TEXT BOOKS:**

1. EASA, "Module-06 Hardware and Materials", Aircraft Technical Book Company
2. Lalit Gupta, "Advanced Composite Materials", Himalayan Books, 2003.
3. George F. Titterton, "Aircraft Materials and Processes", Sterling Book House, 2007.

REFERENCES

1. "Civil Aircraft Inspection Procedure (CAP 459) Part II", Himalayan Books, 2010.
2. Cindy Foreman, "Advanced Composites (EA-358)", Jeppesen, 2002.
3. FAA, "A & P Mechanics (General Handbook EA-AC 65-9A)", Shroff Publishers, 2011
4. Joe Christy, "Aircraft Construction Repair and Inspection", Sterling Book House.
5. FAA, "A & P Mechanics (Power Plant Hand Book EA-AC 65-12A)", Shroff Publishers, 2011
6. FAA, "A & P Mechanics (Airframe Hand Book EA-AC 65-15A)", Shroff Publishers, 2011

AC3208	TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS-I	L	T	P	C
		3	1	0	4

OBJECTIVE

Enable the students to understand aeroplane aerodynamics, flight controls, airframe structures and systems.

Course Outcome – Cos		Cognitive Skill
CO-01	Basic understanding of flight theory	U
CO-02	Knowledge on high speed flights	U
CO-03	Knowledge on the airframe structures general concepts	U
CO-04	Understanding air conditioning and cabin pressurization systems	U
CO-05	Knowledge on the avionics instruments systems	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I THEORY OF FLIGHT

12

Aero plane Aerodynamics and Flight Controls Operation and effect of: roll control: ailerons and spoilers; pitch control: elevators, stabilators, variable incidence stabilizers and canards; yaw control, rudder limiters; Control using elevons, ruddervators; High lift devices; Drag inducing devices; Effects of wing fences, saw tooth leading edges; Boundary layer control using, vortex generators, stall wedges or leading edge devices; Operation and effect of trim tabs, balance and anti balance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels; High Speed Flight , Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number, compressibility buffet, shock wave, aerodynamic heating, area rule; Factors affecting airflow in engine intakes of high speed aircraft; Effects of sweepback on critical Mach number. Airframe Structures — General Concepts; Airworthiness requirements for structural strength; Construction methods.

UNIT II AIRFRAME STRUCTURE

12

Methods of skinning, anti-corrosive protection, wing, empennage and engine attachments; Structure assembly techniques: riveting, bolting, bonding Methods of surface protection - chromating, anodising, painting; Surface cleaning. Airframe symmetry: methods of alignment and symmetry checks. Fuselage Construction and pressurization sealing; Wing, stabilizer, pylon and undercarriage attachments; Seat installation and cargo loading system; Doors and emergency exits: construction, mechanisms, operation and safety devices; Windows and windscreen construction and mechanisms. Wings Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments. Stabilizers Construction; Control surface attachment. Flight Control Surfaces Construction and attachment; Balancing — mass and aerodynamic Nacelles/Pylons Construction; Firewalls; Engine mounts. Seat installation and cargo loading system;

UNIT III AIRCONDITIONING SYSTEM

12

Air supply Sources of air supply including engine bleed, APU and ground cart; Air-conditioning systems; Air cycle and vapor cycle machines Distribution systems Flow, temperature and humidity control system. Pressurization systems; Control and indication including control and safety valves; Cabin pressure controllers. Safety and warning devices Protection and warning devices.

UNIT IV INSTRUMENT SYSTEMS**12**

Instrument Systems Pitot static: altimeter, air speed indicator, vertical speed indicator; Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn coordinator; Compasses: direct reading, remote reading; Glass Cockpit Other aircraft system indication. Avionic Systems Fundamentals of system layouts and operation of; Auto Flight Communications Navigation Systems

UNIT V AIRCRAFT SYSTEMS**12**

Electrical Power Batteries Installation and Operation; DC power generation; AC power generation; Emergency power generation; Voltage regulation; Power distribution; Inverters, transformers, rectifiers; Circuit protection. External/Ground power; Equipment and Furnishings; Emergency equipment requirements; Seats, harnesses and belts. Cabin lay-out; Equipment lay-out; Cabin Furnishing Installation; Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment; Airstairs. Fire Protection Fire and smoke detection and warning systems; Fire extinguishing systems; System tests. Portable fire extinguisher

TOTAL: 60 HOURS**TEXT BOOKS:**

1. EASA, “Module - 11A for Level B1.1 Turbine Aeroplane Structures and Systems”, Aircraft Technical Book Company.
2. Pallett, EHJ, “Aircraft Instruments”, Pearson Education, 2009.
3. FAA H 8083-31, “Aviation Maintenance Technician Handbook - Airframe (Vol. I)”, Shroff Publishers, 2012.
4. FAA H 8083-31, “Aviation Maintenance Technician Handbook - Airframe (Vol. II)”, Shroff Publishers, 2012.

REFERENCES

1. J.E Heywood, “Light Aircraft Maintenance”, Himalayan Books, 2008.
2. Dale Crane & R. Scheppler, “Aircraft Oxygen System”, Himalayan Books, 2006.
3. Brain Kendel, “Manual of Avionics”, Sterling Book House, Third Edition.
4. FAA, “A & P Mechanics (General Handbook EA-AC 65-9A)”, Shroff Publishers, 2011
5. FAA, “A & P Mechanics (Airframe Hand Book EA-AC 65-15A)”, Shroff Publishers, 2011
6. FAA, “A & P Mechanics (Power Plant Hand Book EA-AC 65-12A)”, Shroff Publishers, 2011

AC3209	AVIATION LEGISLATION-II	L	T	P	C
		3	0	0	3

OBJECTIVE

To enable the students to understand aircraft operation, certification and safety rules.

Course Outcome – Cos		Cognitive Skill
CO-01	Basic understanding of the Airworthiness: Series T & X	U
CO-02	Knowledge of CAR 66 & Aircraft Operations	U
CO-03	Knowledge on Aircraft Certification	U
CO-04	Understanding Car- M, Safety Management System & Fuel Tank Safety	U
CO-05	Knowledge on Applicable National and International Requirements	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I CAR 145

9

CAR M (Sub part F); CAR 145 Approval of Maintenance Organizations.

UNIT II CAR SECTION2-AIRWORTHINESS: SERIES T&X

9

Series T Flight Testing of Aircraft: Part II- Flight testing of aircraft for which a C of A had been previously issued. Series X Miscellaneous Requirements: Part II-Weight and balance control of an aircraft, Part III-Provision of Medical Supplies in Aircraft, Part IV- Flammability requirements for furnishing materials to be used in aircraft Part VI-Aircraft Log Books, Part VII-Document to be carried on board by Indian registered aircraft, Part VIII- Requirements for issue of taxi permit.

UNIT III CAR 66 & AIRCRAFT OPERATIONS

9

CAR 66, Aircraft Operations, Commercial Air Transport/Commercial Operations, Air Operators Certificates; Aircraft Placarding (Markings); Documents to be carried on board; Operators Responsibilities, in particular regarding continuing airworthiness and maintenance. General, Certification rules: such as FAA & EACS 23/25/27/29; Type Certification; Supplemental Type Certification; CAR-21 Design/Production Organization Approvals. Aircraft Modifications and repairs approval and certification, Permit to fly requirements. Documents- Certificate of Airworthiness; Certificate of Registration; Noise Certificate; Weight Schedule; Radio Station License and Approval.

UNIT IV CAR- M, SAFETY MANAGEMENT SYSTEM & FUEL TANK SAFETY 9

Detailed understanding of CAR-M, Safety Management System: State Safety Programme, Basic Safety Concepts, Hazards & Safety Risks, Airworthiness Limitations Items (ALI), SMS Safety performance, Safety Assurance. Fuel Tank Safety: Special Federal Aviation Regulations (SFARs) from 14 CFR SFAR 88 of the FAA and of JAA TGL 47, Concept of CDCCL, SMS Operation

UNIT V APPLICABLE NATIONAL AND INTERNATIONAL REQUIREMENTS 9

Applicable National and International Requirements: Maintenance Programme, Maintenance checks and inspections; Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists; Airworthiness Directives; Service Bulletins, Manufacturers service information; Modifications and repairs; Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.; Continuing airworthiness; Test flights; ETOPS /EDTO , maintenance and dispatch requirements; RVSM, RNP, MNPS Operations, All Weather Operations, Category 2/3 operations and minimum equipment requirements.

TOTAL: 45 HOURS

TEXT BOOKS:

1. DGCA, CAR Section 2: Airworthiness
2. CAR 66, CAR M
3. DGCA, Airworthiness Advisory Circulars:

REFERENCE

1. Government of India, "Aircraft Manual Vol. I & Vol. II" , 2018 edition
2. Government of India, "Aircraft Rule 1937"

AC3273	ELECTRICAL FUNDAMENTALS LAB-I	L	T	P	C
		0	0	3	1

OBJECTIVE

To get familiarize with safe working practices Generation of Electricity

Course Outcome – Cos		Cognitive Skill
CO-01	Understand the basics of electricity- generation, cells and measuring instruments	U
CO-02	Able to acquire knowledge on the types of connection, charging and discharging of cells.	U
CO-03	Able to prepare electrolyte for cells. Enabled to perform soldering and de-soldering	U
CO-04	Able to identify, connect and test capacitors and resistors	U
CO-05	Able to remove and install battery in Learjet	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS

Generation of Electricity

1. Demonstration of production of electricity by light, heat, Magnetism and Chemical action
2. Demonstration and use of measuring instruments

DC Sources of Electricity

3. Demonstration of Primary cells, Secondary cells, Lead acid cells, nickel cadmium cells.
4. Exercise on connecting cells in series and parallel.
5. Demonstration of battery internal construction.
6. Exercise on battery charging and discharging (Lead acid)
7. Exercise on battery charging and discharging (Nickel Cadmium)
8. Exercise on battery capacity test and deep cycling of nickel cadmium battery.
9. Exercise on preparing electrolyte for battery.
10. Removal and installation of battery from aircraft (Lear jet)

Resistance/Resistor

11. Exercise on soldering techniques.
12. Identification of resistors and their colour coding, Connections and Calculation to find total resistance in series, parallel and parallel series circuit. Testing of resistors

Capacitance/Capacitor

13. Identification of capacitors and their colour coding, Connect capacitors in series and parallel. Testing of capacitors

TOTAL: 45 HOURS

AC3274	TURBINE AEROPLANE AERODYNAMICS, STRUCTURES SYSTEMS LAB-I	L	T	P	C
		0	0	3	1

OBJECTIVE

To get familiarize with safe working practices and the tool handling methods to implement in Aircraft systems

Course Outcome – Cos		Cognitive Skill
CO-01	Understanding the basics of theory of flight: Aeroplane Aerodynamics and Flight	U
CO-02	Able to acquire knowledge on the Removal and installation of flaps and spoilers	U
CO-03	Able to prepare formers, stringers, Longerons, bulkheads, frames, doubler	U
CO-04	Able to identify, landing gear attachment and components	U
CO-05	Able to air conditioning system	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS

Theory of Flight: Aeroplane Aerodynamics and Flight Controls

1. Demonstration of balance panels and mass balancing
2. Removal and installation of ailerons.
3. Removal and installation of flaps and spoilers

Airframe Structures — General Concepts

4. Demonstration of stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers.
5. Demonstration of beams, floor structures, wing, empennage and engine attachments.
6. Demonstration of aircraft doors, Windows, windshield & Position of Inspection Panel.
7. Demonstration of symmetry checks

Airframe Structures — Aeroplanes: Fuselage (ATA 52/53/56)

8. Demonstration of landing gear attachment and components.
9. Removal and installation of seat.

Air Conditioning (Vapour cycle) and Cabin Pressurization (ATA 21)

10. Demonstration of system components and layout.
11. Functional check of Air conditioning system.
12. Demonstration of safety and warning devices and system layout.

TOTAL: 45 HOURS

SEMESTER V

SL. No.	SUBJECT CODE	SUBJECT	L	T	P	C
I. THEORY						
1.	MS3201	Professional and Business Ethics	3	0	0	3
2.	AC3211	Electrical Fundamentals-II	3	1	0	4
3.	AC3212	Materials and Hardware-II	3	0	0	3
4.	AC3213	Turbine Aeroplane Aerodynamics, Aircraft Structures and Systems-II	3	1	0	4
5.	AC3214	Electronic Fundamentals	3	0	0	3
6.	*****	Elective- I	3	0	0	3
II. PRACTICAL						
7.	AC3275	Electrical Fundamentals Lab-II	0	0	3	1
8.	AC3276	Turbine Aeroplane Aerodynamics, Structures and Systems Lab-II	0	0	3	1
9.	AC3277	Aircraft Engine and Systems Lab-I	0	0	3	1
10.	AC32P1	Summer Internship- II	0	0	0	2
TOTAL			18	0	9	25

MS3201	PROFESSIONAL AND BUSINESS ETHICS	L	T	P	C
		2	0	0	2

OBJECTIVES

1. To recognize legal and ethical issues in business decision-making.
2. To Understand and apply ethical rules and constraints.
3. To enhance analytical problem-solving skills and ethical decision-making abilities.

Course Outcome –Cos		Cognitive Skill
CO-01	Explain the connection between ethics, morals, and values in the work place.	R
CO-02	Allow engineers to better understand the kind of behavior expected from them and their duties towards their profession and the society for maintaining public safety.	U
CO-03	Critically analyze engineering as a social experiment applying scientific and technological principles to the design, fabrication, operation of machines and systems for the benefit of society.	U, An
CO-04	Appraise some of the competing demands on business when scrutinizing the ethics of safety, responsibilities and rights.	U, A
CO-05	Critically apply understanding the ethics of real world contexts and analyze information relevant to global issues.	U, A

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J	PO- K	PO- L
CO-01	S	L	M	N	M	L	N	M	N	M	L	S
CO-02	S	M	N	S	S	M	S	S	N	M	L	N
CO-03	S	S	S	L	N	M	S	S	M	N	L	S
CO-04	M	N	S	S	M	L	S	S	M	N	L	N
CO-05	S	N	M	S	L	M	N	N	M	L	S	M

S-Strong,M-Medium,L-Low,N-Not Relevant

UNIT I HUMAN VALUES

6

Morals, Values, and Ethics - Integrity and Work Ethic - Caring, Sharing, and Honesty - Commitment, Empathy, and Self-Confidence.

UNIT II ENGINEERING ETHICS

6

Senses of 'Engineering Ethics' and Moral Issues -Moral Autonomy and Ethical Theories - Models of Professional Roles.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION

6

Engineering as Experimentation - Engineers as Responsible Experimenters - Codes of Ethics and Legal Perspectives.

UNIT IV SAFETY, RESPONSIBILITIES, AND RIGHTS

6

Safety, Risk, and Risk Assessment - Collegiality, Loyalty, and Respect for Authority - Professional and Employee Rights.

UNIT V GLOBAL ISSUES

6

Multinational Corporations and Environmental Ethics - Engineers as Managers, Consultants, and Expert Witnesses.

TOTAL: 30 HOURS

TEXTBOOKS:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering," McGraw-Hill, New York, Latest edition: 4th edition (2022).
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics," Prentice Hall of India, New Delhi, Latest edition: 2nd edition (2021).

REFERENCES

1. Charles D. Fleddermann, "Engineering Ethics," Pearson Education/Prentice Hall, New Jersey, Latest edition: 4th edition (2022).
2. Charles E Harris, Michael S. Protchard, and Michael J Rabins, "Engineering Ethics - Concepts and Cases," Wadsworth Thompson Learning, United States, Latest edition: 2nd edition (2023).
3. John R Boatright, "Ethics and the Conduct of Business," Pearson Education, New Delhi, Latest edition: 8th edition (2021).
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers," Oxford University Press, Oxford, Latest edition: 2nd edition (2022).

AC3211	ELECTRICAL FUNDAMENTALS–II	L	T	P	C
		3	1	0	4

OBJECTIVES

- To enable the students to understand the different types of electric motors and their application in aircraft.
- To impart basic knowledge of AC theory and circuits.

Course Outcome – Cos		Cognitive Skill
CO-01	Basic understanding of the magnetism and inductance	U
CO-02	Remember knowledge about the DC motor and DC generator	U
CO-03	Apply the techniques about the transformers and polyphase connections	U
CO-04	Apply the techniques about the AC motor and AC generators	U
CO-05	Knowledge on the AC circuits and Filters	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L -Low, N-Not Relevant

UNIT I MAGNETISM AND INDUCTANCE

12

Theory of magnetism and Properties of a magnet; Action of magnet suspended in Earth's magnetic field; Magnetization and demagnetization; Magnetic shielding; Types of magnetic material; Electro -magnets; Hand clasp rules; Basic terms related to magnetism. Precautions, care and storage of magnets. Faraday's Law; Induction principles; Effects of magnetic field strength, rate of change of flux, number of conductor turns on the magnitude of induced voltage; Mutual induction; Effect of rate of change of primary current and mutual inductance on induced voltage; Factors affecting mutual inductance; Lenz's Law; Back emf, self-induction; Saturation point; Principle uses of inductors.

UNIT II DC MOTORS AND GENERATORS

12

Basic motor and generator theory; Construction and purpose of components in DC generator; Operation of DC Generator and factors affecting output and direction of current flow in DC generators; Operation of DC Motor and factors affecting output power, torque, speed, and direction of rotation of DC motors; Series wound, shunt wound and compound motors; Starter Generator construction.

UNIT III TRANSFORMERS

12

Transformer construction principles and operation; Transformer losses and methods for overcoming them; Transformer action under load and no-load conditions; Power transfer, efficiency, polarity markings; Calculation of line and phase voltages and currents; Calculation of power in a three-phase system ; Primary and Secondary current, voltage, turns ratio, power, efficiency; Autotransformers.

UNIT IV AC MOTORS AND GENERATORS

12

Rotation of loop in a magnetic field and waveform produced; Operation and construction of revolving armature and revolving field type AC generators; Single phase, two phase and three phase alternators; Three phase star and delta connections advantages and uses; Permanent Magnet Generators. Construction, principles of operation and characteristics of AC synchronous and induction motors both single and poly phase; Methods of speed control and direction of rotation; Methods of producing a rotating field: capacitor, inductor, shaded or split pole.

UNIT V AC CIRCUITS AND FILTERS

12

Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power; Triangular/Square waves; Single/3 phase principles. Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel; Power dissipation in L, C and R circuits; Impedance, phase angle, power factor and current calculations; True power, apparent power and reactive power calculations. Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.

TOTAL: 60 HOURS

TEXTBOOKS

1. EASA, “Module-03 Electrical Fundamentals”, Aircraft Technical Book Company
2. Theraja, B.L. & Theraja, A.K., “A Text Book of Electrical Technology (Volume I)”, S.Chand & Company Ltd.,2008.
3. Dale Crane, “Basic Electricity for A&P Mechanics”, Himalayan Books, 1975.

REFERENCES

1. Pallett, EHJ, “Aircraft Electrical Systems”, Pearson Education, Third Edition.
2. Thomas K. Eismen, “Aircraft Electricity & Electronics”, Tata Mc-Graw Hill, Fifth Edition

AC3212	MATERIALS AND HARDWARE-II	L	T	P	C
		3	0	0	3

OBJECTIVE

To study the different hardware materials and components used for aircraft applications.

Course Outcome – Cos		Cognitive Skill
CO-01	Basic understanding of the fasteners	U
CO-02	Knowledge about the locking devices and rivets	U
CO-03	Detailed understanding of pipes, unions and springs	U
CO-04	Basic knowledge about transmissions	U
CO-05	Knowledge on the control/Electrical Cables &Connectors	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L-Low, N-Not Relevant

UNIT I FASTENERS

9

Screw threads; Screw nomenclature; Thread forms, dimensions and tolerances for standard threads used in aircraft; Measuring screw threads; Bolts, studs and screws; Self tapping screws, dowels. Nuts: self-locking ,anchor ,standard types ;Machine screws :aircraft specifications; Studs: types and uses; insertion and removal; Bolt types: specification, identification and marking of aircraft bolts, international standards.

UNIT II LOCKING DEVICES AND RIVETS

9

Locking devices; Types of solid and blind rivets: specifications and identification, heat treatment. Aircraft rivets. Tab and spring washers, locking plates, split pins, palnuts, wire locking, quick release fasteners, keys ,circlips, cotter pins.

UNIT III PIPES, UNIONS AND SPRINGS

9

Pipes and Unions; Identification of, and types of rigid and flexible pipes and their connectors used in aircraft; Standard unions for aircraft hydraulic, fuel, oil, Pneumatic and air system pipes. Springs-Types of springs, materials, characteristics, and applications.

UNIT IV TRANSMISSIONS

9

Gear types and their application; Belts and pulleys, chains and sprockets. Gear ratios, reduction, and multiplication gear systems, driven and driving gears, Idler gears, mesh patterns.

UNIT V CONTROL/ELECTRICAL CABLES & CONNECTORS

9

Control Cables: Types of cables; Bowden cables; End fittings, turnbuckles and compensation devices; Pulleys and cable system components; Aircraft flexible control systems. Electrical Cables and Connectors; Cable types, construction and characteristics; High tension and co-axial cables; Crimping; Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes.

TOTAL:45 HOURS

TEXTBOOKS

1. EASA,“Module-06HardwareandMaterials”,AircraftTechnicalBookCompany
2. Lalit Gupta,“Advanced CompositeMaterials”,HimalayanBooks,2003.
3. George F.Titteron,“AircraftMaterialsandProcesses”,SterlingBookHouse,2007.

REFERENCES

1. “Civil Aircraft Inspection Procedure(CAP459)PartII”,HimalayanBooks,2010.
2. Cindy Foreman, “Advanced Composites(EA-358)”,Jeppesen, 2002.
3. FAA,“A&PMechanics(GeneralHandbookEA-AC65-9A)”,ShroffPublishers,2011.
4. Joe Christy,“AircraftConstructionRepairandInspection”,SterlingBookHouse.FAA,“A & P Mechanics (Power Plant Hand book EA-AC 65-12A)”,ShroffPublishers,2011.
5. FAA,“A&P Mechanics(AirframeHandbookEA-AC65-15A)”,Shroff Publishers,2011.

AC3213	TURBINE AEROPLANE AERODYNAMICS STRUCTURES AND SYSTEMS-II	L	T	P	C
		3	1	0	4

OBJECTIVE

- To get knowledge about the different aircraft systems, on board maintenance and flight controls of turbine aero plane.

Course Outcome – Cos		Cognitive Skill
CO-01	Basic understanding of the flight controls	U
CO-02	Knowledge about the fuel systems and hydraulic power	U
CO-03	Apply techniques about the ice and rain protection	U
CO-04	Knowledge about landing gear	U
CO-05	Knowledge on the lights, oxygen, pneumatic/vacuum, water/waste	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

Medium, L-Low, N-Not Relevant

UNIT I FLIGHT CONTROLS

12

Flight Controls (ATA 27); Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control; System operation: manual, hydraulic, pneumatic, electrical, fly-by-wire; High lift devices; Lift dump, speed brakes; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks systems; Balancing and rigging, Stall protection/warning system.

S-
Strong,
M-

UNIT II FUEL SYSTEMS & HYDRAULIC POWER

12

Fuel Systems (ATA28): System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining, Cross-feed and transfer; Indications and warnings; Refueling and defueling; Longitudinal balance fuel systems. Hydraulic Power (ATA 29): System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Indication and warning systems; Interface without her systems

UNIT III ICE AND RAIN PROTECTION

12

Ice and Rain Protection (ATA 30) :Ice formation, classification and detection; Anti-icing systems: electrical, hot air and chemical; De-icing systems: electrical, hot air, pneumatic and chemical; Filters, Pressure Control; Power distribution; Rain repellant; Probe and drain heating and Wiper systems.

UNIT IV LANDING GEAR

12

Landing Gear (ATA32): Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and auto braking; Tyres; Steering; Air-ground sensing.

UNIT V LIGHTS, OXYGEN, NEUMATIC/VACUUM, WATER/WASTE

12

Lights (ATA 33): External: navigation, anti-collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency. Oxygen (ATA 35): System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings; Pneumatic/Vacuum (ATA 36) System lay-out; Sources: engine / APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems. Water/Waste (ATA 38) Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspects.

TOTAL:60 HOURS

TEXTBOOKS

1. EASA,“Module 13 for Level B2 Aircraft Structures and Systems”, Aircraft Technical Book Company.
2. Pallett, EHJ,“AircraftInstruments”,PearsonEducation,2009.
3. FAA H 8083-31, “Aviation Maintenance Technician Handbook-Airframe (Vol.I)”, Shroff Publishers,2012.
4. FAA H8083-31,“AviationMaintenance Technician Handbook-Airframe (Vol.II)”, Shroff Publishers,2012.

REFERENCES

1. J.E Heywood, "Light Aircraft Maintenance", Himalayan Books, 2008.
2. Dale Crane & R. Scheppeler, "Aircraft Oxygen System", Books, 2006.
3. Brain Kendel, "Manual of Avionics", Sterling Book House, Third Edition.
4. FAA, "A&P Mechanics (General Handbook EA-AC65-9A)", Shroff Publishers, 2011.
5. FAA, "A&P Mechanics (Airframe Handbook EA-AC65-15A)", Shroff Publishers, 2011.
6. FAA, "A&P Mechanics (Power Plant Handbook EA-AC 65-12A)", Shroff Publishers, 2011.

AC3214	ELECTRONIC FUNDAMENTALS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To enable the students to understand the basics of electronics and its application.
- To be exposed to printed circuit board and servomechanisms.

Course Outcome– Cos		Cognitive Skill
CO-01	Able to understand the fundamentals of electronics and acquire knowledge on the different diode types	U
CO-02	Understand the transistor types and characteristics	U
CO-03	Gain knowledge on the applications of diodes and transistors.	A
CO-04	Obtain knowledge on the basic concept of Integrated circuits and its applications	U
CO-05	Attain knowledge on PCB, servo mechanism and application of servomechanism on aircraft.	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	S	S	L	L	M	N
CO-02	S	S	M	M	S	S	N	L	N	L
CO-03	M	S	M	M	S	S	N	M	L	N
CO-04	S	M	M	L	M	S	L	L	L	M
CO-05	S	S	M	L	M	S	L	M	M	L

S-Strong, M-Medium, L-Low, N-Not Relevant

UNIT I DIODES

9

Materials, Electron Configuration, Electrical Properties; P and N Type Materials: Effects of Impurities on Conduction, Majority and Minority Characters; PN Junction in a Semiconductor, Development of a Potential across a PN Junction in Unbiased, Forward Biased and Reverse Biased Conditions; Diode: Characteristics and Properties; Operation, Characteristics and Uses: Silicon Controlled Rectifier (Thyristor), Light Emitting Diode, Schottky Diode, Photo Conductive Diode, Varactor Diode, Varistor, Rectifier Diodes, Zener Diode. Functional Testing of Diodes. Diodes in Series and Parallel.

UNIT II TRANSISTORS

9

Construction and Operation of PNP and NPNT transistors; Description, Characteristics, Properties of Common Base, Common Emitter and Common Collector Configuration. Testing of Transistors, Construction and Operation of Transistors-UJT, FET, MOSFET. Biasing Transistors. Multi-Layer Semiconductor Devices.

UNIT III AMPLIFIERS AND WAVE SHAPING CIRCUITS

9

Basic Amplifier Circuits- Class A, Class B, Class C and Class AB Amplifiers, Cascade Amplifiers-Direct Coupling, Resistive-Capacitive Coupling, Impedance Coupling and Transformer Coupling. Push-Pull Amplifiers, Oscillators, Multivibrators, Clippers, Clampers, Full and Half Wave Rectifiers, Bridge Rectifiers, Voltage Doublers and Triplers.

UNIT IV INTEGRATED CIRCUITS

9

Description and Operation of Logic Circuits and Linear Circuits; Introduction to Operational Amplifier, Ideal op amp; Op amp internal circuit; AC and DC characteristics; Op-amp applications: Scale changer, Adder, Subtract or, Integrator, Differentiator, Voltage Follower, Comparator; Advantages and Disadvantages of Positive and Negative Feedback.

UNIT V PRINTED CIRCUIT BOARDS AND SERVOMECHANISMS

9

Description and use of Printed Circuit Boards. Understanding Open and Closed Loop, Follow Up, Servomechanism, Analogue, Transducer, Null, Damping, Feedback, Deadband; Construction Operation and Use of the Following Synchrony System Components: Resolvers, Differential, Control and Torque, E and I Transformers, Inductance Transmitters, Capacitance Transmitters, Synchronous Transmitters; Servomechanism Defects, Reversal of Synchrony Leads, Hunting.

TOTAL: 45 HOURS

TEXTBOOKS

1. EASA, “Module-04 Electronic Fundamentals”, Aircraft Technical Book Company.
2. Bernard Grob, “Basic Electronics”, Tata McGraw Hill, Eighth Edition.
3. Thomas K.Eismin, “Aircraft Electricity & Electronics”, McGraw Hill, Fifth Edition.
4. Millman and Halkias, “Integrated Electronics”, Tata McGraw Hill, 2003.
5. Kennedy & Davis, “Electronic Communication Systems”, Tata McGraw Hill, Fourth Edition.
6. V.K.Metha & Rohith Metha, “Principles of Electronics”, S.Chand & Company, Eleventh Edition, 2009.

REFERENCES

1. “Civil Aircraft Inspection Procedure (CAP 459) Part II”, Himalayan Books, 2010
2. “Civil Aircraft Inspection Procedure (CAP459) Part I”, Himalayan Books, 2009.
3. James Powell, “Aircraft Radio Systems”, Himalayan Books, 2009.
4. “Aviation Fundamentals”, Jeppeson, 2006.
5. John M.Ferrara, “Avionics”, Vol.I, Sterling Book House.
6. Pallett, EHJ, “Aircraft Instruments and Integrated Systems”, Sterling Book House, 1999

AC 3275	ELECTRICAL FUNDAMENTALS LAB-II	L	T	P	C
		0	0	3	1

OBJECTIVE

- To impart fundamental knowledge on Electrical Circuit Equipment & DC Motor/ Generator Theory

Course Outcome – Cos		Cognitive Skill
CO-01	Basic understanding of the DC Motor/ Generator Theory	U

CO-02	Demonstration of AC Generators	U
CO-03	Knowledge about the components of AC Motors	U
CO-04	Detailed demonstration about the electrical circuit equipment	U
CO-05	Knowledge on the wire and cable	U

Mapping of Course Outcome with Programme Outcome

CO \ PO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L-Low, N-Not Relevant

LIST OF EXPERIMENTS

DC Motor/Generator Theory

1. Demonstrate different types of DC Motors and generators
2. Demonstrate dismantling of motor/generator.
3. Demonstrate Check for condition, brush and commutator wear.
4. Demonstrate Continuity test of motor/generator.

Transformers

5. Inspection of transformer and continuity check.
6. Transformers test (no load and full load conditions)

AC Generators

7. Demonstration of Generators.
8. Armature testing.
9. Continuity test on field coils.
10. Installation and removal of generators.

AC Motors

11. Demonstration of different types of AC motors
12. Dismantling and assembling
13. Check for filed winding

Inverter

14. Demonstration of static and rotary motors

Electrical Circuit Equipment

15. Demonstration of the transducers, rectifiers, Wheatstone bridge

Wire and Cables

16. Identification of cables, fitting plugs and sockets, Making up of cable looms.
17. Continuity and insulation checks on cable runs.
18. Continuity and insulation tests on aircraft circuit; use of mega tester.
19. Practice in cable wiring.

TOTAL:45 HOURS

AC3276	TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS LAB-II	L	T	P	C
		0	0	3	1

OBJECTIVE

- To impart fundamental knowledge on inspection–Metal Skinned Aeroplane structures

Course Outcome – Cos		Cognitive Skill
CO-01	Basic Understanding of the inspection–Metal Skinned Ailerons, Elevators and Rudder, Hinges and Actuating Mechanisms	U
CO-02	Demonstration on the Fuel Systems (ATA 28)	U
CO-03	Demonstration on the techniques about the hydraulic power (ATA 29)	U
CO-04	Knowledge on the Ice and Rain Protection (ATA30)	U
CO-05	Knowledge on the landing gear(ATA 32)	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

LIST OF EXPERIMENTS

Flight Controls (ATA 27)

1. Inspection–metal skinned ailerons, elevators and rudder, hinges and actuating mechanisms

Fuel Systems (ATA 28)

2. Demonstration of Fuel system components & its layout.

Hydraulic power (ATA 29)

3. Demonstration of system layout & its components.
4. Perform servicing and inspection of hydraulic system.

Ice and Rain protection (ATA 30)

5. Demonstration of system components and its layout.
6. Demonstration of electrical hot air ,chemical icing system.
7. Demonstration of indication and warning system

Landing Gear (ATA 32)

8. Demonstration of components, system lay out and function.
9. Wheel- removal, inspection and installation of mainwheel.
10. Tire-removal, inspection and installation.
11. Brake-removal, inspection and installation.

TOTAL: 45 HOURS

AC3277	AIRCRAFT ENGINE AND SYSTEMS LAB-I	L	T	P	C
		0	0	3	1

OBJECTIVE

- To impart fundamental knowledge on turbine engine constructional arrangements.

Course Outcome – Cos		Cognitive Skill
CO-01	Basic understanding of the Constructional Arrangement of Turbo Jet Engine	U
CO-02	Demonstrative knowledge about the compressors	U
CO-03	Demonstration on the turbine section.	U
CO-04	Knowledge about the lubricants and fuels	U
CO-05	Knowledge on the fuel systems	U

Mapping of Course Outcome with Programme Outcome

P O CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L-Low, N-Not Relevant

LIST OF EXPERIMENTS

- Demonstration of constructional arrangement of turbojet engine.
- Demonstration of centrifugal and axial compressors.
- Demonstration of exhaust nozzle.
- Demonstration of system components and layout.
- Demonstration of system components and layout.
- Removal, inspection, cleaning and installation of fuel filter
- Demonstration of balance panels and mass balancing.
- Removal and installation of ailerons.
- Demonstration of symmetry checks

10. Demonstration of system components and layout of Air Conditioning and Cabin Pressurization.
11. Demonstration of Fuel system components & its layout.

TOTAL : 45 HOURS

AC32P1	SUMMER INTERNSHIP - I	L	T	P	C
		0	0	0	2

COURSE OBJECTIVE:

This course is aimed to provide more weightage for project work. The project work could be done in the form of a summer project or internship in the industry or even a minor practical project in the university. Participation in any technical event/ competition to fabricate and demonstrate an innovative machine or product could be encouraged under this course.

SEMESTER VI

SL. No.	SUBJECT CODE	SUBJECT	L	T	P	C
I. THEORY						
1.	AI32D1	Fundamentals of Artificial Intelligence	3	0	0	3
2.	AC3215	Introduction to Industrial Management	3	0	0	3
3.	AC3216	Digital Techniques Electronic Instrument Systems– I	3	1	0	4
4.	*****	Elective II	3	0	0	3
5.	*****	Elective III	3	0	0	3
II. PRACTICAL						
6.	AC3278	Electronic Fundamentals Lab	0	0	3	1
7.	AC3279	Airframe Maintenance Lab	0	0	3	1
8.	AC3280	Aircraft Engine and System slab-II	0	0	3	1
9.	AC32P2	Summer Internship- II	0	0	0	2
TOTAL			15	1	9	21

AI32D1	FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

OBJECTIVES

- Understand the basic concepts of intelligent agents.
- Develop general-purpose problem solving agents, logical reasoning agents, and agents that reason under uncertainty.
- Employ AI techniques to solve some of today's real world problems

CourseOutcome– Cos		Cognitive Skill
CO-01	Explain autonomous agents that make effective decisions in fully informed, partially observable, and adversarial settings.	U
CO-02	Choose appropriate algorithms for solving given AI problems	A
CO-03	Design and implement logical reasoning agents	R,A
CO-04	Design and implement agents that can reason under uncertainty	R,A
CO-05	Understand the basic areas of artificial intelligence including problem-solving, knowledge representation, reasoning, decision making, planning, perception and action.	U

Mapping of Course Outcomes with Programme Outcome

PO \ CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G
CO-01	L	L	L	M	L	M	M
CO-02	M	M	S	M	M	M	L
CO-03	M	M	M	M	M	S	S
CO-04	S	M	S	L	L	M	S
CO-05	M	M	L	L	M	M	S

S-Strong, M-Medium, L-Low, N-Not Relevant

UNIT I AI AGENTS

9

Introduction to AI– Agents and Environments– Concept to rationality–Nature of environments – Structure of agents – Problem solving agents– Search algorithms–Uninformed search strategies.

UNIT II PROBLEM SOLVING

9

Heuristic search strategies–heuristic functions - Local search and optimization problems – Local search in continuous space –Search with non-deterministic actions–Search in partially observable environments–Online search agents and unknown environments.

UNIT III THEORY OF GAME PLAYING

9

Game theory– Optimal decision in games– Alpha- beta search– Monte- Carlo tree search– Stochastic games– Partially observable games. Constraint Satisfaction Problems– Constraint propagation– Back tracking search for CSP– Local search for CSP– Structure of CSP.

UNIT IV KNOWLEDGE BASED LOGICAL AGENTS

9

Knowledge- based agents– Propositional logic– Propositional theorem proving–Propositional model checking– Agents based on propositional logic.

First- order logic– Syntax and semantics– Knowledge representation and engineering– Inferences in first- order logic–Forward chaining–Backward chaining–Resolution.

UNIT V KNOWLEDGE REPRESENTATION

9

Ontological engineering– Objects and categories–Events– Mental objects and Modal logic– Reasoning systems for categories– Reasoning with default information.

Classical planning – Algorithms for classical planning – Heuristics for planning–Hierarchical planning– Non- deterministic domains–Time, Schedule,and Resources–Analysis.

TOTAL : 45 HOURS

TEXT BOOKS

1. Stuart Russel and Peter Norvig, “Artificial Intelligence: A Modern Approach”, Fourth Edition, Pearson Education,2020.

REFERENCES

1. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007.
2. Kevin Night, Elaine Rich, and Nair B., “Artificial Intelligence”, McGraw Hill, 2008.
3. Patrick H. Winston, "Artificial Intelligence", Third edition, Pearson Edition, 2006.
4. Deepak Khemani, “Artificial Intelligence”, Tata McGraw Hill Education, 2013.
5. Artificial Intelligence by Example: Develop machine intelligence from scratch using real artificial intelligence use cases -by Dennis Rothman,2018.

AC3215	INTRODUCTION TO INDUSTRIAL MANAGEMENT	L	T	P	C
		3	0	0	3

OBJECTIVES

- To provide an opportunity to learn basic management concepts essential for business.

OUTCOMES

Course Outcome – Cos		Cognitive Skill
CO-01	Understand the basics of management and organization	U
CO-02	Have detailed knowledge on the functions of management	U
CO-03	Understand organizational behavior	U
CO-04	Acquire knowledge of group dynamics	U
CO-05	Attain basic knowledge to the fundamentals of modern concepts	U

Mapping Course Outcomes with Programme Outcome

PO \ CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong,M-Medium,L-Low,N-NotRelevant

UNIT I INTRODUCTION

9

Management-Definition-Functions-Evolution of Modern Management-Scientific Management Development of Management Thought. Approaches to the study of Management, Forms of Organization –Individual Ownership – Partnership – Joint Stock Companies – Co- operative Enterprises – Public Sector Undertakings, Corporate Frame Work – Share Holders – Board of Directors – Committees – Chief Executive –Trade Union.

UNIT II FUNCTIONS OF MANAGEMENT

9

Planning – Nature and Purpose – Objectives – Strategies – Policies and Planning Premises – Decision Making –Organizing – Nature and Process – Premises – Departmentalization – Line and staff – Decentralization –Organizational culture,Staffing-selectionandtraining– Placement–Performanceappraisal–CareerStrategy–OrganizationalDevelopment.Learning– Managinghuman factor–Leadership–Communication, Controlling- Process of Controlling– Controlling techniques, productivity and operations management–Preventive control, Industrial Safety.

UNIT III ORGANIZATIONAL BEHAVIOUR

9

Definition–Organization–Managerial Role and functions–Organizational approaches, Individual behaviour–causes–Environmental Effect–Behaviour and Performance, Perception–Organizational implications. Personality – Contributing factors - Dimension – Need Theories – Process Theories – Job Satisfaction, Learning and Behaviour –Learning Curves, Work Design and approaches.

UNIT IV GROUP DYNAMICS

9

Group Behaviour – Groups – Contributing factors – Group Norms, Communication – Process – Barriers to communication–Effective communication, leadership–formal and informal characteristics–Managerial Grid - Leadership styles – Group Decision Making – Leadership Role in Group Decision, Group Conflicts – Types –Causes–Conflict Resolution– Inter group relations and conflict, Organization centralization and decentralization –Formal and informal– Organizational Structures–Organizational Change and Development– Change Process– Resistance to Change–Culture and Ethics.

UNIT V MODERN CONCEPTS

9

Management by Objectives (MBO), Management by Exception (MBE), Strategic Management - Planning for Future direction – SWOT Analysis – Information technology in management – Decisions support system –Business Process Re-engineering (BPR) – Enterprises Resource Planning (ERP) – Supply Chain Management(SCM)– Activity Based Management (ABM).

TOTAL: 45 HOURS

TEXT BOOKS

1. Herald Knottz and Heinz Weihrich, "Essentials of Management", Tata McGraw Hill Education Pvt. Ltd.,2010.
2. Stephen P. Robbins, "Organization Behaviour", Pearson Education Inc., 13th edition,2010.

REFERENCES

1. Joseph J, Massie, "Essentials of Management" Prentice Hall of India Pvt.Ltd.

AC3216	DIGITAL TECHNIQUES ELECTRONIC INSTRUMENT SYSTEMS-I	L	T	P	C
		3	1	0	4

OBJECTIVES

- To present the digital fundamentals, boolean algebra and its applications in digital systems
- To familiarize with the analysis of various combinational and sequential digital circuits using logic gates
- To understand the basic structure of computer system and architecture of microprocessors
- To impart knowledge of the bus systems, data converters and instruments used in aircraft

Course Outcome – Cos		Cognitive Skill
CO-01	Use Boolean algebra and simplification procedures relevant to digital logic.	A
CO-02	Analyze various combinational and sequential digital circuits.	A
CO-03	State the fundamentals of computer systems and analyze the execution of an instruction	U
CO-04	Explain the principles and working of aircraft data buses and converters	U
CO-05	Interpret data from various aircraft instruments	A

Mapping Course Outcomes with Programme Outcomes

PO \ CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-K
CO-1	S	S	M	M	S	S	N	L	M
CO-2	S	S	S	M	S	S	N	L	S
CO-3	S	S	S	S	M	S	N	L	M
CO-4	S	S	M	M	M	L	N	L	S
CO-5	S	S	S	S	L	L	N	S	S

S-Strong, M-Medium, L-Low, N-Not Relevant

UNIT I DIGITAL FUNDAMENTALS

12

Number Systems – Decimal, Binary, Octal, Hexadecimal, Conversions, 1's and 2's complements, Codes – Binary, BCD, Gray Code, Gillham Code, Alphanumeric codes, Boolean theorems, Logic gates- Logic symbol, Truth tables, Equivalent circuits, Implementation of Gates using Universal gates, Interpretation of logic diagrams.

UNIT II COMBINATIONAL AND SEQUENTIAL CIRCUITS

12

Half and Full Adders, Half and Full Subtractors, Multiplexer, Demultiplexer, Decoder, Encoder, Priority Encoder. Analysis and implementation of combinational circuits. Flip flops – SR, JK, T, D, Master/Slave FF – Operation and Excitation Tables, Triggering of FF, Analysis of clocked sequential circuits–Counters and Shift Registers, Application of digital circuits in aircraft systems.

UNIT III BASIC STRUCTURE OF COMPUTER SYSTEM

12

Basic terminologies, Components of a computer system, Data storage devices – ROM- PROM – EPROM–EEPROM –EAPROM, RAM – Static and dynamic RAM. CPU- Internal architecture of 8-bit processor, Microprocessor operations, Intelx86 family, INTEL Pentium family, AMD29050, Aircraft Computer Systems-Clock Computer, AIDS. Digital integrated circuits: Logic levels, propagation delay, power dissipation, fan-out and fan-in, noise margin, logic families and their characteristics-TTL, CMOS. Uses of medium, large and very large scale integration

UNIT IV AIRCRAFT DATA CONVERTERS AND DATA BUSES

12

Analogue Data, Digital Data, Analogue to digital and digital to analogue converters- Construction, Operation, Applications and Limitations of various types. Bus Terminologies, Serial data bus in aircraft systems, ARINC 429, ARINC 629, MIL-STD-1553B, Brief introduction to other aircraft data buses. Aircraft Networks- Ethernet, ARINC664, AFDX, IEEE 1394 FIREWIRE. Back plane bus system.

UNIT V AIRCRAFT INSTRUMENTS

12

Flight Instruments: Principles and operations – Altimeters, Attitude indicator, Air speed Indicators, Vertical Speed Indicator, Turn and Slip Indicator, Horizontal Situation Indicator; Mach Meters; Electronic Flight Instrument Systems; Engine instruments – EICAS, ECAM. Typical systems arrangements and cockpit layout of electronic instrument systems.

TOTAL: 60 PERIODS

TEXT BOOKS

1. Mike Tooley, “Aircraft Digital Electronic and Computer Systems”, 2nd Edition, Routledge, London, 2015.
2. E.H.J.Pallet, “Aircraft Instruments and Integrated System” Pearson Education Limited, 2011

REFERENCES

1. James W. Wasson, “Digital Techniques /Electronic Instrument Systems”, Aircraft Technical Book Company (EASA), 2015.
2. V.K.Mehta, Rohit Metha, “Principles of Electronics”,11th Edition, S.Chand and Company, New Delhi, 2007
3. Thomas K.Eismin,“Aircraft Electricity and Electronics”, 7th Edition, McGraw-Hill Education, 2019.

AC3278	ELECTRONIC FUNDAMENTALS LAB	L	T	P	C
		0	0	3	1

OBJECTIVE

- To have hands on training in the airplane electronics using transistors, diodes and flipflops
- To perform wiring, component mounting, soldering on PCB

Course Outcome – Cos		Cognitive Skill
CO-01	Able to acquire knowledge on the types of Diodes	A
CO-02	Able to identify, connect wiring and PCB	U
CO-03	Understand the basics of transistors	A
CO-04	Acquire knowledge about voltage regulator (Zener diode)	A
CO-05	Understanding the ARINC system	U

Mapping Course Outcomes with Programme Outcomes

S-Strong, M-Medium, L-Low, N-Not Relevant

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

LIST OF EXPERIMENTS

1. Demonstration of different types of Diodes
2. Functional testing of diodes
3. Demonstration of transistors and testing.
4. Exercise on wiring, component mounting, soldering on PCB.
5. Demonstration of computer system
6. Exercise on flipflop trainer kit
7. Demonstration of breadboard and its use.
8. Exercise on voltage regulator (Zener diode)
9. Pictorial demonstration of ARINC system

TOTAL:45 HOURS

AC 3279	AIRFRAME MAINTENANCE LAB	L	T	P	C
		0	0	3	1

OBJECTIVE

- To study the performance of airplanes under various operating conditions and the fundamentals of Inspection, Repair and Assembly Techniques.

Course Outcome – Cos		Cognitive Skill
CO-01	Understand electrical wiring interconnection system (EWIS)	U
CO-02	Understand the concept of bending, cutting and flaring of pipes and hoses	U
CO-03	Demonstration of bearing defects	U
CO-04	Acquire knowledge of composite and non-metallic	U
CO-05	Perform inspection, repair and assembly techniques for corroded surfaces.	A

Mapping Course Outcomes with Programme Outcomes

PO \ CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L-Low, N-Not Relevant

LIST OF EXPERIMENTS

Electrical Wiring Interconnection System (EWIS)

1. Continuity, insulation and bonding techniques and testing.
2. Use of crimp tools Testing of crimp joints; Connector pin removal and insertion; Coaxial cables: testing and installation precautions
3. Identification of wire types, their inspection criteria and damage tolerance. Wiring protection techniques Cable looming and looms support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding

Riveting

4. Demonstration of different types of Rivets. Removal and installation of rivets and use of oversized rivets.

Pipes and Hoses

5. Exercise on tube cutting and bending and flaring. Inspection of those.

Springs

- Demonstration and inspection of springs

Bearings

- Exercise on bearing cleaning, inspection and lubrication. Demonstration of bearing defects.

Transmissions

- Gear inspection to check backlash and defect; Inspection of chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems.

Control Cables

- Exercise on swaging practice ;Inspection of control cables

Composite and Non-metallic materials

- Demonstration of composite materials and inspection. Demonstration of composite repair.

Fabric Covering

- Exercise on fabric covering, inspection and identification of defects in fabric; Repair of fabric covering

Aircraft Handling and Storage

- Exercise on air craft marshalling, taxing and towing, jacking, chocking and mooring and use of electrical and hydraulic ground supplies

Disassembly, Inspection, Repair and Assembly Techniques

- Demonstration of corrosion removal and assessment and reproduction.

Maintenance Procedures

- Demonstration of maintenance planning, modification, store, certification/release procedures.

TOTAL: 45 HOURS

AC3280	AIRCRAFT ENGINE AND SYSTEMSLAB-II	L	T	P	C
		0	0	3	1

OBJECTIVE

- To study the performance of turbine engine and fundamentals of Inspection, Repair and Assembly Techniques of various aircraft systems.

Course Outcome – Cos		Cognitive Skill
CO-01	Understanding air system	U
CO-02	Knowledge about starting and ignition system	U
CO-03	Apply the inspection and maintenance techniques on engine indication system	A
CO-04	Knowledge about fire protection system	U
CO-05	Understand the engine monitoring and ground operation system	U

Mapping Course Outcomes with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L-Low, N-Not Relevant

LIST OF EXPERIMENTS

1. Visual inspection of engine anti- ice system
2. Visual inspection of engine starter and ignition units
3. Removal, inspection and installation of igniter plugs
4. Demonstration of indication system-exhaust gas temperature/ interstage turbine temperature, engine pressure ratio, engine turbine discharge pressure or jet pipe pressure systems, oil pressure and temperature, fuel pressure and flow, engine speed, power indication system.
5. Demonstration of power plant removal and installation
6. Removal and installation of fire bottle.
7. Demonstrate engine starting and ground runup.
8. Practice in wiring and soldering radio circuits.
9. Use of Multi meters, Megger and bonding testers / milli ohmmeter
10. Practicing wiring, fault tracing
11. Demonstration of system components, de icing system (electrical, hot air, pneumatic and chemical), indication and warning system.
12. Demonstration of landing gear system components and function
13. Wheels and tires – removal, inspection, installation and function check, tire inspection, identification of defects, brake unit inspection.

TOTAL:45 HOURS

AC32P2	SUMMERINTERNSHIP-II	L	T	P	C
		0	0	0	2

OBJECTIVE

This course is aimed to provide more weightage for project work. The project work could be done in the form of a summer project or internship in the industry or even an in or practical project in the university. Participation in any technical event/competition to fabricate and demonstrate an innovative machine or product could be encouraged under this course.

SEMESTER VII

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	MS3202	Principles of Management	2	0	0	2
2.	AC3217	Digital Techniques Electronic Instrument Systems II	3	0	0	3
3.	AC3218	Air Traffic Control and Systems	3	0	0	3
4.	AC3219	Aircraft Design	3	0	0	3
5.	*****	Elective IV	3	0	0	3
PRACTICAL						
6.	AC3281	Digital Techniques Electronic Instrument Systems Lab	0	0	2	1
7.	AC3282	Aircraft propellor Aerodynamics, structures and systems lab	0	0	2	1
TOTAL			14	0	4	16

MS3202	PRINCIPLES OF MANAGEMENT	L	T	P	C
		2	0	0	2

OBJECTIVES

- To introduce students to the basic concepts and functions of management.
- To understand the role and responsibilities of managers in various organizational settings.
- To develop an understanding of the planning, organizing, leading, and controlling functions of management.
- To examine the impact of management theories and practices on organizational performance.
- To equip students with the skills necessary to manage people and processes effectively in a technical environment.

Course Outcome		Cognitive Skill
CO-01	Define and explain the key concepts and functions of management.	U
CO-02	Analyze the roles and responsibilities of managers in different organizational contexts.	U
CO-03	Apply planning, organizing, leading, and controlling principles to real-world scenarios.	U
CO-04	Evaluate the effectiveness of different management theories and practices.	U
CO-05	Demonstrate management skills necessary for leading teams and projects in a technical environment.	U

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I INTRODUCTION TO MANAGEMENT**7**

Definition, nature, and importance of management - Functions of management: Planning, Organizing, Leading, Controlling - Roles and skills of managers - Evolution of management thought: Classical, Behavioral, and Modern theories - Scientific Management (Taylor) - Administrative Theory (Fayol) - Human Relations Movement (Mayo) - Contemporary approaches (Systems Theory, Contingency Theory)

UNIT II PLANNING**5**

Nature and purpose of planning - Types of plans: Strategic, Tactical, Operational - Planning process and techniques - SWOT Analysis, SMART Goals, Scenario Planning - Decision making: Process, types, and tools- Rational Decision-Making Model - Bounded Rationality - Group Decision-Making Techniques (Brainstorming, Delphi Technique)

UNIT III ORGANIZING**5**

Organizational structure and design - Types of organizational structures: Functional, Divisional, Matrix, Network - Authority, responsibility, and delegation - Coordination and communication within organizations - Formal and Informal Communication Channels - Role of Technology in Organizational Communication (Emails, Video Conferencing, Collaborative Tools)

UNIT IV LEADING**7**

Leadership theories and styles - Trait Theory - Behavioral Theories (Ohio State Studies, Michigan Studies) - Contingency Theories (Fiedler's Model, Path-Goal Theory) - Transformational vs. Transactional Leadership - Motivation theories and practices, Maslow's Hierarchy of Needs, Herzberg's Two-Factor Theory, McClelland's Theory of Needs, Modern Approaches (Self-Determination Theory) -Group dynamics and team management - Stages of Team Development (Forming, Storming, Norming, Performing) - Managing Virtual Teams

UNIT V CONTROLLING**6**

Nature and purpose of control - Control process and techniques, Establishing Standards, Measuring Performance, Correcting Deviations - Types of control: Feed forward, Concurrent, Feedback - Quality control and management, Total Quality Management (TQM), Six Sigma, Lean Management, Use of Data Analytics in Quality Control

TOTAL: 30 HOURS**TEXTBOOKS (Latest Editions)**

1. Robbins, S. P., Coulter, M., & DeCenzo, D. A. (2020). Fundamentals of Management (11th ed.). Pearson.
2. Griffin, R. W. (2022). Management: Principles and Practices (12th ed.). Cengage Learning.
3. Jones, G. R., & George, J. M. (2021). Essentials of Contemporary Management (9th ed.). McGraw-Hill Education.

REFERENCES (Latest Editions)

1. Daft, R. L. (2021). Management (14th ed.). Cengage Learning.
2. Bateman, T. S., & Snell, S. A. (2020). Management: Leading & Collaborating in a Competitive World (14th ed.). McGraw-Hill Education.
3. Schermerhorn, J. R. (2021). Management (14th ed.). Wiley.
4. Hill, C. W. L., Schilling, M. A., & Jones, G. R. (2020). Strategic Management: Theory & Cases (13th ed.). Cengage Learning.
5. Kinicki, A., & Williams, B. K. (2021). Management: A Practical Introduction (10th ed.). McGraw-Hill Education.

AC3217	DIGITAL TECHNIQUES ELECTRONIC INSTRUMENT SYSTEMS-II	L	T	P	C
		3	0	0	3

OBJECTIVES

1. To develop the understanding of fibre optics and its application in aircrafts.
2. To enhance the understanding of digital displays and aircraft systems
3. To introduce the students to electromagnetic and electrostatic environment and devices.

Course Outcomes		Cognitive Skill
CO-01	Able to acquire a detailed knowledge on digital aircraft systems.	U
CO-02	Able to understand the electromagnetic environment and the communication devices in aircraft.	U
CO-03	Able to get a detailed knowledge on electrostatic devices and their need in aircraft	A
CO-04	To learn the basics of fibre optics and the application of fibre optics in aircraft.	A
CO-05	To understand the basic sand operation of electronic displays	U

R-Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S-Synthesi

Mapping of Course Outcomes with Programme Outcomes

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-K	PO-L	PO-M
CO-01	S	M	S	M	S	N	N	S	M	L	S	S	N
CO-02	S	M	S	S	S	N	N	S	M	L	S	S	N
CO-03	S	S	S	S	S	N	N	S	S	L	M	S	N
CO-04	S	S	S	M	M	S	N	M	S	L	M	S	N
CO-05	S	M	S	M	M	S	N	M	M	L	S	S	N

S-Strong, M-Medium, L-Low, N-Not relevant

UNIT I ELECTRONIC/DIGITAL AIRCRAFT SYSTEMS

9

General arrangement of typical electronic/digital aircraft systems and associated BITE(Built In Test Equipment) testing such as: (a) ACARS-ARINC Communication and Addressing and Reporting System, EICAS-Engine Indication and Crew Alerting System, FBW-Fly by Wire, FMS-Flight Management System, IRS-Inertial reference system (b) ECAM-Electronic Centralized Aircraft Monitoring, EFIS-Electronic Flight Instrument System, GPS-Global Positioning System, Integrated modular Avionics.

UNIT II ELECTROMAGNETIC ENVIRONMENT & AIRCRAFT COMMUNICATION

9

Influence of the following phenomena on maintenance practices for electronic system: EMC-Electromagnetic Compatibility, EMI-Electromagnetic Interference, HIRF-High Intensity Radiated Field, Lightning/lightning protection. TCAS-Traffic Collision Avoidance system, Cabin System, Information system

UNIT III ELECTROSTATIC SENSITIVE DEVICES

9

Static Electricity, Static Sensitive Devices, ESD Warnings, Handling and transporting ESD, Special handling of components sensitive to electrostatic discharges; Awareness of risks and possible damage, component and personnel anti-static protection devices.

UNIT IV FIBRE OPTICS

9

Advantages and disadvantages of fibre optic data transmission over electrical wire propagation; Propagation in Optical Fibres: Launching, Attenuation, Dispersion and Bandwidth, Practical Optical Networks, Fibre Optic Related Terms; Terminations; Couplers, Control Terminals, Remote Terminals; Fibre Optic Data Bus; Application of Fibre Optics in Aircraft Systems.

UNIT V ELECTRONIC DISPLAYS & SOFTWARE MANAGEMENT CONTROL

9

Principles of operation of common types of displays used in modern aircraft, including Cathode Ray Tube Displays: CRT Control, Light Emitting Diodes: Seven Segment Displays and Liquid Crystal Display: Types of LCD, Passive Matrix Displays, AMLCD Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes.

TOTAL: 45 HOURS

TEXT BOOKS

1. Mike Tooley, "Aircraft Digital Electronic and Computer Systems", 2nd Edition, Routledge, London, 2015.
2. E.H.J.Pallet, "Aircraft Instruments and Integrated System" Pearson Education Limited, 2011.

REFERENCES

1. James W. Wasson, "Digital Techniques /Electronic Instrument Systems", Aircraft Technical Book Company (EASA), 2015.
2. V.K.Mehta, Rohit Metha, "Principles of Electronics", 11th Edition, S.Chand and Company, New Delhi, 2007.
3. Thomas K.Eismin, "Aircraft Electricity and Electronics", 7th Edition, McGraw-Hill Education, 2019.

AC3218	AIR TRAFFIC CONTROL	L	T	P	C
		3	0	0	3

OBJECTIVE:

To study the procedure of the formation of aerodrome and its design and air traffic control.

Course Outcome – Cos		Cognitive Skill
CO-01	Understanding the requirement of Air Traffic Control Systems	U
CO-02	Knowledge of Flight Information Systems and Rules of Air Traffic Systems.	A
CO-03	Knowledge of Direction Indicator Systems for Air Navigation.	R,A
CO-04	Evaluation of Aerodrome Data	E
CO-05	Understanding the Navigation and the related Services	U

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S-Synthesis

Mapping of course outcome with programme outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L
CO-01	S	S	S	M	M	L	L	S	M	M	L	L
CO-02	M	S	N	N	S	N	N	N	N	S	N	N
CO-03	M	L	L	M	L	L	N	L	M	L	L	N
CO-04	L	M	M	S	N	S	S	M	S	N	S	S
CO-05	S	S	L	L	L	L	M	L	L	L	L	M

UNIT I BASIC CONCEPTS

9

Objectives of air traffic control systems - Parts of ATC services – Scope and Provision of ATCs – VFR & IFR operations – Classification of ATS air spaces – Various kinds of separation – Altimeter setting procedures – Establishment, designation and identification of units providing ATS – Division of responsibility of control.

UNIT II AIR TRAFFIC SYSTEMS

9

Area control service, assignment of cruising levels - minimum flight altitude - ATS routes and significant points – RNAV and RNP – Vertical, lateral and longitudinal separations based on time /distance –ATC clearances – Flight plans – position report

UNIT III FLIGHT INFORMATION SYSTEMS 10

Radar service, Basic radar terminology – Identification procedures using primary / secondary radar – performance checks – use of radar in area and approach control services – assurance control and co-ordination between radar / non radar control – emergencies – Flight information and advisory service – Alerting service – Co-ordination and emergency procedures – Rules of the air.

UNIT IV AERODROME DATA 9

Aerodrome data - Basic terminology – Aerodrome reference code – Aerodrome reference point – Aerodrome elevation – Aerodrome reference temperature – Instrument runway, physical Characteristics; length of primary / secondary runway – Width of runways – Minimum distance between parallel runways etc. – obstacles restriction.

UNIT V NAVIGATION AND OTHER SERVICES 8

Visual aids for navigation Wind direction indicator – Landing direction indicator – Location and characteristics of signal area – Markings, general requirements – Various markings – Lights, general requirements – Aerodrome beacon, identification beacon – Simple approach lighting system and various lighting systems – VASI & PAPI - Visual aids for denoting obstacles; object to be marked and lighter – Emergency and other services.

TOTAL : 45 HOURS

TEXT BOOK

1. AIP (India) Vol. I & II, “The English Book Store”, 17-1, Connaught Place, New Delhi

REFERENCES

1. “Aircraft Manual (India) Volume I”, latest Edition – The English Book Store, 17-1, Connaught Place, New Delhi.
2. “PANS – RAC – ICAO DOC 4444”, Latest Edition, The English Book Store, 17-1, Connaught Place, New Delhi.

AC3219	AIRCRAFT DESIGN	L	T	P	C
		3	0	0	3

OBJECTIVE

- To introduce and develop the basic concept of aircraft design.
- Each student is assigned the design of an Airplane (or Helicopter or any other flight vehicle), for given preliminary specifications.

Course Outcome – Cos		Cognitive Skill
CO-01	To review the developments of design in aviation.	U
CO-02	Understanding the power plant types and characteristics.	A
CO-03	Analyze the preliminary design concepts.	R,A
CO-04	To understand the special problems in aircraft design.	E
CO-05	To evaluate the structural design concepts.	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S-Synthesis

Mapping of course outcome with programme outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L
CO-01	S	S	S	M	M	L	L	S	M	M	L	L
CO-02	M	S	N	N	S	N	N	N	N	S	N	N
CO-03	M	L	L	M	L	L	N	L	M	L	L	N
CO-04	L	M	M	S	N	S	S	M	S	N	S	S
CO-05	S	S	L	L	L	L	M	L	L	L	L	M

S-Strong, M-Medium, L-Low, N-Not Relevant

UNIT I REVIEW OF DEVELOPMENTS IN AVIATION

9

Categories and types of aircrafts – various configurations – Layouts and their relative merits – strength, stiffness, fail safe and fatigue requirements – Maneuvering load factors – Gust and maneuverability envelopes – Balancing and maneuvering loads on tail planes.

UNIT II POWER PLANT TYPES AND CHARACTERISTICS

9

Characteristics of different types of power plants – Propeller characteristics and selection – Relative merits of location of power plant.

UNIT III PRELIMINARY DESIGN

9

Selection of geometric and aerodynamic parameters – Weight estimation and balance diagram – Drag estimation of complete aircraft – Level flight, climb, take – off and landing calculations – range and endurance – static and dynamic stability estimates – control requirements.

UNIT IV SPECIAL PROBLEMS

9

Layout peculiarities of subsonic and supersonic aircraft – optimization – of wing loading to achieve desired performance – loads on undercarriages and design requirements.

UNIT V STRUCTURAL DESIGN

9

Estimation of loads on complete aircraft and components – Structural design of fuselage, wings and undercarriages, controls, connections and joints. Materials for modern aircraft – Methods of analysis, testing and fabrication.

TOTAL: 45 HOURS

TEXT BOOKS

1. D.P. Raymer, “Aircraft conceptual design”, AIAA Series, 1988.
2. G. Corning, “Supersonic & Subsonic Airplane Design”, II Edition, Edwards Brothers Inc., Michigan, 1953.
3. E.F. Bruhn, “Analysis and Design of Flight Vehicle Structures”, Tristate Offset Co., U.S.A., 1980.

REFERENCES

1. E. Torenbeek, “Synthesis of Subsonic Airplane Design”, Delft University Press, London, 1976.
2. H.N.Kota, Integrated design approach to Design fly by wire” Lecture notes Interline Pub. Bangalore, 1992.
3. A.A. Lebedenski, “Notes on airplane design”, Part-I, I.I.Sc., Bangalore, 1971.

AC3281	Digital Techniques Electronic Instrument Systems lab	L	T	P	C
		0	0	2	1

OBJECTIVE

Students gain some basic knowledge on aircraft digital techniques electronic instrument systems.

Course Outcome		Cognitive Skill
CO-01	Basic understanding of the demonstration of various measuring instruments	U
CO-02	Remember knowledge about the signal generator cathode ray tube	U
CO-03	Apply the techniques about the CPU, IC and memory devices such as RAM, ROM, PROM	U
CO-04	Apply the techniques about the VSWR waves	U
CO-05	Knowledge on the wave rectifier using diodes	U

R-Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S-Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS

1. Demonstration of various measuring instruments
2. Exercise on “Q” meter : Measuring L,R,C and Q
3. Exercise on frequency meters and measurement of frequency
4. Demonstration of signal generator cathode ray tube
5. Exercise on common logic gates
6. Demonstration of CPU, IC and memory devices such as RAM, ROM, PROM
7. Exercise on clipper and clamper circuits
8. Demonstration of VSWR waves
9. Demonstration of vacuum tubes
10. Exercise on half wave and full wave rectifier using diodes
11. Exercise on amplifiers using transistors
12. Exercise on integrated circuits using timer IC-8 pins and soldering practice.

TOTAL : 30 HOURS

AC3282	AIRCRAFT PROPELLOR AERODYNAMICS, STRUCTURES AND SYSTEMS LAB	L	T	P	C
		0	0	2	1

OBJECTIVE

Students will also gain some basic knowledge on Aircraft propeller

Course Outcome		Cognitive Skill
CO-01	Basic understanding of the demonstration of different types of propellers	U
CO-02	Remember knowledge about the propeller construction	U
CO-03	Apply the techniques about the propeller pitch control	U
CO-04	Apply the techniques about the propeller ice protection	U
CO-05	Knowledge on the propeller maintenance	U

R-Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S-Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS

1. Demonstration of fixed pitch, controllable pitch, constant speeding propeller and propeller/spinner attachment.
2. Demonstration of system layout and components of mechanical and electrical/electronic propeller speed control and pitch change mechanism feathering and reverse pitch; over speed protection.
3. Demonstration of propeller ice protection system.
4. Demonstrate propeller removal, inspection and installation.
5. Demonstration of propeller storage and preservation.
6. Demonstration of mechanically operated gauges (e.g. Bourdon tube)
7. Demonstration of pressure transducers, electrically-operated transmitters.
8. Demonstration of the following instruments and system lay-out of Pitot Static system, Altimeter, Airspeed Indicator and Mach meter.
9. Demonstration of Float-operated design contents gauges.
10. Demonstration of Magnetic compasses
11. Demonstration of compass swinging with the available aircraft or mock-up: compensation practice.

TOTAL: 30 HOURS

SEMESTER VIII

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	AC32P5	On Job Training (AMO) (OJT)	0	0	28	14
TOTAL			0	0	28	14

LIST OF ELECTIVES

SL. No.	SUBJECT CODE	SUBJECT	L	T	P	C
Elective I						
1	AC32A1	Gas Turbine Engine-I	3	0	0	3
2	AC32A2	Aircraft Aerodynamics, Structures and Systems-I	3	0	0	3
Elective II						
3	AC32A3	Gas Turbine Engine-II	3	0	0	3
4	AC32A4	Aircraft Aerodynamics, Structures and Systems-II	3	0	0	3
Elective III						
5	AC32A5	Airframe Maintenance	3	0	0	3
6	AC32A6	Propulsion	3	0	0	3
Elective IV						
7	AC32A7	Propeller	3	0	0	3
8	AC32A8	Aircraft Aerodynamics Structures and Systems III	3	0	0	3

AC32A1	GAS TURBINE ENGINE -I	L	T	P	C
		3	0	0	3

OBJECTIVE

- To impart fundamental knowledge on compressors, combustion and turbine sections, lubrication and fuel systems of gas turbine engine.

Course Outcome – Cos		Cognitive Skill
CO-01	Basic understanding of the fundamentals of engine	U
CO-02	Acquire knowledge about compressors	U
CO-03	Describe the details of the combustion & the turbine section	U
CO-04	Have knowledge about the exhaust, bearings& fuel	U
CO-05	Attain knowledge on the lubrication & fuel system	U

Mapping of Course Outcomes with Programme Outcomes

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L-Low, N-Not Relevant

UNIT I FUNDAMENTALS

9

Fundamentals; Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle; Engine ratings, static thrust, influence of speed, altitude and hot climate, flat rating limitations. Constructional arrangement and operation of turbojet, turbofan, turbo shaft, turboprop. Engine Performance: Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption; Engine efficiencies; By-pass ratio and engine pressure ratio; Pressure, temperature and velocity of the gas flow; The relationship between force, work, power, energy, velocity, acceleration

UNIT II COMPRESSORS

9

Inlet; Compressor inlet ducts; Effects of various inlet configurations; Ice protection. Compressors Axial and centrifugal types; Constructional features and operating principles and applications; Fan balancing; Operation: Causes and effects of compressor stall and surge; Compressor ratio. Methods of air flow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades.

UNIT III COMBUSTION & TURBINE SECTION

9

Combustion Section: Constructional features and principles of operation. Turbine Section. Operation and characteristics of different turbine blade types; Blade to disk attachment; Causes and effects of turbine blade stress and creep. Nozzle guide vanes.

UNIT IV EXHAUST, BEARINGS & FUEL

9

Exhaust: Constructional features and principles of operation; Convergent, divergent and variable area nozzles; Engine noise reduction; Thrust reversers. Bearings and Seals: Constructional features and principles of operation. Safety precautions. Properties and specifications; Fuel additives; Lubricants and Fuels

UNIT V LUBRICATION & FUEL SYSTEM

9

Fuel Systems: System operation/lay-out and components. Lubrication Systems. Operation of engine control and fuel metering systems; including electronic engine control (FADEC); Systems lay-out and components.

TOTAL : 45 HOURS

TEXT BOOKS

1. EASA, "Module-15 Gas Turbine Engine", Aircraft Technical Book Company.
2. Irwine Treager, "Aircraft Gas Turbine Technology", Tata McGraw Hill, 1997.
3. Casamassa & Ralph D. Bent, "Jet Aircraft Power Systems", Tata McGraw Hill, 1998

REFERENCES

1. "Civil Aircraft Inspection Procedure (CAP459) Part I", Himalayan Books, 2009.
2. FAA, "A&P Mechanics (General Hand book EA-AC65-9A)", Shroff Publishers, 2011
3. FAA, "A&P Mechanics (Airframe Hand Book EA-AC65-15A)", Shroff Publishers, 2011
4. FAA, "A&P Mechanics (Power Plant Hand Book EA-AC 65- 12A)", Shroff Publishers, 2011
5. Frank Delp, "Aircraft Propeller and Controls", Jeppesen, 1979.
6. J. Seddon Simon Newman, "Basic Helicopter Aerodynamics", AIAA Education series, 2001.

AC32A2	AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS-I	L	T	P	C
		3	0	0	3

OBJECTIVE

- Enable the students to understand aeroplane aerodynamics, flight controls, airframe structures and systems.

CourseOutcome– Cos		Cognitive Skill
CO-01	Basic understanding of the theory of flight	U
CO-02	Knowledge in the high-speed flight	U
CO-03	Knowledge on the air frame structures general concepts	U
CO-04	Understanding in the air condition and cabin pressurization	U
CO-05	Knowledge on the avionics instruments systems	U

Mapping of Course Outcomes with Programme Outcomes

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L-Low, N-Not Relevant

UNIT I THEORY OF FLIGHT

9

Aeroplane Aerodynamics and controls: Operation and Effect of Roll control: aileron and spoilers, Pitch control: Elevators, Stabilators, variable incidence stabilizers and canards. Yaw control and Rudder Limiters: Elevons, Rudder, Ruddervators High Lift Devices: Flaps, slats, slots Drag Inducing Devices: spoilers, lift dumpers, speed brakes. Operation Of Tabs: trim tabs, servo tabs, control Tabs etc High Speed Flight: Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number. Rotary Wing Aerodynamics: Terminology; Operation and effect of cyclic, collective and anti-torque controls.

UNIT II STRUCTURES

9

Fundamentals of structural Systems, Main forces acting on the aircraft structural members Fail Safe structure and Safe life structure, Load factor, V-N Diagram. Truss structure, Monocoque structure, Semi monocoque structure and Composite structure. Location Numbering Systems - Aircraft Structures, Zonal and station Identification systems. Electrical bonding on the structural part, Lightning strike protection provision.

UNIT III ELECTRICAL POWER (ATA 24)

9

Aircraft Batteries Installation and Operation, DC power generation, AC power generation Emergency power generation, Voltage regulation, Power distribution system. Types of Inverters, Transformers, rectifiers, Circuit protection External /Ground power. Fuel systems (ATA28) System Layout, fuel tanks, supply system, dumping, venting and draining, cross-feed and transfer, Indication and warning, Refueling and Defueling Longitudinal balance of fuel system.

UNIT IV LIGHTS (ATA33)

9

Classification of Lights, External Navigation Light, Landing Lights, Taxiing Light and Ice, Internal Lights, Cockpit light system, Cabin Light system, stair light system, Emergency light system and Cargo light system. Equipment and Furnishings(ATA25) Electronic Emergency equipment requirements, Cabin entertainment requirements, Passenger seats, Emergency Evacuation, Cabin design. Oxygen system (ATA35) System lay out, cockpit , cabin ,oxygen sources, storage, charging and distribution Supply and regulation, Indication and warning

UNIT V AIRCONDITIONING AND CABIN PRESSURIZATION (ATA21)

9

Air supply- Sources of air supply including engine bleed, APU and ground cart; Air Conditioning: Air conditioning systems, vapor cycle air condition system, Air cycle Air-condition system. Air condition distribution system, flow system, Temperature and humidity control system. Pressurization: Pressurization systems, control and indicating systems, Positive and negative pressure control system. Cabin Pressure controllers. Protection and warning systems. Fire Protection (ATA-21): Fire and smoke detection systems, Fire Warning systems, Fire extinguishing systems, Fire system test, Portable fire Extinguisher,

TOTAL : 45 HOURS

TEXT BOOKS

1. EASA, "Module - 11A for Level B1.1 Turbine Aeroplane Structures and Systems", Aircraft Technical Book Company.
2. Pallett,EHJ, "Aircraft Instruments", Pearson Education,2009.
3. FAA H 8083-31, "Aviation Maintenance Technician Handbook - Airframe (Vol. I)", Shroff Publishers,2011

REFERENCES

1. J.E Heywood, "Light Aircraft Maintenance", Himalayan Books, 2008.
2. Dale Crane & R. Scheppeler, "Aircraft Oxygen System", Himalayan Books, 2006.
3. Brain Kendel, "Manual of Avionics", Sterling Book House, Third Edition.
4. FAA, "A&P Mechanics (General Handbook EA-AC65-9A)", Shroff Publishers, 2011
5. FAA, "A&P Mechanics (Airframe Handbook EA-AC65-15A)", Shroff Publishers, 2011
6. FAA, "A & P Mechanics (Power Plant Handbook EA-AC 65-12A)", Shroff Publishers, 2011

AC32A3	GAS TURBINE ENGINE -II	L	T	P	C
		3	0	0	3

OBJECTIVES

- To impart knowledge on the engine starting, indicating and power augmentation systems of gas turbine engine.
- To acquire knowledge on the engine controls, installation and protection methods.
- To know the fundamentals of ground handling techniques.

Course Outcome – Cos		Cognitive Skill
CO-01	Understand the knowledge of engine starting systems.	U
CO-02	Understand the concept of engine indicating and power augmentation systems	U
CO-03	Able to acquire knowledge of the engine controls and auxiliary power units	U
CO-04	Able to acquire knowledge of the power plant installation and fire protection systems	U
CO-05	Able to know the fundamentals of ground handling techniques	U

Mapping of Course Outcomes with Programme Outcomes

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L-Low, N-Not Relevant

UNIT I ENGINE STARTING SYSTEMS 9

Air Systems; Operation of engine air distribution and anti-ice control systems ,including internal cooling, sealing and external air services. Starting and Ignition Systems; Maintenance safety requirements. Ignition systems and components; Operation of engine starting systems and components.

UNIT II ENGINE INDICATING & POWER AUGMENTATION SYSTEMS 9

Engine Indication Systems;ExhaustGasTemperature/InterstageTurbineTemperature;Engine Thrust Indication: Engine Pressure Ratio, engine turbine discharge pressure or jet pipe pressure systems; Oil pressure and temperature; Fuel pressure and flow; Engine speed; Vibration measurement and indication; Torque; Power; Power Augmentation Systems: Operation and applications; After burner systems. Water injection, water methanol.

UNIT III ENGINE CONTROLS & APU 9

Turbo-prop Engines; Gas coupled/free turbine and gear coupled turbines Reduction gears; Integrated engine and propeller controls; Over speed safety devices. Turbo-shaft engines- Arrangements, drives systems, reduction gearing, couplings, control systems. Auxiliary Power Units (APUs)- Purpose, operation, protective systems.

UNIT IV INSTALLATION&FIREPROTECTION 9

Power plant Installation Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cable sand rods, lifting points and drains. Fire Protection Systems: Operation of detection and extinguishing systems.

UNIT V GROUND RUN & STORAGE 9

Engine Monitoring and Ground Operation; Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Trend(including oil analysis, vibration and boroscope) monitoring; Inspection of engine and components to criteria, tolerances and data specified by engine manufacturer. Compressor washing/cleaning; Foreign Object Damage. Engine Storage and Preservation- Preservation and de preservation for the engine and accessories/systems.

TOTAL : 45 HOURS

TEXT BOOKS

1. EASA,“Module-15GasTurbineEngine”,AircraftTechnicalBookCompany.
2. Irwine Treager, “Aircraft Gas Turbine Technology”, Tata McGraw Hill, 1997.
3. Casamassa & Ralph D.Bent, “Jet Aircraft Power Systems”, Tata McGraw Hill, 1998

REFERENCES

1. “Civil Aircraft Inspection Procedure (CAP 459) Part I”, Himalayan Books, 2009.
2. FAA, “A&P Mechanics (General Handbook EA-AC65-9A)”, Shroff Publishers, 2011
3. FAA, “A&P Mechanics (Airframe Hand Book EA-AC65-15A)”, Shroff Publishers, 2011
4. FAA, “A & P Mechanics (Power Plant Hand Book EA-AC 65-12A)”, Shroff Publishers, 2011
5. Frank Delp, “Aircraft Propeller and Controls”, Jeppesen, 1979.

AC32A4	AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS-II	L	T	P	C
		3	0	0	3

OBJECTIVE

- To get knowledge about the different aircraft autopilot & hydraulic and pneumatic systems, on board maintenance and communication and navigation of turbine aeroplane.

Course Outcome– Cos		Cognitive Skill
CO-01	Basic understanding of autopilot	U
CO-02	Attain knowledge about communication and navigation systems	U
CO-03	Acquire the details about instruments systems	U
CO-04	Knowledge on hydraulic power and landing gear	U
CO-05	Knowledge on pneumatic/vacuum systems	U

Mapping of Course Outcomes with Programme Outcomes

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L-Low, N-Not Relevant

UNIT I AUTO FLIGHT (ATA22)

9

Fundamentals of automatic flight control including working principles and current terminology. Command signal processing. Modes of operation, roll, yaw and pitch channels. Yaw dampers. Stability augmentation system In helicopters ,automatic trim control, Autopilot navigation aids interface; Auto throttle systems, Automatic Landing Systems: principles and categories, modes of operation, approach, glideslope, land, go-around, system monitors and failure conditions.

UNIT II COMMUNICATION/NAVIGATION (ATA 23/34)

9

Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver and transmitter. Working principles of Very High Frequency (VHF) communication ,High Frequency (HF) communication, Emergency Locator Transmitters, Very High Frequency omnidirectional range (VOR),Automatic Direction Finding (ADF),Instrument Landing System (ILS),Microwave Landing System (MLS),Flight Director systems, Distance Measuring Equipment (DME),Very Low Frequency and hyperbolic navigation (VLF/Omega),Doppler navigation, Area navigation ,RNAV systems, Flight Management Systems, Global Positioning System (GPS), Global Navigation Satellite Systems (GNSS),Inertial Navigation System ,Air Traffic Control transponder, secondary surveillance radar, Traffic Alert and Collision Avoidance System (TCAS),Weather radar, Radio altimeter, ARINC communication and reporting and Cockpit Voice Recorder.

UNIT III INSTRUMENTS SYSTEMS (ATA31)

9

Classification of Instruments, Atmospheric condition ,Pressure measuring devices and systems, Pitot static systems ,Altimeters, Vertical speed indicators, Airspeed indicators, Machmeters, Altitude reporting/alerting systems, Air data computers, Instrument pneumatic systems, Direct reading pressure and temperature gauges, Temperature indicating systems, Fuel quantity indicating systems, Gyroscopic principles, Artificial horizons, Slip indicators, Directional gyros, Ground Proximity Warning Systems, Compass systems, Flight Data Recording systems, Electronic Flight Instrument Systems, Instrument warning systems including master warning systems and centralized warning panels, Stall warning systems and angle of attack indicating systems, Vibration measurement and indication, Glass cockpit.

UNIT IV HYDRAULIC POWER AND LANDING GEAR SYSTEM (ATA29/32) 9

Hydraulic system Lay-out, Types of hydraulic fluids, Hydraulic reservoirs and accumulators. Hydraulic Pressure Generation by: electrical, mechanical, pneumatic and Emergency pressure generation. Types of Hydraulic Filters, Hydraulic Power distribution, Indication and warning systems, Interface with other systems .Landing Gear System (ATA-32):Construction, shock absorbing, Extension and retraction systems: normal and emergency, Indications and warnings, Wheels, brakes, antiskid and auto braking, Tyres, Steering, Air-ground sensing.

UNIT V PNEUMATIC/VACUUM, ICE/RAIN PROTECTION AND WATER/WASTE 9

Pneumatic/vacuum (ATA 36): System lay-out, Sources: engine/APU, compressors, reservoirs, ground supply, Pressure control; Distribution; Indications and warnings, Interfaces with other systems. Ice and Rain Protection (ATA 30) :Ice formation, classification and detection, Anti-icing systems: electrical, hot air and chemical, De-icing systems: electrical, hot air, pneumatic, chemical, Rain repellent; Probe and drain heating; Wiper Systems. Water/Waste (ATA 38):Water system lay-out, supply, distribution, servicing and draining, Toilet system lay-out, flushing and servicing.

TOTAL : 45 HOURS

TEXT BOOKS

1. EASA, “Module - 11A for LevelB1.1 Turbine Aeroplane Structures and Systems”, Aircraft Technical Book Company.
2. Pallett,EHJ, “Aircraft Instruments”, Pearson Education,2009.
3. FAA H 8083-31, “Aviation Maintenance Technician Handbook - Airframe (**Vol. I**)”, Shroff Publishers, 2012.
4. FAA H 8083-31, “Aviation Maintenance Technician Handbook - Airframe (**Vol. II**)”, Shroff Publishers, 2012.

REFERENCES

1. J.EHeywood,“Light Aircraft Maintenance”,HimalayanBooks,2008.
2. DaleCrane&R.Scheppler,“AircraftOxygenSystem”,HimalayanBooks,2006.
3. Brain Kendel, “Manual of Avionics”, Sterling Book House, Third Edition.
4. FAA,“A&P Mechanics (General Handbook EA-AC65-9A)”,Shroff Publishers,2011
5. FAA, “A&P Mechanics (Airframe HandBook EA-AC65-15A)”, Shroff Publishers,2011
6. FAA, “A & P Mechanics (Power Plant Hand Book EA-AC 65-12A)”, Shroff Publishers, 2011

AC32A5	AIRFRAME MAINTENANCE	L	T	P	C
		3	0	0	3

OBJECTIVE

- To provide an opportunity to learn basic management concepts essential for business.

Course Outcome– Cos		Cognitive Skill
CO-01	Understand the knowledge turbine engine	U
CO-02	Understand the turbine fuel controls	U
CO-03	Able to acquire knowledge of engine indicating system	U
CO-04	Able to acquire knowledge of engine parameter-detailed operation	U
CO-05	Able to know the fundamentals of starting and ignition system	U

Mapping of Course Outcomes with Programme Outcomes

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO- J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L-Low, N-Not Relevant

UNIT I AVIONICS GENERAL TEST EQUIPMENTS

9

Operation function and use of avionic general test equipment, Dead weight Tester, Bonding Tester, Thermos couple Test, fuel Quantity Tester, Insulation Resistance Tester, Diode Tester, Transistor Tester, Vacuum Pump, ILS, LORAN, GPS, AFCS, ELT, Pitot Static System.

UNIT II ELECTRICAL WIRING INTERCONNECTION SYSTEMS (EWIS)

9

Continuity, insulation and bonding techniques and testing; Use of crimp tools: hand and hydraulic operated; Testing of crimp joints; Connector pin removal and insertion, Co-axial cables: testing and installation precautions, Identification of wire types, their inspection criteria and damage tolerance. Wiring protection techniques, Cable looming and loom support, cable clamps, protective sleeve techniques including heat shrink wrapping, shielding. EWIS installations, inspection, repair, maintenance and cleanliness standards.

UNIT III AIRCRAFT WEIGHT AND BALANCE

9

Responsibility for Weight and Balance Control, Weight Control, Terminology, Effects of Weight, Stability and Balance Control, Weight and Balance Theory, Equipment for Weighing, Preparation for Weighing, Safety Considerations Determining the CG, EWCG Formulas, Single Engine Aircraft Weight and Balance computation. Multi Engine Aircraft Weight and Balance Computation, Large aircraft Weight and Balance computation. Determining the location of the empty weight center of gravity (EWCG) relative to both the datum and the mean aerodynamic chord(MAC).

UNIT IV AIRCRAFT HANDLING AND STORAGE

9

Key Safety Considerations For Parking &Storage, Storage location, Landing gear safety devices, Use of Chocks, Protection against strong winds, Post high-wind inspection, Grounding/ earthing of the aircraft, Protecting air data probes, Aircraft Moving Method, Aircraft Re-Fueling Method, Aircraft mooring, Aircraft Jacking, Effects of Environmental Condition on Aircraft handling and Operations.

UNIT V DISASSEMBLY ,INSPECTION, REPAIR AND ASSEMBLY TECHNIQUES

9

Types of defects and visual inspection techniques. Corrosion removal, assessment and reproduction. Non-destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and borescope methods, Dis-assembly and re-assembly techniques. Abnormal Events: Inspections following lightning strikes and HIRF penetration. Aircraft Maintenance Procedures: continuing airworthiness of an aircraft, AMM, Maintenance task and tasks procedure, Job Set-Up Information, Servicing of aircraft, Removal and Installation of parts, Deactivation and Reactivation. Operational test, Functional Test, System Test and Bite Test. Inspection/Check.

TOTAL : 45 HOURS

TEXT BOOKS

1. Kroes, Watkins, Delp, "Aircraft Maintenance and Repair", McGraw Hill, New York, 1992.

REFERENCES

1. Brimm D.J., BoggesH.E., "Aircraft Maintenance", Pitman Publishing corp., NewYork, 1940.
2. Delp Bent and Mckinely, "Aircraft Maintenance Repair", McGraw Hill, NewYork,
3. Larry Reithmeir, "Aircraft Repair Manual", Palamar Books, Marquette,1992.

AC32A6	PROPULSION	L	T	P	C
		3	0	0	3

OBJECTIVE

- To impart fundamental knowledge on turbine engine constructional arrangements

Course Outcome– Cos		Cognitive Skill
CO-01	Understand the knowledge turbine engine	U
CO-02	Understand the turbine fuel controls	U
CO-03	Able to acquire knowledge of engine indicating system	U
CO-04	Able to acquire knowledge of engine parameter-detailed operation	U
CO-05	Able to know the fundamentals of starting and ignition system	U

Mapping of Course Outcomes with Programme Outcomes

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L-Low, N- Not Relevant

UNIT I TURBINE ENGINE

9

Requirements, Energy, Potential Energy, Kinetic Energy. Newton's Laws Of Motion, First Law, Second Law & Third Law. Bernoulli's Principle, Boyle's & Charles' Law. Force, Work, Power and Torque Force Work. Motion: Speed and Velocity, Acceleration, Power and Weight, Fuel Economy Durability and Reliability, Types and Construction, Turbine Engine Types, Bypass Ratio.

UNIT II TURBINE FUEL CONTROLS

9

General Requirements, Turbine Fuel Controls, Hydro mechanical Fuel Controls, Hydro mechanical/Electronic Fuel Control, FADEC Fuel Control Systems. FADEC for an Auxiliary Power Unit, FADEC Fuel Control Propulsion Engine. Fuel System Operation, Engine Fuel System Components: Main Fuel Pumps (Engine Driven), Fuel Heater, Fuel Spray Nozzles and Fuel Manifolds, Simplex Fuel Nozzle. Duplex Fuel Nozzle, Air blast Nozzles, Flow Divider. Fuel Pressurizing and Dump Valves, Combustion Drain Valves, Fuel Quantity Indicating Units.

UNIT III ENGINE INDICATING SYSTEM

9

Engine Parameters: Purpose, Position, Description, Operation. Operating Parameters: Engine Thrust Indication, Comparison of EPR and N1, EGT (Exhaust Gas Temperature), N2, Flow meter (FF: Fuel Flow). Monitoring Parameters. Lubrication System: Oil Quantity, Oil Pressure, Oil Temperature, Low Oil Pressure Alert, Filter Pre, Clogging Alert, Engine Vibration Indication, Nacelle Temperature, Maintenance.

UNIT IV ENGINE PARAMETER-DETAILED OPERATION

9

Operation and Controls: Pressure Data, Temperature Data. Pressure Data: EPR (Engine Pressure Ratio), Oil Pressure, Low Oil Pressure Alert, Fuel Filter Pre-Clogging Alert, Fuel Pressure. Temperature Data: EGT (Exhaust, Gas Temperature), Oil Temperature, Fuel Temperature, Nacelle Temperature. Mechanical Movement Data: N1, N2, Fuel Flow Rate (FF Or Fuel Flow), Engine Vibrations, Engine Torque, Manifold Pressure, Propeller Rotational Speeds. Interfaces: Engine Interfaces, Aircraft Interfaces. Monitoring and Alert: Analog Dial Indicators (Gauges), Electronic Indicators. Maintenance: Thermocouple Temperature Sensor, EPR Thrust Indication, Vibration Sensor, N1, N2 Speed Sensors.

UNIT V STARTING AND IGNITION SYSTEM

9

Starting and ignition system: Ignition System Maintenance Safety, Gas Turbine Engine Starters Electric Starting Systems and Starter Generator, Starting Systems, Trouble shooting a Starter Generator Starting System. Air Turbine Starters, Air Turbine Troubleshooting Guide, Turbine Ignition Systems, Capacitor Discharge Exciter Unit, Igniter Plugs, Turbine Ignition System Inspection and Maintenance. Inspection: Check System Operation, Repair, Removal, Maintenance and Installation of ignition system Components, Ignition System Leads, Igniter Plugs.

TOTAL : 45 HOURS

TEXT BOOKS

1. EASA, “Module - 15 Gas Turbine Engine”, Aircraft Technical Book Company.
2. Irwine Treager, “Aircraft Gas Turbine Technology”, Tata McGraw Hill, 1997.
3. Casamassa & Ralph D.Bent, “Jet Aircraft Power Systems”, Tata McGraw Hill, 1998.

REFERENCES

1. “Civil Aircraft Inspection Procedure (CAP 459) Part I”, Himalayan Books, 2009.
2. FAA, “A & P Mechanics (General Handbook EA-AC 65-9A)”, Shroff Publishers, 2011
3. FAA, “A & P Mechanics (Airframe Hand Book EA-AC 65-15A)”, Shroff Publishers, 2011.
4. FAA, “A&P Mechanics (Power Plant Hand Book EA-AC 65-12A)”, Shroff Publishers, 2011.
5. Frank Delp, “Aircraft Propeller and Controls”, Jeppesen, 1979.
6. J.Seddon Simon Newman, “Basic Helicopter Aerodynamics”, AIAA Education series, 2001

AC32A7	PROPELLER	L	T	P	C
		3	0	0	3

OBJECTIVE

To introduce the basic concepts, construction, operation and maintenance of propellers.

Course Outcome		Cognitive Skill
CO-01	Basic understanding of the fundamentals	U
CO-02	Remember knowledge about the materials used in wooden construction	U
CO-03	Apply the techniques about the pitch control	U
CO-04	Remember the knowledge about the synchronizing and ice protection	U
CO-05	Knowledge on the maintenance & storage	U

R-Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S-Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

UNIT I FUNDAMENTALS

9

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

UNIT II CONSTRUCTION

9

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

UNIT III PITCH CONTROL

9

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

UNIT IV SYNCHRONIZING AND ICE PROTECTION

9

Propeller Synchronising; Synchronising and synchrophasing equipment. Propeller Ice Protection Fluid and electrical de-icing equipment.

UNIT V: MAINTENANCE & STORAGE

9

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

TOTAL: 45 HOURS

TEXT BOOKS:

1. EASA, “Module 17A Propeller”, Aircraft Technical Book Company.
2. FAA, “A & P Mechanics (Power Plant Hand Book EA-AC 65-12A)”, Shroff Publishers, 2011
3. Kroes & Wild, “Aircraft Power Plants”, Glencoe McGraw Hill, 1995.

REFERENCES

1. “Civil Aircraft Inspection Procedure (CAP 459) Part I”, Himalayan Books, 2009.
2. Frank Delp, “Aircraft Propeller and Controls”, Jeppesen, 1979.
3. Kroes, Walkins, Delp, “Aircraft Maintenance & Repair”, Tata McGraw Hill, 2010

AC32A8	AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS-III	L	T	P	C
		3	0	0	3

OBJECTIVE

- To get knowledge about the different aircraft autopilot & hydraulic and pneumatic systems, on board maintenance and communication and navigation of turbine aeroplane.

Course Outcome– Cos		Cognitive Skill
CO-01	Basic understanding of on board maintenance systems.	U
CO-02	Attain knowledge about integrated modular avionics	U
CO-03	Acquire the details about cabin system	U
CO-04	Knowledge on cabin network services	U
CO-05	Knowledge on Aircraft information system	U

Mapping of Course Outcomes with Programme Outcomes

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L-Low, N-Not Relevant

UNIT I ON BOARD MAINTENANCE SYSTEMS

9

Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring). Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control

UNIT II INTEGRATED MODULAR AVIONICS

9

Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc.; Core System; Network Components.

UNIT III CABIN SYSTEMS

9

The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). Includes voice, data, music and video transmissions. The Cabin Intercommunication Data System provides an interface between cockpit/ cabin crew and cabin systems. These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels.

UNIT IV CABIN NETWORK SERVICE

9

The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems: Data/Radio Communication, In-Flight Entertainment System. The Cabin Network Service may host functions such as: Access to pre-departure/departure reports, E-mail/intranet/Internet access, Passenger database; Cabin Core System; In-flight Entertainment System; External Communication System; Cabin Mass Memory System; Cabin Monitoring System; Miscellaneous Cabin System.

UNIT V INFORMATION SYSTEMS

9

The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display. Typical examples include Air Traffic and Information Management Systems and Network Server Systems

TOTAL : 45 HOURS

TEXT BOOKS

1. EASA, “Module 11A for Level B1.1 Turbine Aeroplane Structures and Systems”, Aircraft Technical Book Company.
2. Pallett, EHJ, “Aircraft Instruments”, Pearson Education, 2009.
3. FAA H 8083-31, “Aviation Maintenance Technician Handbook - Airframe (Vol. I)”, Shroff Publishers, 2012.
4. FAA H 8083-31, “Aviation Maintenance Technician Handbook - Airframe (Vol. II)”, Shroff Publishers, 2012.

REFERENCES

1. J.E Heywood, “Light Aircraft Maintenance”, Himalayan Books, 2008.
2. Dale Crane & R. Scheppler, “Aircraft Oxygen System”, Himalayan Books, 2006.
3. Brain Kendel, “Manual of Avionics”, Sterling Book House, Third Edition.
4. FAA, “A&P Mechanics (General Handbook EA-AC65-9A)”, Shroff Publishers, 2011
5. FAA, “A&P Mechanics (Airframe Handbook EA-AC65-15A)”, Shroff Publishers, 2011
6. FAA, “A & P Mechanics (Power Plant Handbook EA-AC 65-12A)”, Shroff Publishers, 2011

LIST OF OPEN ELECTIVES

SL. NO.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	AC32D1	Theory of Flight	3	0	0	3
2.	AC32D2	Industrial Ergonomics	3	0	0	3

AC32D1	THEORY OF FLIGHT	L	T	P	C
		3	0	0	3

OBJECTIVE

To introduce the concepts of flying, International standard atmosphere, structural aspects of airplanes, brief description of systems, instruments and power plants used in airplanes.

Course Outcome– Cos		Cognitive Skill
CO-01	Basic understanding of on board maintenance systems.	U
CO-02	Attain knowledge about integrated modular avionics	U
CO-03	Acquire the details about cabin system	U
CO-04	Knowledge on cabin network services	U
CO-05	Knowledge on Aircraft information system	U

Mapping of Course Outcomes with Programme Outcomes

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L-Low, N-Not Relevant

UNIT I INTRODUCTION

9

International Standard Atmosphere (ISA), application to aerodynamics. 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: Angle of Attack, Lift coefficient, Drag coefficient, Aero foil contamination including ice, snow, frost.

UNIT II THEORY OF FLIGHT**9**

Relationship between lift, weight, thrust and drag; Glide ratio; Steady state flights, performance; Theory of the turn; Influence of load factor: stall, flight envelope and structural limitations; Lift augmentation. Longitudinal, lateral and directional stability (active and passive)

UNIT III FLIGHT CONTROLS OPERATION**9**

Roll control: Ailerons and spoilers; various types of Ailerons: Differential aileron movement. Pitch control: elevators, stabilizers, variable incidence stabilizers and canards; Yaw control, rudder limiters; Roll causes Yaw and Yaw causes Roll; Dutch Roll. Control using elevators, ruddervators; High lift devices, slots, slats, flaps, FL aprons; Drag inducing devices, spoilers, lift dampers, speed brakes; Effects of wing fences, saw tooth leading edges; Boundary layer control using, vortex generators, stall wedges or leading edge devices; Operation and effect of trim tabs, balance and anti balance (leading) tabs, servo tabs, spring tabs, mass balance; Control surface bias, aerodynamic balance panels.

UNIT IV HIGH SPEED FLIGHT**9**

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

UNIT V ROTARY WING AERODYNAMICS**9**

Terminology; Effects of gyroscopic precession; Torque reaction and directional control; Dissymmetry of lift, Blade tip stall; Translating tendency and its correction; Coriolis effect and compensation; Vortex ring state, power settling, over pitching; Auto-rotation; Ground effect.

TOTAL: 45 HOURS**TEXT BOOKS:**

1. Anderson, J.D., "Introduction to Flight", McGraw-Hill, 1995.
2. Stephen. A. Brandt, "Introduction to Aeronautics: A design perspective" American Institute of Aeronautics & Astronautics, 1997

REFERENCES

1. Kermode, A.C., "Mechanics of Flight", Himalayan Book, 1997

AC32D2	INDUSTRIAL ERGONOMICS	L	T	P	C
		3	0	0	3

OBJECTIVES

To make the students familiarize with various concepts of Ergonomics, so that students will be able to apply the concepts of ergonomics to Design of man – machine system.

Course Outcome– Cos		Cognitive Skill
CO-01	Basic understanding of on board maintenance systems.	U
CO-02	Attain knowledge about integrated modular avionics	U
CO-03	Acquire the details about cabin system	U
CO-04	Knowledge on cabin network services	U
CO-05	Knowledge on Aircraft information system	U

Mapping of Course Outcomes with Programme Outcomes

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J
CO-01	S	S	S	M	M	L	L	N	M	N
CO-02	M	S	M	M	S	N	N	N	N	L
CO-03	M	L	L	M	L	L	N	N	L	N
CO-04	L	M	M	S	N	S	S	S	L	M
CO-05	S	S	L	L	L	L	M	M	S	L

S-Strong, M-Medium, L-Low, N-Not Relevant

UNIT I HUMAN PERFORMANCE AND LIMITATIONS

9

Concepts of human factors engineering and ergonomics – Man – machine system and design philosophy – Physical work – Heat stress – manual lifting – work posture – repetitive motion. The need to take human factors into account-Incidents attributable to human factors/human error; ‘Murphy’s’ law. Vision – Hearing - Information processing- Attention and perception; Memory; Claustrophobia and physical access.

UNIT II SOCIAL PSYCHOLOGY & FACTORS AFFECTING PERFORMANCE

9

Responsibility: individual and group; Motivation and de-motivation; Peer pressure; Fitness/health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and under load; Sleep and fatigue, shift work; Alcohol, medication, drug abuse. Fitness/health, Stress: dome static and work related; Time pressure and deadlines; Workload: overload and underload; Sleep and fatigue, shiftwork; Alcohol, medication, drug abuse.

UNIT III DESIGN OF SYSTEMS**9**

Displays – Controls – Workplace – Seating – Work process – Duration and rest periods – Hand tool design – Design of visual displays – Design for shift work. Physical work- Repetitive task, Visual Inspection, Complex Systems

UNIT IV ENVIRONMENTAL FACTORS IN DESIGN**9**

Temperature – Humidity – Noise – Illumination – Vibration – Measurement of illumination and contrast – use of photometers – Recommended illumination levels. The ageing eye – Use of indirect (reflected) lighting – cost efficiency of illumination – special purpose lighting for inspection and quality control – Measurement of sound – Noise exposure and hearing loss – Hearing protectors – analysis and reduction of noise – Effects of Noise on performance – annoyance of noise and interference with communication – sources of vibration discomfort.

UNIT V WORK PHYSIOLOGY & HUMAN ERRORS**9**

Provision of energy for muscular work – Role of oxygen physical exertion – Measurement of energy expenditure Respiration – Physical work capacity and its evaluation – Error models and theories, Types of errors, implication of errors, avoiding an damaging errors- Recognizing and avoiding hazards, dealing with emergencies.

TOTAL: 45 HOURS**REFERENCES**

1. Martin Helander, A guide to the ergonomics of manufacturing, East West press, 2007
2. E.J. McCormic & Mark S. Sangers, Human factors in engineering design, McGraw Hill 2007