Regulation 2023
Program Structure

1091 DIPLOMA IN AIRCRAFT MAINTENANCE ENGINEERING (Avionics)

Program Outcomes (PO's)

POs are statements that describe what students are expected to know and be able to do upon graduating from the program. These relate to the skills, knowledge, analytical ability, attitude, and behavior that students acquire through the program.
The POs essentially indicate what the students can do from subject-wise knowledge acquired by them during the program. As such, POs define the professional profile of an engineering diploma graduate.
NBA has defined the following seven POs for an Engineering diploma graduate:

PO1: Basic and Discipline-specific knowledge: Apply knowledge of basic mathematics, science and engineering fundamentals and an engineering specialization to solve the engineering problems.

PO2: Problem analysis: Identify and analyse well-defined engineering problems using codified standard methods.

PO3: Design/ development of solutions: Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

PO4: Engineering Tools, Experimentation, and Testing: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

PO5: Engineering practices for society, sustainability and environment: Apply appropriate technology in the context of society, sustainability, environment and ethical practices.

PO6: Project Management: Use engineering management principles individually, as a team member or as a leader to manage projects and effectively communicate about well-defined engineering activities.

PO7: Life-long learning: Ability to analyse individual needs and engage in updating in the context of technological changes.

Credit Distribution

Semester	No of Courses	Periods	Credits
Semester I	8	640	20
Semester II	9	640	20
Semester III	7	640	21
Semester IV	7	640	19
Semester V	8	640	22
Semester VI	3	660	18
		Total	**120**

Industrial Training during Summer vacation for Two Weeks has to be completed to earn the required two credits.

GOVERNMENT OF TAMIL NADU
DEPARTMENT OF TECHNICAL EDUCATION
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Semester III								
#	**Course Category**	**Course Type**	**Code**	**Course Title**	**L-T-P**	**Period**	**Credit**	**End Exam**
1	Program Core	Theory	1091233110	Components of Aircraft Structures	3-0-0	45	3	Theory
2	Program Core	Theory	1091233210	Avionics System - I	3-0-0	45	3	Theory
3	Program Core	Theory	1091233310	Flight Mechanics	3-0-0	45	3	Theory
4	Program Core	Practical/Lab	1091233420	Components of Aircraft Structures Practical	0-0-6	90	3	Practical
5	Program Core	Practical/Lab	1091233520	Avionics System – I Practical	0-0-6	90	3	Practical
6	Program Core	Practical/Lab	1091233620	Flight Mechanics Practical	0-0-6	90	3	Practical
7	Open Elective	Advanced Skill Certification	1091233760	Advanced Skills Certification - III	1-0-2	60	2	NA
8	Humanities & Social Science	Integrated Learning Experience	1091233880	Growth Lab	-	30	0	-
9	Audit Course	Integrated Learning Experience	1091233881	Induction Program - II	-	16	0	-
10	Audit Course	Integrated Learning Experience	1091233882	I&E/ Club Activity/ Community Initiatives	-	16	0	-
11	Audit Course	Integrated Learning Experience	1091233883	Shop floor Immersion	-	8	0	-
12	Audit Course	Integrated Learning Experience	1091233884	Student-Led Initiative	-	22	0	-
13	Audit Course	Integrated Learning Experience	1091233885	Emerging Technology Seminars	-	8	0	-
14	Audit Course	Integrated Learning Experience	1091233886	Health & Wellness	0-0-2	30	1	-
					Test & Revisions	30		NA
					Library	15		
					Total	**640**	**21**	

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Semester IV								
#	**Course Category**	**Course Type**	**Code**	**Course Title**	**L-T-P**	**Period**	**Credit**	**End Exam**
1	Program Core	Theory	1091234110	Aircraft System	3-0-0	45	3	Theory
2	Program Core	Theory	1091234210	Avionics Systems - II	3-0-0	45	3	Theory
3	Program Core	Practical/Lab	1091234320	Aircraft System Practical	0-0-6	90	3	Practical
4	Program Core	Practical/Lab	1091234420	Avionics Systems – II Practical	0-0-6	90	3	Practical
5	Program Core	Practical/Lab	1091234520	Aero Modeling Practical Using CAD	0-0-4	60	2	Practical
6	Program Core	Practicum	1091234640	Fundamentals of Control Systems	1-0-4	75	3	Practical
7	Open Elective	Advanced Skill Certification	1091234760	Advanced Skills Certification - IV	1-0-2	60	2	NA
8	Audit Course	Integrated Learning Experience	1091234882	I&E/ Club Activity/ Community Initiatives	-	30	0	-
9	Audit Course	Integrated Learning Experience	1091234883	Shop floor Immersion	-	8	0	-
10	Audit Course	Integrated Learning Experience	1091234884	Student-Led Initiative	-	24	0	-
11	Audit Course	Integrated Learning Experience	1091234885	Emerging Technology Seminars	-	8	0	-
12	Audit Course	Integrated Learning Experience	1091234886	Health & Wellness	-	30	0	-
13	Audit Course	Integrated Learning Experience	1091234887	Special Interest Groups (Placement Training)	-	30	0	-
					Test & Revisions	30		
					Library	15		
					Total	**640**	**19**	

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Semester V								
#	**Course Category**	**Course Type**	**Code**	**Course Title**	**L-T-P**	**Period**	**Credit**	**End Exam**
1	Program Core	Theory	1091235110	UAV System Design	4-0-0	60	4	Theory
2	Program Core	Theory	1091235210	Aircraft Ground Handling	3-0-0	45	3	Theory
3	Program Core	Practical/Lab	1091235320	Aircraft Ground Handling Practical	0-0-6	90	3	Practical
4	Program Core	Practical/Lab	1091235420	UAV System Design Practical	0-0-6	90	3	Practical
5	Program Core	Practicum	1091235540	Aircraft Navigation System	1-0-4	75	3	Practical
6	Humanities & Social Science	Practicum	1091235654	Innovation & Startup	1-0-2	45	2	Project
7	Project/Internship	Project/Internship	1091235773	Industrial Training* [Summer Vacation - 90 Hours]	-	-	2	Project
8	Open Elective	Advanced Skill Certification	1091235860	Advanced Skills Certification - V	1-0-2	60	2	NA
9	Audit Course	Integrated Learning Experience	1091235981	Induction program - III	-	40	0	-
10	Audit Course	Integrated Learning Experience	1091235984	Student-Led Initiative	-	30	0	-
11	Audit Course	Integrated Learning Experience	1091235986	Health & Wellness	-	30	0	-
12	Audit Course	Integrated Learning Experience	1091235987	Special Interest Groups (Placement Training)	-	30	0	-
					Test & Revisions	30		
					Library	15		
					Total	**640**	**22**	

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Semester VI								
#	**Course Category**	**Course Type**	**Code**	**Course Title**	**L-T-P**	**Period**	**Credit**	**End Exam**
1	Open Elective	Theory		Electives - I (Pathway)	3-0-0	45	3	Theory
2	Open Elective	Practicum		Elective - II (Specialization)	1-0-4	75	3	Practical
3	Industrial Training / Project	Project/Internship		In-house Project / Internship / Fellowship **	-	540	12	Project
					Total	**660**	**18**	
3	Industrial Training / Project	Project/Internship	1091236351	Internship	-	540	12	Project
3	Industrial Training / Project	Project/Internship	1091236353	Fellowship	-	540	12	Project
3	Industrial Training / Project	Project/Internship	1091236374	In-house Project	-	540	12	Project

Note: ** Every student should select any one from the In-House Project or Internship or Fellowship. The guidelines given have to be followed.

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Elective - I (Pathway)								
#	**Course Category**	**Course Type**	**Code**	**Course Title**	**L-T-P**	**Period**	**Credit**	**End Exam**
1	Elective | Higher Education	Theory	1091236111	Civil Aviation Requirements	3-0-0	45	3	Theory
2	Elective | Entrepreneurship	Theory	6000236112	Entrepreneurship	3-0-0	45	3	Theory
3	Elective | Technocrats	Theory	1091236113	Airworthiness Requirements	3-0-0	45	3	Theory

Elective - II (Specialization)								
#	**Course Category**	**Course Type**	**Code**	**Course Title**	**L-T-P**	**Period**	**Credit**	**End Exam**
1	Elective	Practicum	1091236241	Helicopter Modeling	1-0-4	75	3	Practical
2	Elective	Practicum	1091236242	Rocket Modeling	1-0-4	75	3	Practical
3	Elective	Practicum	1091236243	2 Seater Flight Modeling	1-0-4	75	3	Practical

1091233110	**Components of Aircraft Structures**	L	T	P	C
THEORY		3	0	0	3

Introduction

Students should have knowledge of aircraft structures, as it is the structure of the aircraft that carries and takes on the weight as well as all aerodynamic loads under different engines as well as operating conditions. This gives students a broad understanding and appreciation of one of the important parts of mechanics of flight.

This course gives exposure and basic knowledge of structural requirements of all lift surfaces, fuselage, landing gear and control surfaces of an aircraft. This will help students to correlate and understand the aerodynamics loads and their effects on the structures better. This also helps students to acquire good skills in servicing and maintenance of these structures.

Students should be physically shown at least lifting and control surfaces structures along with landing gear systems sufficient practice should be given to gent students familiarized with these structures

Course Objectives

The objective of this course is to enable the student to

To Study the basic knowledge of Introduction to Aircraft Structures, Airframe Structures – Aeroplane, Stabilizers, Flight Control Surfaces, Nacelles/Pylons .

Course Outcomes

On successful completion of this course, the student will be able to

CO 1: Understand the significance of Aircraft Structures.

CO 2: Understand the significance and Operation of Structure.

CO 3: Describe Principles of Structure Assembly.

CO 4: Describe Principles of Air Frame Assembly- aero plane.

CO 5: Understand the significance and Operation of Stabilize.

Pre-requisites

Nil

1091233110	**Components of Aircraft Structures**	L	T	P	C
THEORY		3	0	0	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	-	1	-	-	2
CO2	3	2	1	1	-	-	2
CO3	3	2	1	1	-	-	2
CO4	3	2	-	1	-	-	2
CO5	2	2	-	2	2	-	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of

discrepancies.

- Regularly revise the core concepts of structure as they are fundamental to understanding aircraft.
- Focus on understanding the practical applications and operational principles rather than memorizing equations.
- Engage with practical lab sessions or virtual lab simulations to gain hands-on experience with this structure.

Assessment Methodology

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

1091233110	**Components of Aircraft Structures**	L	T	P	C
THEORY		3	0	0	3

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.

CA1and CA2, Assessment test should be conducted for two units as below.

Answer five questions (5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should write Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The answer scripts of every student (online / offline) for this assessment should be kept for records and future verification. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should write any two questions. The question may have two subdivisions only.

Syllabus Contents

Unit I	**Introduction of Aircraft**	
Introduction to aircraft, major aircraft components, aircraft systems and their Functions, reference lines, station and zone identification systems		7
Unit II	**Aircraft Structures**	
Introduction - Principal Aircraft Structures - Fuselage – Trusses, construction, Various types. Main plane – Basic features of Construction, main parts.		7

1091233110	**Components of Aircraft Structures**	L	T	P	C
THEORY		3	0	0	3

Empennage – Horizontal and vertical stabilizers. Primary control surfaces (Ailerons, Rudder and Elevators). Secondary control surfaces (Flaps, Slats, spoilers and tabs)		
Unit III	**Structural Assembly**	
Structured components of wing, fuellage and emperriage (H.T + V.T) Structural assembly techniques: riveting, bolting and adhesive bonding.		7
Unit IV	**Airframe Structures — Aero plane**	
Fuselage (ATA 52/53/56) :Construction and pressurization sealing; Wing, stabiliser,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		7
UNIT V	**Stabilizers**	
Construction; Control surface attachment.(Rudder, Flap, Aileron) Construction and attachment; Balancing — mass and aerodynamic.		7
	Test + Revision	10
	TOTAL HOURS	45

Suggested list of Students Activity,

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class quizzes conducted on a weekly/fortnightly based on the course.
- Mini project that shall be an extension of any practical lab exercise to real-world application

1091233110	**Components of Aircraft Structures**	L	T	P	C
THEORY		3	0	0	3

Text Book for Reference:

1. T H G Megson, Aircraft Structures for Engineering Students, Edward Arnold, U.K.
2. R M Rivello, Theory and Analysis of Flight Structures, McGrawHill Book Co.
3. E F Bruhn, Analysis and Design of Flight Vehicle Structures, Tri State offset co. USA.
4. G F Titterton, Aircraft Materials and Processes, Himalayan Books, New Delhi.
5. E T Hill, The Materials for Aircraft Construction, Pitman, London.
6. Dictionary of Aeronautical terms (Dale Crane).
7. Aircraft handbook FAA (AC 65-15 A).
8. Aircraft structure Ch. 01 (FAA).
9. Aircraft Construction Repair and Inspection-By Joe Christy.
10. Aviation Maintenance Technician Handbook by FAA.
11. Aircraft Maintenance and Repair- Delp/Bent/McKinley,AC 43.1B.

END SEMESTER QUESTION PATTERN - Theory Exam

Duration: 3 Hrs. **Max. Marks: 100**

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Instruction to the Question Setters

Four questions will be asked from every unit, students should write any two questions for 10 marks. The question may have two subdivisions only.

1091233210	**Avionics System - I**	L	T	P	C
THEORY		3	0	0	3

Introduction

Diploma holders in Aircraft Maintenance must have a sound knowledge of various avionics analog systems which go in the cockpit. This subject is designed to give them an insight into typical systems so that they understand their principles of working. This would also help them in acquiring skills in maintenance of these systems.

Course Objectives

To Study the basic knowledge of Avionics Systems, Principles of Communication Systems., Transmission, Aerials and Propagation, Devices, Microwave Engineering, Radar Engineering

Course Outcomes

On successful completion of this course, the student will be able to

CO 1: Understand the significance of communication.

CO 2: Understand the significance and Operation of Transmission Theory.

CO 3: Describe Principles of MicroWave Engineering.

CO 4: Describe Principles of Microwave devices.

CO 5: Understand the significance and Operation of RADAR .

Pre-requisites

Nil

1091233210	**Avionics System - I**	L	T	P	C
THEORY		3	0	0	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	-	1	-	-	2
CO2	3	2	1	1	-	-	2
CO3	3	2	1	1	-	-	2
CO4	3	2	-	1	-	-	2
CO5	2	2	-	2	2	-	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of

discrepancies.

- Regularly revise the core concepts of structure as they are fundamental to understanding aircraft.
- Focus on understanding the practical applications and operational principles rather than memorizing equations.
- Engage with practical lab sessions or virtual lab simulations to gain hands-on experience with this structure.

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

1091233210	**Avionics System - I**	L	T	P	C
THEORY		3	0	0	3

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.

CA1and CA2, Assessment test should be conducted for two units as below.

Answer five questions (5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should write Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The answer scripts of every student (online / offline) for this assessment should be kept for records and future verification. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should write any two questions. The question may have two subdivisions only.

Syllabus Contents

Unit I	**Principles of communication**	
Information : Communication systems: signals, analogue, digital and coded forms, time and frequency representation, types of distortion Information : Nature and measure, influence of bandwidth and signal/noise ratio on channel capacity.		7

1091233210	**Avionics System - I**	L	T	P	C
THEORY		3	0	0	3

Modulation : Amplitude, frequency and phase modulations, single and vestigial sideband forms, demodulation, Super heterodyne principle, automatic gain and frequency control, typical circuit arrangements.		
Unit II	**Transmission Theory**	
Transmission lines and their circuit representation, characteristic impedance, complex propagation constant, standing wave radio, matching and impedance charts. Aerials and Propagation : Antenna theory, various types of antenna for medium wave, short wave, VHF and UHF frequencies, propagation at microwave frequencies, atmospheric attestation.		7
Unit III	**Microwave Engineering**	
Rectangular and circular waveguides, coaxial lines, field patterns, modes (high order and evanescent), passive components (e.g., Directional couplers, filters, isolators and circulators)		7
Unit IV	**Microwave Devices**	
Magnetron, Klystron, backward wave oscillator, Traveling wave tubes, Amplifiers and parametric amplifiers. Diode detectors and mixers.		7
UNIT V	**Radar Engineering**	
Radar definition, Radar range equation, pulsed, CW and Doppler Radars, MTI, Noise Figure Consideration, various types of radar displays, Detection of radar signals in Noise.		7
	Test + Revision	10
	TOTAL HOURS	45

1091233210	**Avionics System - I**	L	T	P	C
THEORY		3	0	0	3

Suggested list of Students Activity,

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class quizzes conducted on a weekly/fortnightly based on the course.
- Mini project that shall be an extension of any practical lab exercise to real-world application

Text Book for Reference:

1. Bapat, Electronics Circuits and systems Analog and Digital, Tata McGraw Hill, Delhi.
2. H C Rai and Mahesh popli, Fundamentals of ELECTRONICS, Dhapatrai&sons, Naisarak, Delhi.
3. Mehta V K, principals of electronics, S Chand &CO., New Delhi.
4. K Ayala, introduction to 8021 Microcontroller, Prentice Hall.
5. P D Choudhari, computer organization and Design, Prentice Hall.
6. Mathur, Kulshestra and Chadha, Electronic devices: Applications and Integrated circuits, umeh publications.
7. Ramabhadran, Electronic ,principles and Techniques , Hindustan Publishing Corporation.

END SEMESTER QUESTION PATTERN - Theory Exam

Duration: 3 Hrs. **Max. Marks: 100**

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Instruction to the Question Setters

Four questions will be asked from every unit, students should write any two questions for 10 marks. The question may have two subdivisions only.

1091233310	**Flight Mechanics**	L	T	P	C
THEORY		3	0	0	3

Introduction

An aircraft capable of flying in spite of its large weight. It has a particular shape and becomes airborne beyond certain speeds. In order to appreciate the principles involved in flying it is essential to gain knowledge and skill in the area of mechanics of fluids applied to flying. .

Course Objectives

To Study the basic knowledge of Physics of the Atmosphere and Aerodynamics, Theory of Flight – Aeroplane Aerodynamics and Flight Controls, Wind Tunnels.

Course Outcomes

On successful completion of this course, the student will be able to

CO 1: Understand the significance of Aerodynamics.

CO 2: Understand the significance and Operation of Theory of Flight.

CO 3: Describe Principles of aero plane Control.

CO 4: Describe Principles of Wind Tunnel.

CO 5: Understand the significance and Operation of High Speed Flight.

Pre-requisites

Nil

1091233310	**Flight Mechanics**	L	T	P	C
THEORY		3	0	0	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	-	1	-	-	2
CO2	3	2	1	1	-	-	2
CO3	3	2	1	1	-	-	2
CO4	3	2	-	1	-	-	2
CO5	2	2	-	2	2	-	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of

discrepancies.

- Regularly revise the core concepts of structure as they are fundamental to understanding aircraft.
- Focus on understanding the practical applications and operational principles rather than memorizing equations.
- Engage with practical lab sessions or virtual lab simulations to gain hands-on experience with this structure.

Assessment Methodology

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

1091233310	**Flight Mechanics**	L	T	P	C
THEORY		3	0	0	3

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.

CA1and CA2, Assessment test should be conducted for two units as below.

Answer five questions (5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should write Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The answer scripts of every student (online / offline) for this assessment should be kept for records and future verification. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should write any two questions. The question may have two subdivisions only.

Syllabus Contents

Unit I	**Physics of the Atmosphere and Aerodynamics**	
International Standard Atmosphere (ISA), 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, aerodynamic centre, centre of pressure, stagnation point, profile (parasite) drag, induced drag, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio; Thrust, Weight. Generation of		7

1091233310	**Flight Mechanics**	L	T	P	C
THEORY		3	0	0	3

Lift and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall; Aerofoil contamination including ice, snow, frost.		
Unit II	**Theory of Flight**	
Relationship between lift, weight, thrust and drag; Glide ratio; Steady state flights, performance; Theory of the turn; Influence of load factor: stall, flight envelope and structural limitations; Lift augmentation.		7
Unit III	**Theory of Flight - Aeroplane 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 eleven's, ruddervators; High lift devices, slots, slats, flaps, flaperons;Drag inducing devices, spoilers, lift dumpers, speed brakes; Effects of wing fences, saw tooth leading edges; Operation and effect of trim tabs, balance and ant balance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels.		7
Unit IV	**Wind Tunnels**	
Types of wind tunnels, Pressure measurements, Fire measurements. Low speed wind tunnels, Open Jet wind tunnels, closed circuit wind tunnels, supersonic tunnels		7
UNIT V	**High Speed Flight**	
Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number,critical Mach number, compressibility effect, buffet, shock wave, aerodynamic heating, area rule;Factors affecting airflow in engine intakes of high speed aircraft; Effects of sweepback on critical Mach number.		7
	Test + Revision	10
	TOTAL HOURS	45

1091233310	**Flight Mechanics**	L	T	P	C
THEORY		3	0	0	3

Suggested list of Students Activity,

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class quizzes conducted on a weekly/fortnightly based on the course.
- Mini project that shall be an extension of any practical lab exercise to real-world application

Text Book for Reference:

1. E H J Pallet: Aircraft Instruments - Principles and Applications, Himalayan Books
2. E H J Pallet, Automatic Flight Control, Blackwell.
3. Leach Malvino, Digital Principles and Applications, Tata McGraw Hill

END SEMESTER QUESTION PATTERN - Theory Exam

Duration: 3 Hrs. **Max. Marks: 100**

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Instruction to the Question Setters

Four questions will be asked from every unit, students should write any two questions for 10 marks. The question may have two subdivisions only.

1091233420	**Components of Aircraft Structures Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Introduction:

Students should have knowledge of aircraft structures, as it is the structure of the aircraft that carries and takes on the weight as well as all aerodynamic loads under different engines as well as operating conditions. This gives students a board mechanics of flight.

This course gives exposure and basic knowledge of structural requirements of all lift surfaces, fuselage, landing gear and control surfaces of an aircraft. This will help students to correlate and understand better. This also helps students to acquire good skills in servicing and maintenance of these structures.

Students should be physically shown at least lifting and control surface structures along with landing gear systems sufficient practice should be given to get students familiarized with these structures

Course Objectives:

The objective of this course is to enable the student to To Study the basic knowledge of Introduction to Aircraft Structures, Airframe Structures – Aeroplane, Stabilizers, Flight Control Surfaces, Nacelles/Pylons .

Course Outcomes:

On successful completion of this course, the student will be able to

CO1: Understand the structures developed using sheet metals

CO2: Understand the different joints used in the aircraft structures

CO3: Understand the soldering, swaging, thread cutting, and Cable splicing

CO4: Exposure of different defects occur in the aluminum structures

CO5: Principles used in the Composite repair and inspection methods.

Pre-requisites:

NIL

1091233420	**Components of Aircraft Structures Practical**	L	T	P	C
PRACTICAL		0	0	6	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	1	3	-	-	2
CO2	2	2	1	3	-	-	2
CO3	2	2	2	3	-	-	3
CO4	2	2	2	3	-	-	2
CO5	2	2	-	3	1	-	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

- It is advised that teachers make the learning experience more engaging by introducing innovative and interesting ways of teaching.
- The teachers need to expose the students to material in multiple modes to help them learn it faster and retain it longer.
- Incorporate technology tools and resources, such as online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional practice opportunities.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability-based.
- Seminars: Host seminars where students present their findings from Swinburne's test and performance curve analyses.
- Group Discussions: Facilitate discussions on the results and implications of these tests for real-world applications.
- Simulation Software: Utilize simulation software to model and analyze the operation

1091233420	**Components of Aircraft Structures Practical**	L	T	P	C
PRACTICAL		0	0	6	3

- Guest Lectures: Invite industry experts to talk about the latest technologies and trends in motor drives and their applications in robotics and automation.
- This strategy aims to blend theoretical knowledge with practical skills, preparing students for real-world engineering challenges. It encourages active learning, critical thinking, and collaboration among students, essential skills for future engineers.
- Preparation: Before each class, ensure all equipment is functional and safety protocols are in place.
- Assessment: Evaluate students through quizzes, lab reports, and presentations on their understanding and analysis of the experiments.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Practical Document	Practical Test	Practical Examination
Portion	First Cycle	Second Cycle	All Exercises	All Exercises	All Exercises
Duration	2 Periods	2 Periods	Regularly	3 Hours	3 Hours
Exam Marks	50	50	100	100	100
Converted to	10	10	10	20	60
Marks	10		10	20	60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

1091233420	**Components of Aircraft Structures Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Note:

- **CA1 and CA2:** All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

  Cycle I: 1, 2, 3, 4, 5 and 6.

  Cycle II: 7, 8, 9, 10, 11 and 12.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Procedure	10
B	Marking	20
C	Execution	20
TOTAL		50

- **CA 3:** Practical document should be maintained for every exercise immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical document should be submitted for the Practical Test and End Semester Examination with a bonafide certificate

  The details of the documents to be prepared as per the instruction below.

  Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise.

1091233420	**Components of Aircraft Structures Practical**	L	T	P	C
PRACTICAL		0	0	6	3

This documentation can be carried out in a separate notebook or printed manual or in a file with the documents. The procedure and sketch should be written by the student manually.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The logbook and the practical documents should be submitted for the verification by the Flying Squad and DOTE Official.

- **CA 4:** All the exercises should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test (CA4) should be conducted as per the scheme of evaluation as below. The marks awarded should be converted to 20 Marks for the internal assessment.

SCHEME OF EVALUATION

Part	Description	Marks
A	Procedure	10
B	Marking	20
C	Dimensioning	20
D	Execution	20
E	Result	20
F	Viva Voice	10
	TOTAL MARKS	**100**

1091233420	**Components of Aircraft Structures Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Syllabus Contents

Exercise No.	**Description**	**Period**
1	Sheet metal marking, cutting, sheet metal structural defects	10
2	Practice of 1st model. Butt Joint and inspect	5
3	Practice of 2nd model. Lap Joint and inspect	5
4	Practice of 3rd model. V-Joint and inspect	5
5	Practice of 3rd model. T-Joint and inspect	5
6	Demonstration of 2nd model- Radius Gauge	5
7	Soldering Exercises, inspection and defects	8
8	Cable splicing and swaging	5
9	Taps and Dies, thread cutting and inspection	8
10	Detection of defects in aluminium material and structures	8
11	Simple repair of Composite and non-metallic materials and structures	8
12	Repair of aluminium structures	8
Practice + Test + Revision		10
Total		90

1091233420	**Components of Aircraft Structures Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Suggested List of Students Activity:

Engaging in group discussions to delve into the theoretical dimensions .

Presenting lab and project findings to foster knowledge reinforcement and polish communication skills.

Analyzing industrial case studies to connect theoretical learning with practical applications in real-world scenarios.

Participating in guest lectures and workshops to gain insights from industry experts and learn about critical diagnostic tests for equipment maintenance

END SEMESTER EXAMINATION – PRACTICAL EXAM.

BOARD EXAMINATIONS

Note:

- All the exercises have to be completed, any one exercise will be given for examination.
- All the exercises should be given in the question paper. The student is allowed to select by lot or question papers issued by the DOTE Exam section shall be used.
- Practical documents along with the activity report should be submitted for the End Semester Examinations.

DETAILED ALLOCATION OF MARKS.

Part	Description	Marks
A	Procedure	10
B	Marking	20
C	Dimensioning	20
D	Execution	20
E	Result	20
F	Viva Voice	10
	TOTAL MARKS	**100**

1091233420	**Components of Aircraft Structures Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Equipment / Facilities required conducting the Practical Course.

S.No	Name of the Equipment's	Quantity Required
1.	Set of basic tools for dismantling and assembly	1 set
2.	NDT equipment	1
3.	Micrometers, depth gauges, vernier callipers	2 each
4.	Shear cutter pedestal type	1
5.	Drilling Machine	1
6.	Bench Vices	5
7.	Radius Bend bars	1
8.	Pipe Flaring Tools	1
9.	Welding machine	1
10.	Glass fibre, epoxy resin	1

1091233520	AVIONICS SYSTEM – I PRACTICAL	L	T	P	C
PRACTICAL		0	0	6	3

Introduction:

Diploma holders in Aircraft Maintenance must have a sound knowledge of various avionics Digital systems which go in the cockpit. This subject is designed to give them an insight into typical systems so that they understand their principles of working. This would also help them in acquiring skills in maintenance of these systems.

Course Objectives:

To Study the basic knowledge of Avionics Systems, Avionics System Essentials, Packaging, System Assessment, Validation and Certification.

Course Outcomes:

On successful completion of this course, the student will be able to

CO1: Understand the construction of A.M. Modulation.

CO2: Understand the construction of F.M.Modulation

CO3: Understand and construct Demodulation of A.M

CO4: Exposure of Digital FSK (Frequency Shift Keying, Amplitude Shift Keying).

CO5: Understand the Construction of Direction-Finding Antenna.

Pre-requisites:

NIL

1091233520	AVIONICS SYSTEM – I PRACTICAL	L	T	P	C
PRACTICAL		0	0	6	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	1	3	-	-	2
CO2	2	2	1	3	-	-	2
CO3	2	2	2	3	-	-	3
CO4	2	2	2	3	-	-	2
CO5	2	2	-	3	1	-	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

- It is advised that teachers make the learning experience more engaging by introducing innovative and interesting ways of teaching.
- The teachers need to expose the student to material in multiple modes help them learn it faster and retain it longer.
- Incorporate technology tools and resources, such as online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional practice opportunities.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability based.
- Seminars: Host seminars where students present their findings from Swinburne's test and performance curve analyses.
- Group Discussions: Facilitate discussions on the results and implications of these tests for real-world applications.
- Simulation Software: Utilize simulation software to model and analyze the operation

1091233520	AVIONICS SYSTEM – I PRACTICAL	L	T	P	C
PRACTICAL		0	0	6	3

- Guest Lectures: Invite industry experts to talk about the latest technologies and trends in motor drives and their applications in robotics and automation.
- This strategy aims to blend theoretical knowledge with practical skills, preparing students for real-world engineering challenges. It encourages active learning, critical thinking, and collaboration among students, essential skills for future engineers.
- Preparation: Before each class, ensure all equipment is functional and safety protocols are in place.
- Assessment: Evaluate students through quizzes, lab reports, and presentations on their understanding and analysis of the experiments.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Practical Document	Practical Test	Practical Examination
Portion	First Cycle	Second Cycle	All Exercises	All Exercises	All Exercises
Duration	2 Periods	2 Periods	Regularly	3 Hours	3 Hours
Exam Marks	50	50	100	100	100
Converted to	10	10	10	20	60
Marks	10		10	20	60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

1091233520	**AVIONICS SYSTEM – I PRACTICAL**	L	T	P	C
PRACTICAL		0	0	6	3

Note:

- **CA1 and CA2:** All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

  Cycle I: 1, 2, 3, 4, 5 and 6.

  Cycle II: 7, 8, 9, 10, 11 and 12.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Procedure	15
B	Execution	35
TOTAL		50

- **CA 3:** Practical document should be maintained for every exercise immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical document should be submitted for the Practical Test and End Semester Examination with a bonafide certificate

  The details of the documents to be prepared as per the instruction below.

  Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise.

1091233520	AVIONICS SYSTEM – I PRACTICAL	L	T	P	C
PRACTICAL		0	0	6	3

This documentation can be carried out in a separate notebook or printed manual or in a file with the documents. The procedure and sketch should be written by the student manually.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The logbook and the practical documents should be submitted for the verification by the Flying Squad and DOTE Official.

- **CA 4:** All the exercises should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test (CA4) should be conducted as per the scheme of evaluation as below. The marks awarded should be converted to 20 Marks for the internal assessment.

SCHEME OF EVALUATION

Part	Description	Marks
A	Procedure	15
B	Connection	25
C	Execution	35
D	Result	15
E	Viva Voice	10
	TOTAL MARKS	**100**

1091233520	**AVIONICS SYSTEM – I PRACTICAL**	L	T	P	C
PRACTICAL		0	0	6	3

Syllabus Contents

Exercise No.	**Description**	**Period**
1	Construct A.M.Modulation and verify the readings.	**10**
2	Construct F.M. Modulation and verify the readings.	10
3	Construct Demodulation of A.M and verify the readings.	10
4	Verify Magnetron and Klystron – set up and verify it.	10
5	Construct a Radiation Pattern Experiment (Dipole-Yogi Antenna) and verifying the readings.	15
6	Construct Digital FSK (Frequency Shift Keying, Amplitude Shift Keying) and verifying the readings.	15
7	Construct Direction Finding Antenna and verify the readings	10
8	RADAR – Study experiment	10
Practice + Test + Revision		10
Total		90

Suggested List of Students Activity:

- Engaging in group discussions to delve into the theoretical dimensions .
- Presenting lab and project findings to foster knowledge reinforcement and polish communication skills.
- Analyzing industrial case studies to connect theoretical learning with practical applications in real-world scenarios.

1091233520	AVIONICS SYSTEM – I PRACTICAL	L	T	P	C
PRACTICAL		0	0	6	3

- Participating in guest lectures and workshops to gain insights from industry experts and learn about critical diagnostic tests for equipment maintenance.

END SEMESTER EXAMINATION – PRACTICAL EXAM.

BOARD EXAMINATIONS

Note:

- All the exercises have to be completed, any one exercise will be given for examination.
- All the exercises should be given in the question paper. The student is allowed to select by lot or question papers issued by the DOTE Exam section shall be used.
- Practical documents along with the activity report should be submitted for the End Semester Examinations.

DETAILED ALLOCATION OF MARKS.

Part	Description	Marks
A	Procedure	15
B	Connection	25
C	Execution	35
D	Result	15
E	Viva Voice	10
	TOTAL MARKS	**100**

1091233520	**AVIONICS SYSTEM – I PRACTICAL**	L	T	P	C
PRACTICAL		0	0	6	3

Equipment / Facilities required conducting the Practical Course.

S.No	Name of the Equipment's	Quantity Required
1.	Set of basic tools for dismantling and assembly	1 set
2.	NDT equipment	1
3.	Micrometers, depth gauges, vernier callipers	2 each
4.	Shear cutter pedestal type	1
5.	Drilling Machine	1
6.	Bench Vices	5
7.	Radius Bend bars	1
8.	Pipe Flaring Tools	1
9.	Welding machine	1
10.	Glass fibre, epoxy resin	1

1091233620	FLIGHT MECHANICS PRACTICAL	L	T	P	C
PRACTICAL		0	0	6	3

Introduction:

Students should have knowledge of aircraft structures, as it is the structure of the aircraft that carries and takes on the weight as well as all aerodynamic loads under different engines as well as operating conditions.

This course gives exposure and basic knowledge of structural requirements of all lift surfaces, fuselage, landing gear and control surfaces of an aircraft. This will help students to correlate and understand the aerodynamics loads and their affects on the structures, better. This also helps students to acquire good skills in servicing and maintenance of these structures.

Students should be physically shown at least lifting and control surfaces structures along with landing gear systems sufficient practice should be given to gent students familiarized with these structures

Course Objectives:

The objective of this course is to enable the student to To Study the basic knowledge of Introduction to Aircraft Structures, Airframe Structures – Aeroplane, Stabilizers, Flight Control Surfaces, Nacelles/Pylons.

Course Outcomes:

On successful completion of this course, the student will be able to

C01: Understand the angle of attack for lift and stall.

C02: Understand the different angles of attack and its effects.

C03: Exposure of airflow effect on the lifting surfaces.

C04: Exposure to the Calibration of a Pitot Static System.

C05: Understand the fluid flow effect on the aerofoil surface.

Pre-requisites:

NIL

CO/PO Mapping

1091233620	FLIGHT MECHANICS PRACTICAL	L	T	P	C
PRACTICAL		0	0	6	3

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	1	3	-	-	2
CO2	2	2	1	3	-	-	2
CO3	2	2	2	3	-	-	3
CO4	2	2	2	3	-	-	2
CO5	2	2	-	3	1	-	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

- It is advised that teachers make the learning experience more engaging by introducing innovative and interesting ways of teaching.
- The teachers need to expose the student to material in multiple modes help them learn it faster and retain it longer.
- Incorporate technology tools and resources, such as online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional practice opportunities.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability based.
- Seminars: Host seminars where students present their findings from Swinburne's test and performance curve analyses.
- Group Discussions: Facilitate discussions on the results and implications of these tests for real-world applications.
- Simulation Software: Utilize simulation software to model and analyze the operation
- Guest Lectures: Invite industry experts to talk about the latest technologies and

1091233620	FLIGHT MECHANICS PRACTICAL	L	T	P	C
PRACTICAL		0	0	6	3

trends in motor drives and their applications in robotics and automation.

- This strategy aims to blend theoretical knowledge with practical skills, preparing students for real-world engineering challenges. It encourages active learning, critical thinking, and collaboration among students, essential skills for future engineers.
- Preparation: Before each class, ensure all equipment is functional and safety protocols are in place.
- Assessment: Evaluate students through quizzes, lab reports, and presentations on their understanding and analysis of the experiments.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Practical Document	Practical Test	Practical Examination
Portion	First Cycle	Second Cycle	All Exercises	All Exercises	All Exercises
Duration	2 Periods	2 Periods	Regularly	3 Hours	3 Hours
Exam Marks	50	50	100	100	100
Converted to	10	10	10	20	60
Marks	10		10	20	60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

1091233620	FLIGHT MECHANICS PRACTICAL	L	T	P	C
PRACTICAL		0	0	6	3

- **CA1 and CA2:** All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

  Cycle I: 1, 2, 3, 4, 5 and 6.

  Cycle II: 7, 8, 9, 10, 11 and 12.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Procedure	15
B	Execution	35
TOTAL		50

- **CA 3:** Practical document should be maintained for every exercise immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical document should be submitted for the Practical Test and End Semester Examination with a bonafide certificate

  The details of the documents to be prepared as per the instruction below.

  Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise.

  This documentation can be carried out in a separate notebook or printed manual or in a file with the documents. The procedure and sketch should be written by the student manually.

1091233620	FLIGHT MECHANICS PRACTICAL	L	T	P	C
PRACTICAL		0	0	6	3

The detailed date of the practices and its evaluations should be maintained in the course logbook. The logbook and the practical documents should be submitted for the verification by the Flying Squad and DOTE Official.

- **CA 4:** All the exercises should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test (CA4) should be conducted as per the scheme of evaluation as below. The marks awarded should be converted to 20 Marks for the internal assessment.

SCHEME OF EVALUATION

Part	Description	Marks
A	Procedure	15
B	Connection	25
C	Execution	35
D	Result	15
E	Viva Voice	10
	TOTAL MARKS	**100**

1091233620	**FLIGHT MECHANICS PRACTICAL**	L	T	P	C
PRACTICAL		0	0	6	3

Syllabus Contents

Exercise No.	**Description**	**Period**
1	Fabricate Aerofoil Model - Understanding associated terms	**10**
2	Effect of angle of attack and airflow velocity on lift and Stalling	10
3	Servicing of flow over streamlined bodies with different angle of attack by flow visualization technique	15
4	Identifying High lift devices and practical understanding of their effect on lift with respect to aircraft speed (Air flow)	15
5	Removal / installation of Pitot Static Instruments	10
6	Calibration of a Pitot Static System using a Pitot Static Leak tester	10
7	Practical study of various factors affecting lift and drag on an aerofoil.	10
8	Factors affecting flow of fluid over an aerofoil surface and demonstrate the entire effect	10
Practice + Test + Revision		10
Total		90

Suggested List of Students Activity:

- Engaging in group discussions to delve into the theoretical dimensions .
- Presenting lab and project findings to foster knowledge reinforcement and polish communication skills.
- Analyzing industrial case studies to connect theoretical learning with practical applications in real-world scenarios.

1091233620	FLIGHT MECHANICS PRACTICAL	L	T	P	C
PRACTICAL		0	0	6	3

- Participating in guest lectures and workshops to gain insights from industry experts and learn about critical diagnostic tests for equipment maintenance.

END SEMESTER EXAMINATION – PRACTICAL EXAM.

BOARD EXAMINATIONS

Note:

- All the exercises have to be completed, any one exercise will be given for examination.
- All the exercises should be given in the question paper. The student is allowed to select by lot or question papers issued by the DOTE Exam section shall be used.
- Practical documents along with the activity report should be submitted for the End Semester Examinations.

DETAILED ALLOCATION OF MARKS.

Part	Description	Marks
A	Procedure	10
B	Tabulation	20
C	Calculation	20
D	Execution	20
E	Result	20
F	Viva Voice	10
	TOTAL MARKS	**100**

1091233620	**FLIGHT MECHANICS PRACTICAL**	L	T	P	C
PRACTICAL		0	0	6	3

Equipment / Facilities required conducting the Practical Course.

S.No	Name of the Equipment's	Quantity Required
1.	Subsonic Wind tunnel	1
2.	Water tunnel	1
3.	Models(aerofoil, rough and smooth cylinder , flat plate)	5
4.	Flow measurement device	1

1091234110	**Aircraft Systems**	L	T	P	C
THEORY		3	0	0	3

Introduction

Diploma holders in Aeronautical Engineering and Aircraft Maintenance must have a sound knowledge of various mechanical and electrical systems which go in the airframe. This subject is designed to give them an insight into typical systems so that they understand their principles of working. This would also help them in acquiring skills in maintenance of these systems.

The course will provide basic knowledge of how the systems operate, what are the services operated in these systems, their salient features etc. Further specialization will be necessary if they have to work on any one of these systems when students are inducted in service. The students should be physically shown typical systems on the aircraft and be asked to trace various components so that they get familiarized with these systems as they are installed in the aircraft.

Course Objectives

The objective of this course is to enable the student to

To Study the basic knowledge of Fuselage, Wings, Stabilizing Surfaces, Landing Gear, Flight Controls, Air-conditioning Systems, Anti-ice Systems, Fuel System.

Course Outcomes

On successful completion of this course, the student will be able to

CO 1: Understand the significance of the Aircraft System.

CO 2: Understand the significance and Operation of the System.

CO 3: Describe Principles of Structure Assembly system.

CO 4: Describe Principles of Air Frame Assembly- aero plane.

CO 5: Understand the significance and Operation of the System.

Pre-requisites

Nil

1091234110	**Aircraft Systems**	L	T	P	C
THEORY		3	0	0	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	-	1	-	-	2
CO2	3	2	1	1	-	-	2
CO3	3	2	1	1	-	-	2
CO4	3	2	-	1	-	-	2
CO5	2	2	-	2	2	-	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

1091234110	**Aircraft Systems**	L	T	P	C
THEORY		3	0	0	3

- Regularly revise the core concepts of structure as they are fundamental to understanding aircraft.
- Focus on understanding the practical applications and operational principles rather than memorizing equations.
- Engage with practical lab sessions or virtual lab simulations to gain hands-on experience with this structure.

Assessment Methodology

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.

1091234110	**Aircraft Systems**	L	T	P	C
THEORY		3	0	0	3

CA1and CA2, Assessment test should be conducted for two units as below.

Answer five questions (5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should write Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The answer scripts of every student (online / offline) for this assessment should be kept for records and future verification. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should write any two questions. The question may have two subdivisions only.

Syllabus Contents

Unit I	**Fuselage**	**7**
Types of construction – stress- Wings - Types of construction - structural components – stress- Stabilizing surfaces - vertical,horizontal and V-tail surfaces- 'flutter- compensation system - mach trim - Landing Gear- types - locking devices and emergency extension systems - accidental retraction prevention devices - position, movement lights and indicators- nose wheel steering - wheels and tyres (limitations) - braking systems.		
Unit II	**Flight Controls**	**7**
Primary controls: elevator, aileron and rudder - trim - mode of actuation (mechanical, hydraulic, electrical, fly-by-wire)- operation, indicators, warning devices and controls) - efforts		

to transmit - Secondary controls: - leading and trailing edge lift augmentation devices - lift dumping and speed brakes - variable elevator - mode of actuation (mechanical, hydraulic, electrical, fly-by-wire) - operation, indicators, warning devices and controls).		
Unit III	**Hydraulics**	**7**
Basic principles of hydromechanics - hydraulic fluids - schematic construction and functioning of hydraulic systems - Hydraulic system - main, standby and emergency system - operation, indicators, warning system - ancillary system - Pneumatic system - power sources- schematic construction - potential failures, warning devices - operation, indicators, warning systems - pneumatic operated systems.		
Unit IV	**Air-conditioning systems**	**7**
Construction, functioning, operation, indicators and warning devices - heating and cooling - temperature regulation - automatic and manual - ram air nitration - schematic construction- Anti-ice systems - operating limitations and initiation, timing of de-icing system usage - ice warning system - Pressurization - cabin altitude, maximum cabin altitude, differential pressure		
UNIT V	**Fuel system**	**7**
Fuel tanks :Structural components and types - location of tanks on single-and-multi-engine aircraft - sequence and types of re-fuelling- unusable fuel Fuel feed : gravity and pressure feed - cross feed- Fuel system monitoring - erating, indicators, warning systems - fuel management (sequencing of fuel tank switching) - dipstick		
Test + Revision		10
TOTAL HOURS		45

1091234110	**Aircraft Systems**	L	T	P	C
THEORY		3	0	0	3

Suggested list of Students Activity,

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class quizzes conducted on a weekly / fortnightly based on the course.
- Mini project that shall be an extension of any practical lab exercise to real-world application.

Text Book for Reference:

1. J V Casamassa and RD Bent, Jet Aircraft Power Systems, McGraw Hill.
2. E H J Pallet, Automatic Flight Control, BSP Profession Books.1993.
3. Civil Aircraft Inspection Procedures (CAP 459), Himalayan Books 25.
4. W Thomson, Thrust for Flight, Sir Issac Pitman.1992
5. Michacl J. Kroes, William A Watkins and Frank Delp, Aircraft Maintenance and Repair, McGraw Hill 1993
6. Airframe and Power Plant, Mechanics General Hand Book (EA-AC 65-9A), Himalayan
7. Airframe and Powerplant Mechanics (AC 65-15A) -Airframe Hand Book FAA.
8. Civil Aircraft Inspection Procedure (CAP 459) Part II Aircraft.
9. Aviation Maintenance Technician Hand book by FAA.
10. Hydraulic Servo Systems by M. GUILLON.

END SEMESTER QUESTION PATTERN - Theory Exam

Duration: 3 Hrs. **Max. Marks: 100**

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Instruction to the Question Setters

Four questions will be asked from every unit, students should write any two questions for 10 marks. The question may have two subdivisions only.

1091234210	**Avionics Systems - II**	L	T	P	C
THEORY		3	0	0	3

Introduction

Diploma holders in Aircraft Maintenance must have a sound knowledge of various avionics Digital systems which go in the cockpit. This subject is designed to give them an insight into typical systems so that they understand their principles of working. This would also help them in acquiring skills in maintenance of these systems.

Course Objectives

The objective of this course is to enable the student

To Study the basic knowledge of Avionics Systems, Avionics System Essentials, Packaging, System Assessment, Validation and Certification.

To learn about AVIONICS SYSTEM DATA BUSES, MIL-STD-1553B, ARINC-429, ARINC-629.

Military aircraft cockpits, MFDs, MFK, HUD, HDD, HMD, DVI, HOTAS

Course Outcomes

On successful completion of this course, the student will be able to

CO1: Understand the Role of Avionics in Civil and Military Aircraft systems & sub-systems.

CO2: Understand the significance of Avionics system architectures and standards.

CO3: Describe Principles of Civil and Military aircraft cockpits & Display Technologies.

CO4: Describe Principles of system cooling - EMI/EMC requirements & standards.

CO5: Understand the system assessment, validation, and certification.

Pre-requisites

Nil

1091234210	**Avionics Systems - II**	L	T	P	C
THEORY		3	0	0	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	-	1	-	-	2
CO2	3	2	1	1	-	-	2
CO3	3	2	1	1	-	-	2
CO4	3	2	-	1	-	-	2
CO5	2	2	-	2	2	-	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

1091234210	**Avionics Systems - II**	L	T	P	C
THEORY		3	0	0	3

- Regularly revise the core concepts of structure as they are fundamental to understanding aircraft.
- Focus on understanding the practical applications and operational principles rather than memorizing equations.
- Engage with practical lab sessions or virtual lab simulations to gain hands-on experience with this structure.

Assessment Methodology

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.

1091234210	**Avionics Systems - II**	L	T	P	C
THEORY		3	0	0	3

CA1and CA2, Assessment test should be conducted for two units as below.

Answer five questions (5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should write Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The answer scripts of every student (online / offline) for this assessment should be kept for records and future verification. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should write any two questions. The question may have two subdivisions only.

Syllabus Contents

Unit I	**INTRODUCTION TO AVIONICS**	**7**
Role for Avionics in Civil and Military Aircraft systems, Avionics sub-systems, defining avionics System/subsystem requirements-importance of 'ilities', Avionics system architectures.		
Unit II	Role for Avionics	**7**
Role for Avionics in Civil and Military Aircraft systems, Avionics sub-systems, defining avionics System/subsystem requirements-importance of 'ilities', Avionics system architectures. MIL-STD-1553B, ARINC-429, ARINC-629.		

1091234210	**Avionics Systems - II**	L	T	P	C
THEORY		3	0	0	3

Unit III	**AVIONICS SYSTEM ESSENTIALS: DISPLAYS, I/O DEVICES AND POWER**	**7**
Trends in display technology, Alphanumeric displays, character displays etc., Civil and Military aircraft cockpits, MFDs, MFK, HUD, HDD, HMD, DVI, HOTAS.		
Unit IV	**PACKAGING**	**7**
Modular Avionics Packaging - Trade-off studies - ARINC and DOD types - system cooling - EMI/EMC requirements & standards		
UNIT V	**SYSTEM ASSESSMENT, VALIDATION AND CERTIFICATION**	**7**
Fault tolerant systems - Hardware and Software - Fault Tree analysis – Failure mode and effects analysis – Criticality, damaging modes and effects analysis - Software development process models - Software Assessment and Validation -Civil and Military standards		
Test + Revision		10
TOTAL HOURS		45

Suggested list of Students Activity,

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class quizzes conducted on a weekly / fortnightly based on the course.
- Mini project that shall be an extension of any practical lab exercise to real-world application.

Text Book for Reference:

1. The Aircraft Act, 1934
2. The Aircraft Rules, 1937 VOL 1
3. The Aircraft Rules, 1937 VOL 3
4. AIRCRAFT MAINTENANCE Information Circular

1091234210	**Avionics Systems - II**	L	T	P	C
THEORY		3	0	0	3

5. CAR - Section - 1, 2, & 8 SMS
6. CAR - 21, M, 145, 66 & 147
7. Special Federal Aviation Regulations (SFARs) - 14 CFR, SFAR 88 & JAA TGL 47
8. Airworthiness Procedure Manual

END SEMESTER QUESTION PATTERN - Theory Exam

Duration: 3 Hrs. **Max. Marks: 100**

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Instruction to the Question Setters

Four questions will be asked from every unit, students should write any two questions for 10 marks. The question may have two subdivisions only.

1091234320	**Aircraft System Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Introduction:

Students should have knowledge of aircraft structures, as it is the structure of the aircraft that carries and takes on the weight as well as all aerodynamic loads under different engine as well as operating conditions. This gives students a board understanding and appreciation of one of the important parts of mechanics of flight.

This course gives exposure and basic knowledge of structural requirements of all lift surfaces, fuselage, landing gear and control surfaces of an aircraft. This will help students to correlate and understand the aerodynamics loads and their affects on the structures, better. This also helps students to acquire good skills in servicing and maintenance of these structures.

Students should be physically shown at least lifting and control surfaces structures along with landing gear systems sufficient practice should be given to gent students familiarized with these structures

Course Objectives:

The objective of this course is to enable the student to To Study the basic knowledge of Introduction to Aircraft Structures, Airframe Structures – Aeroplane, Stabilizers, Flight Control Surfaces, Nacelles/Pylons .

Course Outcomes:

On successful completion of this course, the student will be able to

CO 1: Understand the levelling of the aircraft.

CO 2: Inspection of the air conditioning system of an aircraft.

CO 3: Describe the Principles of Rigging and operational check flight control systems

CO 4: Inspect and service the landing gear systems

CO 5: Understand the various system like pressure, vacuum, and temperature indicator on the display panel

Pre-requisites:

NIL

1091234320	**Aircraft System Practical**	L	T	P	C
PRACTICAL		0	0	6	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	1	3	-	-	2
CO2	2	2	1	3	-	-	2
CO3	2	2	2	3	-	-	3
CO4	2	2	2	3	-	-	2
CO5	2	2	-	3	1	-	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

- It is advised that teachers make the learning experience more engaging by introducing innovative and interesting ways of teaching.
- The teachers need to expose the students to material in multiple modes to help them learn it faster and retain it longer.
- Incorporate technology tools and resources, such as online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional practice opportunities.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability-based.
- Seminars: Host seminars where students present their findings from Swinburne's test and performance curve analyses.
- Group Discussions: Facilitate discussions on the results and implications of these tests for real-world applications.
- Simulation Software: Utilize simulation software to model and analyze the operation.

1091234320	**Aircraft System Practical**	L	T	P	C
PRACTICAL		0	0	6	3

- Guest Lectures: Invite industry experts to talk about the latest technologies and trends in motor drives and their applications in robotics and automation.
- This strategy aims to blend theoretical knowledge with practical skills, preparing students for real-world engineering challenges. It encourages active learning, critical thinking, and collaboration among students, essential skills for future engineers.
- Preparation: Before each class, ensure all equipment is functional and safety protocols are in place.
- Assessment: Evaluate students through quizzes, lab reports, and presentations on their understanding and analysis of the experiments.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Practical Document	Practical Test	Practical Examination
Portion	First Cycle	Second Cycle	All Exercises	All Exercises	All Exercises
Duration	2 Periods	2 Periods	Regularly	3 Hours	3 Hours
Exam Marks	50	50	100	100	100
Converted to	10	10	10	20	60
Marks	10		10	20	60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

1091234320	**Aircraft System Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Note:

- **CA1 and CA2:** All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

  Cycle I: 1, 2, 3, 4, 5 and 6.

  Cycle II: 7, 8, 9, 10, 11 and 12.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Dismantling	15
B	Servicing	20
C	Assembling	15
TOTAL		50

- **CA 3:** Practical document should be maintained for every exercise immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical document should be submitted for the Practical Test and End Semester Examination with a bonafide certificate

  The details of the documents to be prepared as per the instruction below.

  Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise.

1091234320	**Aircraft System Practical**	L	T	P	C
PRACTICAL		0	0	6	3

This documentation can be carried out in a separate notebook or printed manual or in a file with the documents. The procedure and sketch should be written by the student manually.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The logbook and the practical documents should be submitted for the verification by the Flying Squad and DOTE Official.

- **CA 4:** All the exercises should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test (CA4) should be conducted as per the scheme of evaluation as below. The marks awarded should be converted to 20 Marks for the internal assessment.

SCHEME OF EVALUATION

Part	Description	Marks
A	Procedure	15
B	Dismantling	15
C	Servicing	20
D	Assembling	15
E	Report / Result	25
F	Viva Voce	10
	TOTAL MARKS	**100**

1091234320	**Aircraft System Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Syllabus Contents

Exercise No.	**Description**	**Period**
1	Dismantling, servicing and reassembling of Jacking and levelling of an aircraft. Record caution, warnings and procedure	**10**
2	Dismantling, servicing and reassembling of Locate and inspect components of air-conditioning system	10
3	Dismantling, servicing and reassembling of Replace passenger seats and Check seat belts for serviceability.	10
4	Dismantling, servicing and reassembling of Rigging and operational check flight control systems	10
5	Dismantling, servicing and reassembling of landing gear systems.	10
6	Dismantling, servicing and reassembling of Wheel and Brake removal /installation and checking of tyre air pressure.	10
7	Dismantling, servicing and reassembling of various fire exchangers.	10
8	Checking various systems like pressure, vacuum and temperature indicator on the display panel.	10
Practice + Test + Revision		10
Total		90

1091234320	**Aircraft System Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Suggested List of Students Activity:

Engaging in group discussions to delve into the theoretical dimensions .

Presenting lab and project findings to foster knowledge reinforcement and polish communication skills.

Analyzing industrial case studies to connect theoretical learning with practical applications in real-world scenarios.

Participating in guest lectures and workshops to gain insights from industry experts and learn about critical diagnostic tests for equipment maintenance

END SEMESTER EXAMINATION – PRACTICAL EXAM.

BOARD EXAMINATIONS

Note:

- All the exercises have to be completed, any one exercise will be given for examination.
- All the exercises should be given in the question paper. The student is allowed to select by lot or question papers issued by the DOTE Exam section shall be used.
- Practical documents along with the activity report should be submitted for the End Semester Examinations.

DETAILED ALLOCATION OF MARKS.

Part	Description	Marks
A	Procedure	15
B	Dismantling	25
C	Servicing	25
D	Assembling	25
E	Viva Voce	10
	TOTAL MARKS	**100**

1091234320	**Aircraft System Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Equipment / Facilities required conducting the Practical Course.

S.No	Name of the Equipment's	Quantity Required
1.	Serviceable aircraft with all systems	1
2.	Assembling and disassembling tools	1 set

1091234420	**Avionics Systems – II Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Introduction:

Diploma holders in Aircraft Maintenance must have a sound knowledge of various avionics Digital systems which go in the cockpit. This subject is designed to give them an insight into typical systems so that they understand their principles of working. This would also help them in acquiring skills in maintenance of these systems.

Course Objectives:

To Study the basic knowledge of Avionics Systems, Avionics System Essentials, Packaging, System Assessment, Validation and Certification.

To learn about AVIONICS SYSTEM DATA BUSES, MIL-STD-1553B, ARINC-429, ARINC-629.

Military aircraft cockpits, MFDs, MFK, HUD, HDD, HMD, DVI, HOTAS.

Course Outcomes:

On successful completion of this course, the student will be able to

CO1: Understand the Configuration of 1553B card BC to RT.

CO2: Understand the Configuration of 1553B card RT to BC

CO3: Understand the Configuration of 1553B card RT to RT

CO4: Understand the Configuration of AFDX

CO5: Understand the Configuration of ARINAC 429 & 629

Pre-requisites:

NIL

1091234420	**Avionics Systems – II Practical**	L	T	P	C
PRACTICAL		0	0	6	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	1	3	-	-	2
CO2	2	2	1	3	-	-	2
CO3	2	2	2	3	-	-	3
CO4	2	2	2	3	-	-	2
CO5	2	2	-	3	1	-	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

- It is advised that teachers make the learning experience more engaging by introducing innovative and interesting ways of teaching.
- The teachers need to expose the students to material in multiple modes to help them learn it faster and retain it longer.
- Incorporate technology tools and resources, such as online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional practice opportunities.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability-based.
- Seminars: Host seminars where students present their findings from Swinburne's test and performance curve analyses.
- Group Discussions: Facilitate discussions on the results and implications of these tests for real-world applications.
- Simulation Software: Utilize simulation software to model and analyze the operation

1091234420	**Avionics Systems – II Practical**	L	T	P	C
PRACTICAL		0	0	6	3

- Guest Lectures: Invite industry experts to talk about the latest technologies and trends in motor drives and their applications in robotics and automation.
- This strategy aims to blend theoretical knowledge with practical skills, preparing students for real-world engineering challenges. It encourages active learning, critical thinking, and collaboration among students, essential skills for future engineers.
- Preparation: Before each class, ensure all equipment is functional and safety protocols are in place.
- Assessment: Evaluate students through quizzes, lab reports, and presentations on their understanding and analysis of the experiments.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Practical Document	Practical Test	Practical Examination
Portion	First Cycle	Second Cycle	All Exercises	All Exercises	All Exercises
Duration	2 Periods	2 Periods	Regularly	3 Hours	3 Hours
Exam Marks	50	50	100	100	100
Converted to	10	10	10	20	60
Marks	10		10	20	60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

1091234420	**Avionics Systems – II Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Note:

- **CA1 and CA2:** All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

  Cycle I: 1, 2, 3, 4, 5 and 6.

  Cycle II: 7, 8, 9, 10, 11 and 12.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Procedure	10
B	Connection	20
C	Execution	20
TOTAL		50

- **CA 3:** Practical document should be maintained for every exercise immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical document should be submitted for the Practical Test and End Semester Examination with a bonafide certificate

  The details of the documents to be prepared as per the instruction below.

  Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise.

1091234420	**Avionics Systems – II Practical**	L	T	P	C
PRACTICAL		0	0	6	3

This documentation can be carried out in a separate notebook or printed manual or in a file with the documents. The procedure and sketch should be written by the student manually.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The logbook and the practical documents should be submitted for the verification by the Flying Squad and DOTE Official.

- **CA 4:** All the exercises should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test (CA4) should be conducted as per the scheme of evaluation as below. The marks awarded should be converted to 20 Marks for the internal assessment.

SCHEME OF EVALUATION

Part	Description	Marks
A	Procedure	15
B	Connection	25
C	Execution	25
D	Result	15
E	Report / Result	10
F	Viva Voice	10
	TOTAL MARKS	**100**

1091234420	**Avionics Systems – II Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Syllabus Contents

Exercise No.	**Description**	**Period**
1	Configuring 1553B card BC to RT	13
2	Configuring 1553B card RT to BC	13
3	Configuring 1553B card RT to RT.	13
4	Configuring AFDX	13
5	Configuring ARINAC 429	13
6	Configuring ARINAC 629	13
Practice + Test + Revision		12
Total		90

Suggested List of Students Activity:

Engaging in group discussions to delve into the theoretical dimensions .

Presenting lab and project findings to foster knowledge reinforcement and polish communication skills.

Analyzing industrial case studies to connect theoretical learning with practical applications in real-world scenarios.

Participating in guest lectures and workshops to gain insights from industry experts and learn about critical diagnostic tests for equipment maintenance

1091234420	**Avionics Systems – II Practical**	L	T	P	C
PRACTICAL		0	0	6	3

END SEMESTER EXAMINATION – PRACTICAL EXAM.

BOARD EXAMINATIONS

Note:

- All the exercises have to be completed, any one exercise will be given for examination.
- All the exercises should be given in the question paper. The student is allowed to select by lot or question papers issued by the DOTE Exam section shall be used.
- Practical documents along with the activity report should be submitted for the End Semester Examinations.

DETAILED ALLOCATION OF MARKS.

Part	Description	Marks
A	Procedure	15
B	Connection	25
C	Execution	25
D	Result	15
E	Report / Result	10
F	Viva Voice	10
	TOTAL MARKS	**100**

1091234420	**Avionics Systems – II Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Equipment / Facilities required conducting the Practical Course.

S.No	Name of the Equipment's	Quantity Required
1.	MIL-STD-1553 with adapter for USB or Ethernet equipped computers	1

1091234520	**Aero Modeling Practical Using CAD**	L	T	P	C
PRACTICAL		0	0	4	2

Introduction:

Students should have knowledge of aircraft structures, as it is the structure of the aircraft that carries and takes on the weight as well as all aerodynamic loads under different engines as well as operating conditions. This gives students a broad understanding and appreciation of one of the important parts of mechanics of flight.

This course gives exposure and basic knowledge of structural requirements of all lift surfaces, fuselage, landing gear and control surfaces of an aircraft. This will help students to correlate and understand the aerodynamics loads and their affects on the structures better. This also helps students to acquire good skills in servicing and maintenance of these structures.

Students should be physically shown at least lifting and control surfaces structures along with landing gear systems sufficient practice should be given to gent students familiarized with these structures

Course Objectives:

The objective of this course is to enable the student to To Study the basic knowledge of Introduction to Aircraft Structures, Airframe Structures – Aeroplane, Stabilizers, Flight Control Surfaces, Nacelles/Pylons .

Course Outcomes:

On successful completion of this course, the student will be able to

CO 1: Understand how to draw 2D and 3D aircraft parts in ACAD software.

CO 2: Understand how to draw the assembly drawing in ACAD software

CO 3: Design the 3D Elements like Hex Bolt, Nut, split pin, Dome Nut etc., Using CATIA software

CO 4: Understand the surface modelling and Design of a typical Aircraft wing Spar

CO 5: Design the Leading edge & Leading-edge Rib of an aircraft using CATIA Software.

Pre-requisites:

NIL

1091234520	**Aero Modeling Practical Using CAD**	L	T	P	C
PRACTICAL		0	0	4	2

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	1	3	-	-	2
CO2	2	2	1	3	-	-	2
CO3	2	2	2	3	-	-	3
CO4	2	2	2	3	-	-	2
CO5	2	2	-	3	1	-	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

- It is advised that teachers make the learning experience more engaging by introducing innovative and interesting ways of teaching.
- The teachers need to expose the students to material in multiple modes to help them learn it faster and retain it longer.
- Incorporate technology tools and resources, such as online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional practice opportunities.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability-based.
- Seminars: Host seminars where students present their findings from Swinburne's test and performance curve analyses.
- Group Discussions: Facilitate discussions on the results and implications of these tests for real-world applications.
- Simulation Software: Utilize simulation software to model and analyze the operation

1091234520	**Aero Modeling Practical Using CAD**	L	T	P	C
PRACTICAL		0	0	4	2

- Guest Lectures: Invite industry experts to talk about the latest technologies and trends in motor drives and their applications in robotics and automation.
- This strategy aims to blend theoretical knowledge with practical skills, preparing students for real-world engineering challenges. It encourages active learning, critical thinking, and collaboration among students, essential skills for future engineers.
- Preparation: Before each class, ensure all equipment is functional and safety protocols are in place.
- Assessment: Evaluate students through quizzes, lab reports, and presentations on their understanding and analysis of the experiments.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Practical Document	Practical Test	Practical Examination
Portion	First Cycle	Second Cycle	All Exercises	All Exercises	All Exercises
Duration	2 Periods	2 Periods	Regularly	3 Hours	3 Hours
Exam Marks	50	50	100	100	100
Converted to	10	10	10	20	60
Marks	10		10	20	60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

1091234520	**Aero Modeling Practical Using CAD**	L	T	P	C
PRACTICAL		0	0	4	2

Note:

- **CA1 and CA2:** All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

  Cycle I: 1, 2, 3, 4 and 5.

  Cycle II: 6, 7, 8, 9 and 10.

SCHEME OF EVALUATION

Part	Description	Marks
A	Editing /Creation	10
B	Formatting	10
C	Assembly	10
D	Dimensioning	10
E	Printout	5
F	Viva Voice	5
	TOTAL MARKS	**50**

- **CA 3:** Practical document should be maintained for every exercise immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical

document should be submitted for the Practical Test and End Semester Examination with a bonafide certificate

The details of the documents to be prepared as per the instruction below.

Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise.

This documentation can be carried out in a separate notebook or printed manual or in a file with the documents. The procedure and sketch should be written by the student manually.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The logbook and the practical documents should be submitted for the verification by the Flying Squad and DOTE Official.

- **CA 4:** All the exercises should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test (CA4) should be conducted as per the scheme of evaluation as below. The marks awarded should be converted to 20 Marks for the internal assessment.

SCHEME OF EVALUATION

Part	Description	PART A	PART B
A	Editing /Creation	10	10
B	Formatting	10	10
C	Assembly	10	10
D	Dimensioning	10	10
E	Printout	5	5
F	Viva Voice	5	5
	TOTAL MARKS	**50**	**50**

1091234520	**Aero Modeling Practical Using CAD**	L	T	P	C
PRACTICAL		0	0	4	2

Syllabus Contents

Exercise No.	Description	Period
	AutoCAD Lab	
1	Design of basic mechanical 2D diagrams using ACAD software with dimensions.	8
2	Draw an isometric view of typical aircraft using ACAD software showing all major aircraft structures.	8
3	Draw an assembly view of typical torsional box an aircraft structure using ACAD software (Using two skins, one spar and 3 ribs and assemble using aerospace fasteners)	8
4	Design of 3D drawings of basic mechanical parts in ACAD software.	8
5	Draw a typical aircraft control surface in 2D drawing using ACAD software	8
	CATIA Lab	
6	Design of Basic Mechanical 3D Elements (like Hex Bolt, Nut, split pin, Dome Nut Tap washer etc. using CATIA software.	8
7	Understanding of surface modeling and Design a typical Aircraft wing Spar in 3d model using CATIA software and estimate its weight for Aluminum and Carbon-Epoxy material.	8
8	Design a wing outer structure with winglet using CATIA software.	8
9	Design a Leading edge & Leading-edge Rib of an aircraft using CATIA Software	8

1091234520	**Aero Modeling Practical Using CAD**	L	T	P	C
PRACTICAL		0	0	4	2

10	Design a torsional box using two skins, one spar and 3 ribs and assemble using aerospace fasteners using CATIA software	8
Practice + Test + Revision		10
Total		90

Suggested List of Students Activity:

Engaging in group discussions to delve into the theoretical dimensions .

Presenting lab and project findings to foster knowledge reinforcement and polish communication skills.

Analyzing industrial case studies to connect theoretical learning with practical applications in real-world scenarios.

Participating in guest lectures and workshops to gain insights from industry experts and learn about critical diagnostic tests for equipment maintenance

END SEMESTER EXAMINATION – PRACTICAL EXAM.

BOARD EXAMINATIONS

Note:

- All the exercises have to be completed, any one exercise will be given for examination.
- All the exercises should be given in the question paper. The student is allowed to select by lot or question papers issued by the DOTE Exam section shall be used.
- Practical documents along with the activity report should be submitted for the End Semester Examinations.

1091234520	**Aero Modeling Practical Using CAD**	L	T	P	C
PRACTICAL		0	0	4	2

DETAILED ALLOCATION OF MARKS.

Part	Description	PART A	PART B
A	Editing /Creation	10	10
B	Formatting	10	10
C	Assembly	10	10
D	Dimensioning	10	10
E	Printout	5	5
F	Viva Voice	5	5
	TOTAL MARKS	**50**	**50**

Equipment / Facilities required conducting the Practical Course.

S.No	Name of the Equipment's	Quantity Required
1.	Personal computer	30
2	Printer	1
3	Required Software's CAD and Catia Package	Sufficient to the strength

1091234640	**Fundamentals of Control Systems**	L	T	P	C
PRACTICUM		1	0	4	3

Introduction:

The diploma holder in aircraft maintenance must have required knowledge and skills about the construction and maintenance of Gas Turbine Engine. Hence this subject has been divided into two sections.

Course Objectives:

The objective of this course is to enable the student to

- To understand the use of transfer function models for analysis of physical systems and introduce the control system components.
- To provide adequate knowledge in the time response of systems and steady state error analysis.
- To accord basic knowledge in obtaining the open loop and closed–loop frequency responses of systems.
- To introduce stability analysis and design of compensators
- To introduce state variable representation of physical systems
- To Study the basic knowledge of Fundamentals, Engine Performance, Inlet, Compressors, Combustion Section, Turbine Section and Exhaust.

Course Outcomes:

On successful completion of this course, the student will be able to

CO1: Describe the systems and representation.

CO2: Understand the frequency response.

CO3: Learn the time response.

CO4: Describe the stability and compensator design.

CO5: Demonstrate the state variable analysis.

1091234640	**Fundamentals of Control Systems**	L	T	P	C
PRACTICUM		1	0	4	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	2	3	2	3
CO2	3	2	3	2	3	3	3
CO3	3	-	3	3	3	3	3
CO4	3	3	3	3	3	3	3
CO5	3	2	3	2	3	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

Engage and Motivate: Instructors should actively engage students to boost their learning confidence.

Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.

Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.

Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.

Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.

Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

1091234640	**Fundamentals of Control Systems**	L	T	P	C
PRACTICUM		1	0	4	3

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	Cycle I Experiments	Cycle II Experiments	All Units	All Experiments	All Experiments
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

  Practical documents should be maintained for every experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total

marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

The details of the documents to be prepared as per the instruction below.

Each experiment should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next experiment.

This documentation can be carried out in a separate notebook or a printed manual or a file with documents. The student should draw the Circuit Diagram and take readings, do calculations and prepare the Graph/Result manually in the documents.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad and DOTE Official.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Procedure	10
B	Coding	20
C	Execution	20
TOTAL		50
D	Practical Documents (As per the portions)	10
Total Marks		60

Cycle I: 1, 2 and 3.

Cycle II: 4, 5, 6 and 7.

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

1091234640	**Fundamentals of Control Systems**	L	T	P	C
PRACTICUM		1	0	4	3

Question pattern – Written Test Theory

Description		**Marks**	
Part – A	30 MCQ Questions.	30 X 1 Mark	30 Marks
Part – B	7 Questions to be answered out of 10 Questions.	7 X 10 Marks	70 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	**DESCRIPTION**	**MARKS**
A	Procedure	10
B	Coding	20
C	Execution	20
D	Result	10
E	Written Test	30
F	Viva Voce	10
	TOTAL	100

Note: For the written test 30 MCQ shall be asked from the theory portions.

1091234640	**Fundamentals of Control Systems**	L	T	P	C
PRACTICUM		1	0	4	3

Syllabus Contents

Theory Portion		
UNIT - I : **SYSTEMS AND REPRESENTATION**		3
Basic elements in control systems: – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – AC and DC servomotors – Block diagram-reduction techniques – Signal flow graphs.		
UNIT - II : **FREQUENCY RESPONSE**		3
Frequency response: – Bode plot – Polar plot – Determination of closed loop response from open loop response – Correlation between frequency domain and time domain specifications		
Practical Exercises:		
Ex.No	**Name of the Experiment**	**Period**
1	Simulation of open and closed loop systems	7
2	Simulation of Electrical and Mechanical Systems	7
UNIT – III : **TIME RESPONSE**		7
Time response: – Time domain specifications – Types of test input – I and I order system response – Error coefficients – Generalized error series – Steady state error – Rot locus construction- Effects of P, PI, PID modes of feedback control –Time response analysis		
UNIT - IV : **STABILITY AND COMPENSATOR DESIGN**		3
Characteristics equation – Rout Hurwitz criterion – SyQuest stability criterion- Performance criteria – Effect of Lag, lead and lag-lead compensation on frequency response-Design of Lag, lead and lag lead compensator using bode plots		
Practical Exercises:		
Ex.No	**Name of the Experiment**	**Period**
3	Simulation of plotk diagram reduction technique	7
4	Computing transfer function using signal flow graph technique	7

1091234640	**Fundamentals of Control Systems**	L	T	P	C
PRACTICUM		1	0	4	3

5	Time analysis of second order system.	7
UNIT – V: **STATE VARIABLE ANALYSIS**		3
Concept of state variables – State models for linear and time invariant Systems – Solution of state-and output equation in controllable canonical form – Concepts of controllability and observably		
Practical Exercises:		
Ex.No	**Name of the Experiment**	**Period**
6	Frequency analysis of second order system.	7
7	Stability analysis of system using rout hwlite analysis.	7
	Practice + Test + Revision	11
	Total	75

Suggested List of Students Activity:

Presentation/Seminars by students on any recent technological developments based on the course.

Periodic class quizzes conducted on a weekly/fortnightly based on the course.

Text book for Reference:

1. Nise, Norman S. Control Systems Engineering. John Wiley & Sons, 2010. ISBN: 9780470547564.
2. B Gebhart, Control Systems Engineering, 2nd Ed., McGraw Hill
3. J L Kererbrock,Control Systems Engineering, MIT Press, 1991
4. Gordon C Oates, Control Systems Engineering & Technology & Design, AIAA Publications

1091234640	**Fundamentals of Control Systems**	L	T	P	C
PRACTICUM		1	0	4	3

Equipment / Facilities required to conduct the Practical Course.

S.No	Name of the Equipment's	Quantity Required
1.	Computer	30 No
2.	MATLAB software	1 No

END SEMESTER EXAMINATIONS – PRACTICAL EXAM

Note:

All the exercises should be completed before the Board Practical Examinations. End Semester Practical examination should be conducted for all the exercises / experiments for 100 Marks. Students will be permitted to select any one exercise by lot or question paper supplied by the DOTE Exam section shall be used. The record of work done by the student should be submitted with a Bonafide Certificate.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Procedure	10
B	Coding	20
C	Execution	20
D	Result	10
E	Written Test	30
F	Viva Voce	10
	TOTAL	100

Note: For the written test 30 MCQ shall be asked from the theory portions.

1091235110	UAV System Design	L	T	P	C
THEORY		4	0	0	4

Introduction

The course, aimed at an interdisciplinary group of students, covers the whole design cycle for a multirotor UAV, from conceptual design to in-flight validation, with specific reference to modelling, simulation, identification and control. The students will acquire knowledge and skill in the flying of UAV and controls of UAV. The teaching is to be practice oriented.

Course Objectives

The objective of this course is to enable the student to

To Study the basic knowledge of Unmanned Aerial Vehicle (UAV).

To learn about different raw materials used in the fabrication of UAV.

To get exposure to the avionics hardware used in autopilot.

To understand the different communication systems used in the UAV.

To learn about way point navigation systems used in the UAV.

Course Outcomes

On successful completion of this course, the student will be able to

CO1: Understand the history, classification, terminology, models, prototypes, and applications of UAVs.

CO2: Explain airframe dynamics, modelling, structures, wing design, engine types, equipment maintenance, management, and control surfaces.

CO3: Describe avionics hardware such as autopilot, sensors (AGL, pressure, accelerometer, gyros), servos, actuators, power supply, processor, integration, installation, configuration, and testing.

CO4: Analyse and integrate communication payloads, telemetry, controls, feedback systems, sensors, displays, and simulation for UAV operation and troubleshooting".

CO5: Explore path planning, MAV, waypoints navigation, ground control software, recent trends in UAVs, and case studies.

1091235110	**UAV System Design**	L	T	P	C
THEORY		4	0	0	4

Pre-requisites

Nil

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	-	1	-	1
CO2	3	2	-	2	-	-	-
CO3	3	2	2	2	-	-	-
CO4	3	3	2	2	-	-	-
CO5	3	2	2	-	-	1	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.

1091235110	UAV System Design	L	T	P	C
THEORY		4	0	0	4

- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.
- Regularly revise the core concepts of structure as they are fundamental to understanding aircraft.
- Focus on understanding the practical applications and operational principles rather than memorizing equations.
- Engage with practical lab sessions or virtual lab simulations to gain hands-on experience with this structure.

Assessment Methodology

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

1091235110	UAV System Design	L	T	P	C
THEORY		4	0	0	4

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.

CA1and CA2, Assessment test should be conducted for two units as below.

Answer five questions (5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should write Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The answer scripts of every student (online / offline) for this assessment should be kept for records and future verification. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should write any two questions. The question may have two subdivisions only.

Syllabus Contents

Unit I	**INTRODUCTION TO UAV**	10
History of UAV – classification – basic terminology - models and prototypes – applications.		
Unit II	**BASICS OF AIRFRAME**	10
Airframe – dynamics – modeling - structures – wing design - engines types - equipment maintenance and management - control surfaces - specifications.		

1091235110	UAV System Design	L	T	P	C
THEORY		4	0	0	4

Unit III	**AVIONICS HARDWARE**	10
Autopilot – AGL - pressure sensors - servos - accelerometer – gyros - actuators - power supply processor, integration, installation, configuration, and testing.		
Unit IV	**COMMUNICATION PAYLOADS AND CONTROLS**	10
Payloads - Telemetry - tracking - Aerial photography - controls - PID feedback - radio control frequency range – SAS - flight director - commands and videos - elements of control loops - flight computer sensor - displays - parameter settings - modems - memory system - simulation - ground test - analysis troubleshooting.		
UNIT V	**PATH PLANNING AND MAV**	10
Waypoints navigation - ground control software - Recent trends in UAV - Case Studies.		
Test + Revision		10
TOTAL HOURS		60

Suggested list of Students Activity,

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class quizzes conducted on a weekly / fortnightly based on the course.
- Mini project that shall be an extension of any practical lab exercise to real-world application.

Text Book for Reference:

1. Jane's Unmanned Aerial Vehicles and Targets, Jane's Information Group; ASIN: 0710612575,1999
2. R. Said and H. Chayeb, "Power supply system for UAV", KTH, 2002.

1091235110	UAV System Design	L	T	P	C
THEORY		4	0	0	4

3. Robert C. Nelson, Flight Stability and Automatic Control, McGraw-Hill, Inc, 1998.
4. Skafidas, “Microcontroller Systems for a UAV”, KTH, TRITA-FYS 2002:51 ISSN 0280-316 X.34, 2002
5. Kimon P. Valavanis, “Advances in Unmanned Aerial Vehicles: State of the Art and the Roadto Autonomy”, Springer, 2007
6. Paul G Fahlstrom, Thomas J Gleason, “Introduction to UAV Systems”, UAV Systems, Inc,1998,
7. Dr. Armand J. Chaput, “Design of Unmanned Air Vehicle Systems”, Lockheed MartinAeronautics Company, 2001
8. P.J.Swatton , “Ground studies for pilots’ flight planning”, Sixth edition, 2002.

END SEMESTER QUESTION PATTERN - Theory Exam

Duration: 3 Hrs. **Max. Marks: 100**

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Instruction to the Question Setters

Four questions will be asked from every unit, students should write any two questions for 10 marks. The question may have two subdivisions only.

1091235210	**Aircraft Ground Handling**	L	T	P	C
THEORY		3	0	0	3

Introduction

Diploma holders in Aircraft Maintenance must have a sound knowledge of various Airframe & Powerplant Mechanics, Civil Aircraft Inspection Procedure, Part - II- Aircraft AL/3-6 - landing Gear- AL/3-7- Control Systems-AL/3-8 to AL/3-10 - Fire - AL/3-18 to AL/3-20 - Tyres, Wheels & Brakes - Al/3-21 - Hydraulic systems - GOL/1-1 & GOL/1-2 - Ground Operations - Precautions in Fuelling & Defuelling issued by DGCA

Course Objectives

The objective of this course is to enable the student to

To Study the basic knowledge of Ground Handling of Aircraft, Knowledge of Airport and its Procedures.

To learn Maintenance and Handling of Ground equipment used in aircraft Maintenance.

To understand Safety and Fire Precautions during Maintenance and Landing Gear

Course Outcomes

On successful completion of this course, the student will be able to

CO 1: Demonstrate basic understanding of ground handling procedures and safety practices for aircraft operations.

CO 2: Explain key airport infrastructure and operational procedures including control tower functions and airfield layout.

CO 3: Describe the maintenance procedures and handling techniques for various ground support equipment used in aircraft maintenance.

CO 4: Discuss safety protocols and procedures, including fire precautions, during aircraft maintenance activities.

CO 5: Perform maintenance tasks related to landing gear systems, including shock strut charging, brake maintenance, and tire inspections.

Pre-requisites

Nil

1091235210	**Aircraft Ground Handling**	L	T	P	C
THEORY		3	0	0	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	-	1	-	1
CO2	3	2	-	-	1	-	-
CO3	3	-	-	2	1	-	-
CO4	3	3	-	-	1	-	-
CO5	3	-	2	2	-	-	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly

assess experiment outcomes and analyze potential sources of error in case of discrepancies.

- Regularly revise the core concepts of structure as they are fundamental to understanding aircraft.
- Focus on understanding the practical applications and operational principles rather than memorizing equations.
- Engage with practical lab sessions or virtual lab simulations to gain hands-on experience with this structure.

Assessment Methodology

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

1091235210	**Aircraft Ground Handling**	L	T	P	C
THEORY		3	0	0	3

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.

CA1and CA2, Assessment test should be conducted for two units as below.

Answer five questions (5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should write Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The answer scripts of every student (online / offline) for this assessment should be kept for records and future verification. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should write any two questions. The question may have two subdivisions only.

Syllabus Contents

Unit I	**General knowledge of ground handling of Aircraft**	7
Safety; Mooring, Jacking, Leveling, Hoisting of aircraft, Towing, Mooring of an a/c during adverse conditions. Aircraft cleaning and maintaining. Ground signaling/marshalling of aircraft in day & night time		

1091235210	**Aircraft Ground Handling**	L	T	P	C
THEORY		3	0	0	3

Unit II	**Brief knowledge of airport and its procedures**	7
Control tower, Dispersal areas, Aprons, Tarmac, Taxi track, Runway and its ends. Approach and clear zone layout.Brief knowledge of the signals given by the control tower.Knowledge of Airfield lighting system, Aircraft Rescue & Fire Fighting..		
Unit III	**Maintenance and handling of ground equipments used in maintenance of aircraft**	7
Compressors, Portable hydraulic test stands, Electrical power supply equipment, charging trolley. Air-conditioning and Heating unit, Ground support air start unit.Pressure oil unit, Fire extinguishers, jacks, Hoisting cranes/gantry, Ladders, Platforms, Trestles, and Chocks		
Unit IV	**Knowledge of safety and fire precautions**	7
To be observed during maintenance including refuelling, defueling & engine start.Maintenance of hydraulic accumulators, reservoirs and filters: Rigging of flight control surfaces and duplicate inspection; Rigging checks-Angular alignment checks and symmetry checks, Knowledge and use of Tensiometers, Protractors etc.		
UNIT V	**Maintenance of landing gear (L/G)**	7
Shock strut charging and bleeding, Maintenance of L/G brakes i.e., Dragging, Grabbing, Fading, Brakes and excessive brake pedal travel. Maintenance on wheels, tyres and tubes i.e., dismantling, inspection, assembling, inflating, inspection and installation Storage of Retables		
Test + Revision		10
TOTAL HOURS		45

Suggested list of Students Activity,

- Presentation/Seminars by students on any recent technological developments based on the course.

1091235210	**Aircraft Ground Handling**	L	T	P	C
THEORY		3	0	0	3

- Periodic class quizzes conducted on a weekly / fortnightly based on the course.
- Mini project that shall be an extension of any practical lab exercise to real-world application.

Text Book for Reference:

1. Airframe & Powerplant Mechanics, General Handbook AC65-A By US Department of Transporation, FAA
2. Airframe & Powerplant Machanics, Airframe Handbook AC 65-5A By US Dept. of Transportation, FAA
3. Civil Aircraft Inspection Procedure, Part - II- Aircraft a) AL/3-6 - landing Gear b) AL/3-7- Control Systems. c) AL/3-8 to AL/3-10 - Fire. d) AL/3-18 to AL/3-20 - Tyres, Wheels & Brakes. e) Al/3-21 - Hydraulic systems. f) GOL/1-1 & GOL/1-2 - Ground Operations.
4. Michacl J Kroes and William A Watkins, Aircraft Maintenance and Repair, McGraw Hill.
5. Civil Aviation Requirement - Section - 2- Airworthiness Series H or Saftey & Fire.
6. Precautions in Fuelling & Defuelling issued by DGCA.
7. General Handbook AC65-9A.
8. Airframe Handbook AC 65-15A.

END SEMESTER QUESTION PATTERN - Theory Exam

Duration: 3 Hrs. **Max. Marks: 100**

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Instruction to the Question Setters

Four questions will be asked from every unit, students should write any two questions for 10 marks. The question may have two subdivisions only.

1091235320	**Aircraft Ground Handling Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Introduction:

Diploma holders in Aircraft Maintenance must have a sound knowledge of various Airframe & Powerplant Mechanics, Civil Aircraft Inspection Procedure, Part - II - Aircraft.

AL/3-6 - landing Gear- AL/3-7 - Control Systems - AL/3-8 to AL/3-10 - Fire - AL/3-18 to AL/3-20 - Tyres, Wheels & Brakes - Al/3-21 - Hydraulic systems - GOL/1-1 & GOL/1-2 - Ground Operations - Precautions in Fuelling & Defuelling issued by DGCA.

Course Objectives:

The objective of this course is to enable the student to

To Study the basic knowledge of Ground Handling of Aircraft, Knowledge of Airport and its Procedures.

To learn Maintenance and Handling of Ground equipment used in the aircraft Maintenance.

To understand Safety and Fire Precautions during Maintenance and Landing Gear.

Course Outcomes:

CO1: Demonstrate proficiency in dismantling, servicing, and reassembling hydraulic systems, including bleeding and replenishing fluid reservoirs, while adhering to safety precautions.

CO2: Perform dismantling, servicing, and reassembling of hydraulic accumulators, including charging and ground power unit checks.

CO3: Practice fire extinguishing techniques for various types of fires encountered in aircraft operations.

CO4: Demonstrate effective headset communication protocols during aircraft arrival and departure, and identify hazard zones around aircraft.

CO5: Perform dismantling, servicing, and reassembling of fuel systems, including fuel sample checks and refuelling procedures.

Pre-requisites:

NIL

1091235320	**Aircraft Ground Handling Practical**	L	T	P	C
PRACTICAL		0	0	6	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	-	2	-	-	-
CO2	3	-	2	2	-	-	-
CO3	3	2	-	-	1	-	-
CO4	3	-	-	-	-	2	1
CO5	3	-	2	2	-	-	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

- It is advised that teachers make the learning experience more engaging by introducing innovative and interesting ways of teaching.
- The teachers need to expose the students to material in multiple modes to help them learn it faster and retain it longer.
- Incorporate technology tools and resources, such as online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional practice opportunities.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability-based.
- Seminars: Host seminars where students present their findings from Swinburne's test and performance curve analyses.
- Group Discussions: Facilitate discussions on the results and implications of these tests for real-world applications.
- Simulation Software: Utilize simulation software to model and analyze the operation

1091235320	**Aircraft Ground Handling Practical**	L	T	P	C
PRACTICAL		0	0	6	3

- Guest Lectures: Invite industry experts to talk about the latest technologies and trends in motor drives and their applications in robotics and automation.
- This strategy aims to blend theoretical knowledge with practical skills, preparing students for real-world engineering challenges. It encourages active learning, critical thinking, and collaboration among students, essential skills for future engineers.
- Preparation: Before each class, ensure all equipment is functional and safety protocols are in place.
- Assessment: Evaluate students through quizzes, lab reports, and presentations on their understanding and analysis of the experiments.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Practical Document	Practical Test	Practical Examination
Portion	First Cycle	Second Cycle	All Exercises	All Exercises	All Exercises
Duration	2 Periods	2 Periods	Regularly	3 Hours	3 Hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	20	60
Marks	10		10	20	60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to

select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

Cycle I: 1, 2, 3, 4 and 5.

Cycle II: 6, 7, 8, 9 and 10.

SCHEME OF EVALUATION

Part	Description	Marks
A	Dismantling	20
B	Servicing	20
C	Assembling	20
	TOTAL MARKS	**60**

- **CA 3:** Practical document should be maintained for every exercise immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical document should be submitted for the Practical Test and End Semester Examination with a bonafide certificate

The details of the documents to be prepared as per the instruction below.

Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise.

1091235320	**Aircraft Ground Handling Practical**	L	T	P	C
PRACTICAL		0	0	6	3

This documentation can be carried out in a separate notebook or printed manual or in a file with the documents. The procedure and sketch should be written by the student manually.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The logbook and the practical documents should be submitted for the verification by the Flying Squad and DOTE Official.

- **CA 4:** All the exercises should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test (CA4) should be conducted as per the scheme of evaluation as below. The marks awarded should be converted to 20 Marks for the internal assessment.

SCHEME OF EVALUATION

Part	Description	PART A
A	Procedure	10
B	Dismantling	20
C	Servicing	20
D	Assembling	20
E	Report	20
F	Viva Voice	10
	TOTAL MARKS	**100**

1091235320	**Aircraft Ground Handling Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Syllabus Contents

Exercise No.	Description	Period
1	Dismantle service and reassemble the Hydraulic system bleeding, replenish fluid reservoir and handling precautions.	10
2	Dismantle service and reassemble the Hydraulic accumulators and charging Use of ground power unit and checks	10
3	Dismantle service and reassemble the various types of fires, practicing fire extinguishing.	10
4	Practice on headset communication during arrival and departure of aircraft & Identification of aircraft hazard zones.	10
5	Dismantle service and reassemble the Fuel sample check and refueling.	10
6	Dismantle service and reassemble the Flight control system lubrication.	10
7	Dismantle service and reassemble the Tire pressure check.	10
8	Dismantle service and reassemble the Aircraft parking and mooring.	10
Practice + Test + Revision		10
Total		90

Suggested List of Students Activity:

Engaging in group discussions to delve into the theoretical dimensions .

Presenting lab and project findings to foster knowledge reinforcement and polish communication skills.

Analyzing industrial case studies to connect theoretical learning with practical applications in real-world scenarios.

Participating in guest lectures and workshops to gain insights from industry experts and learn about critical diagnostic tests for equipment maintenance.

1091235320	**Aircraft Ground Handling Practical**	L	T	P	C
PRACTICAL		0	0	6	3

END SEMESTER EXAMINATION – PRACTICAL EXAM.

BOARD EXAMINATIONS

Note:

- All the exercises have to be completed, any one exercise will be given for examination.
- All the exercises should be given in the question paper. The student is allowed to select by lot or question papers issued by the DOTE Exam section shall be used.
- Practical documents along with the activity report should be submitted for the End Semester Examinations.

DETAILED ALLOCATION OF MARKS.

Part	**Description**	**PART A**	**PART B**
A	Editing /Creation	10	10
B	Formatting	10	10
C	Assembly	10	10
D	Dimensioning	10	10
E	Printout	5	5
F	Viva Voice	5	5
	MARKS	50	50
	TOTAL	**100**	

1091235320	**Aircraft Ground Handling Practical**	L	T	P	C
PRACTICAL		0	0	6	3

Equipment / Facilities required conducting the Practical Course.

S.No	Name of the Equipment's	Quantity Required
1.	Serviceable aircraft with all systems	1
2	Assembling and disassembling tools	1
3	Aircraft Hydraulic system with accessories*	1
4	Fire Extinguishers (Solid, Liquid, Gas)	1
5	Aircraft fuel system*	1
6	Aircraft Lubrication system*	1
7	Aircraft Landing system*	1
8	Aircraft Tire*	8
9	Air compressor	1
10	Pressure gauges	2
11	Battery and charging system	1

1091235420	UAV System Design Practical	L	T	P	C
PRACTICAL		0	0	6	3

Introduction:

The course, aimed at an interdisciplinary group of students, covers the whole design cycle for a multirotor UAV, from conceptual design to in-flight validation, with specific reference to modelling, simulation, identification and control. The students will acquire knowledge and skill in the flying of UAV and controls of UAV. The teaching is to be practice oriented

Course Objectives:

The objective of this course is to enable the student

To Study the basic knowledge of Unmanned Arial Vehicle (UAV),

To learn on different raw materials used in the fabrication of UAV

To get exposure to the avionics hardware's used in auto pilot.

To understand the different communication systems used in the UAV

To learn about way point navigation systems used in the UAV

Course Outcomes:

CO1: Understand the fundamental principles of flight mechanics including forces, moments, equilibrium, and static stability of an aircraft.

CO2: Explain basic navigation concepts and techniques, including the determination of aircraft position and motion relative to reference points.

CO3: Describe the principles and applications of radio navigation systems like ADF, VOR, LORAN, ILS, and MLS.

CO4: Discuss the functions and applications of flight attitude control systems (autopilot), stability augmentation systems (SAS), control augmentation systems (CAS), GPS, and inertial navigation.

CO5: Perform calculations for weight and balance, utilize flight management and guidance systems for aircraft navigation, and optimize aircraft performance and fuel consumption.

Pre-requisites:

NIL

1091235420	UAV System Design Practical	L	T	P	C
PRACTICAL		0	0	6	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	-	2	1
CO2	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

- It is advised that teachers make the learning experience more engaging by introducing innovative and interesting ways of teaching.
- The teachers need to expose the students to material in multiple modes to help them learn it faster and retain it longer.
- Incorporate technology tools and resources, such as online platforms, interactive multimedia, and virtual communication tools, to enhance engagement and provide additional practice opportunities.
- Throughout the course, a theory-demonstrate-practice-activity strategy may be used to ensure that learning is outcome and employability-based.
- Seminars: Host seminars where students present their findings from Swinburne's test and performance curve analyses.
- Group Discussions: Facilitate discussions on the results and implications of these tests for real-world applications.
- Simulation Software: Utilize simulation software to model and analyze the operation

1091235420	**UAV System Design Practical**	L	T	P	C
PRACTICAL		0	0	6	3

- Guest Lectures: Invite industry experts to talk about the latest technologies and trends in motor drives and their applications in robotics and automation.
- This strategy aims to blend theoretical knowledge with practical skills, preparing students for real-world engineering challenges. It encourages active learning, critical thinking, and collaboration among students, essential skills for future engineers.
- Preparation: Before each class, ensure all equipment is functional and safety protocols are in place.
- Assessment: Evaluate students through quizzes, lab reports, and presentations on their understanding and analysis of the experiments.

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Practical Document	Practical Test	Practical Examination
Portion	First Cycle	Second Cycle	All Exercises	All Exercises	All Exercises
Duration	2 Periods	2 Periods	Regularly	3 Hours	3 Hours
Exam Marks	60	60	100	100	100
Converted to	10	10	10	20	60
Marks	10		10	20	60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments as per the portions mentioned above should be completed and kept for the practical test. The students shall be permitted to

select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded will be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

SCHEME OF EVALUATION

Part	Description	Marks
A	Dismantling	20
B	Servicing	20
C	Assembling	20
	TOTAL MARKS	**60**

- **CA 3:** Practical document should be maintained for every exercise immediately after completion of the practice. The same should be evaluated for 10 Marks. The total marks awarded should be converted to 10 Marks for the internal assessment. The practical document should be submitted for the Practical Test and End Semester Examination with a bonafide certificate

The details of the documents to be prepared as per the instruction below.

Each exercise should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next exercise.

This documentation can be carried out in a separate notebook or printed manual or in a file with the documents. The procedure and sketch should be written by the student manually.

1091235420	UAV System Design Practical	L	T	P	C
PRACTICAL		0	0	6	3

The detailed date of the practices and its evaluations should be maintained in the course logbook. The logbook and the practical documents should be submitted for the verification by the Flying Squad and DOTE Official.

- **CA 4:** All the exercises should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test (CA4) should be conducted as per the scheme of evaluation as below. The marks awarded should be converted to 20 Marks for the internal assessment.

SCHEME OF EVALUATION

Part	Description	PART A
A	Procedure	10
B	Dismantling	20
C	Servicing	20
D	Assembling	20
E	Report	20
F	Viva Voice	10
	TOTAL MARKS	**100**

Syllabus Contents

Exercise No.	Description	Period
1	Develop a Model of Drone with four to five members group	80
Practice + Test + Revision		10
Total		90

1091235420	UAV System Design Practical	L	T	P	C
PRACTICAL		0	0	6	3

END SEMESTER EXAMINATION – PRACTICAL EXAM.

BOARD EXAMINATIONS

Note:

- All the exercises have to be completed, any one exercise will be given for examination.
- All the exercises should be given in the question paper. The student is allowed to select by lot or question papers issued by the DOTE Exam section shall be used.
- Practical documents along with the activity report should be submitted for the End Semester Examinations.

DETAILED ALLOCATION OF MARKS.

Part	Description	PART A
A	Procedure	10
B	Dismantling	20
C	Servicing	20
D	Assembling	20
E	Report	20
F	Viva Voice	10
	TOTAL MARKS	**100**

Equipment / Facilities required conducting the Practical Course.

S.No	Name of the Equipment's	Quantity Required
1.	Serviceable DRONE with all systems	**1**
2	Assembling and disassembling tools	**1**

1091235540	**Aircraft Navigation System**	L	T	P	C
PRACTICUM		1	0	4	3

Introduction:

Diploma holders in Aircraft Maintenance must have a sound knowledge of various avionics Navigation systems which go in the Aircraft Radio System. This subject is designed to give them an insight into typical systems so that they understand their principles of working. This would also help them in acquiring skills in simulation of navigation systems.

Course Objectives:

The objective of this course is to enable the student to

- To Study the basic knowledge of Avionics Systems, General Navigation, Navigation control, Radio Navigation - ADF - VOR - LORAN - ILS MLS, Navigation Guidance, Flight Control.

Course Outcomes:

On successful completion of this course, the student will be able to

CO1: Understand the fundamental principles of flight mechanics including forces, moments, equilibrium, and static stability of an aircraft.

CO2: Explain basic navigation concepts and techniques, including the determination of aircraft position and motion relative to reference points.

CO3: Describe the principles and applications of radio navigation systems like ADF, VOR, LORAN, ILS, and MLS.

CO4: Discuss the functions and applications of flight attitude control systems (autopilot), stability augmentation systems (SAS), control augmentation systems (CAS), GPS, and inertial navigation.

CO5: Perform calculations for weight and balance, utilize flight management and guidance systems for aircraft navigation, and optimize aircraft performance and fuel consumption.

1091235540	**Aircraft Navigation System**	L	T	P	C
PRACTICUM		1	0	4	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	1	-	-	-	-
CO2	3	2	-	1	-	-	-
CO3	3	-	-	-	1	-	1
CO4	3	-	2	-	-	1	-
CO5	3	-	2	1	-	-	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

Engage and Motivate: Instructors should actively engage students to boost their learning confidence.

Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.

Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.

Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.

Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.

Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

1091235540	**Aircraft Navigation System**	L	T	P	C
PRACTICUM		1	0	4	3

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	Cycle I Experiments	Cycle II Experiments	All Units	All Experiments	All Experiments
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

  Practical documents should be maintained for every experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total

marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

The details of the documents to be prepared as per the instruction below.

Each experiment should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next experiment.

This documentation can be carried out in a separate notebook or a printed manual or a file with documents. The student should draw the Circuit Diagram and take readings, do calculations and prepare the Graph / Result manually in the documents.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad and DOTE Official.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Procedure	10
B	Coding	20
C	Execution	20
TOTAL		50
D	Practical Documents (As per the portions)	10
Total Marks		60

Cycle I: 1, 2 and 3.

Cycle II: 4, 5, 6 and 7.

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

1091235540	**Aircraft Navigation System**	L	T	P	C
PRACTICUM		1	0	4	3

Question pattern – Written Test Theory

Description		**Marks**	
Part – A	30 MCQ Questions.	30 X 1 Mark	30 Marks
Part – B	7 Questions to be answered out of 10 Questions.	7 X 10 Marks	70 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	**DESCRIPTION**	**MARKS**
A	Procedure	10
B	Coding	20
C	Execution	20
D	Result	10
E	Written Test	30
F	Viva Voce	10
	TOTAL	100

Note: For the written test 30 MCQ shall be asked from the theory portions.

1091235540	**Aircraft Navigation System**	L	T	P	C
PRACTICUM		1	0	4	3

Syllabus Contents

Theory Portion		
UNIT - I : **GENERAL**		3
Review of flight mechanics, Dynamic of an aircraft relative to the reference coordinate located on the aircraft centre of gravity. Forces and moments acting on the aircraft Equilibrium of the forces and moments acting on the aircraft, aircraft equation of motion and aircraft static stability.		
UNIT - II : **NAVIGATION**		3
Basic concepts of navigation process with guidance circumference related to Control, Circumference, Determination of position and motion of an aircraft through measurements of a respective geometric configuration relative to reference		
Practical Exercises:		
Ex.No	**Name of the Experiment**	**Period**
1	Calibration of Accelerometer.	7
2	Calibration of Gyroscope.	7
UNIT – III : **RADIO NAVIGATION**		3
ADF - VOR - LORAN - ILS - MLS.		
UNIT - IV **GUIDANCE**		3
Primary functions in flight attitude control (auto pilot), Stability augmentation system (SAS), and Control Augmentation system (CAS) longitudinal and lateral directional modes of flight. Satellite based navigation concept such as GPS application and the basic concept of inertial navigation, Required Navigation Procedure		
Practical Exercises:		
Ex.No	**Name of the Experiment**	**Period**
3	Calibration of optical sensor.	7

1091235540	**Aircraft Navigation System**	L	T	P	C
PRACTICUM		1	0	4	3

4	Simulation of Altimeter data.	7
5	Simulation of way point navigation.	7
UNIT – V: **FLIGHT MANAGEMENT**		3
Calculation of weight and balance, familiarization with navigation of modern aircraft using flight management and guidance system, performance of aircraft, optimization of fuel consumption using flight management system		
Practical Exercises:		
Ex.No	**Name of the Experiment**	**Period**
6	Coordinate estimation of target using GPS.	7
7	Simulation of coordinate transformation Technique.	7
	Practice + Test + Revision	11
	Total	75

Suggested List of Students Activity:

Presentation/Seminars by students on any recent technological developments based on the course.

Periodic class quizzes conducted on a weekly/fortnightly based on the course.

Text book for Reference:

1. The Air Pilot's Manual, Flying Training Vol.3, Airlife Publishing.
2. J E Hitercock, Navigation for Pilots, Airlife Publishing 1997.
3. R B Underdown, Ground Studies for Pilots, Vol.3, Blackwell.
4. Trevor Thom, Air Navigation, Airlife Publishing.
5. A E Bramson and N H Birch, Radio Navigation for Pilots, Airlife Publishing 1984.
6. Avionics Navigation Systems, M.Kayton, W. Fried.
7. Aircraft Radio System-by J. Powell.
8. Electronic Communication System by George Kennedy.

1091235540	**Aircraft Navigation System**	L	T	P	C
PRACTICUM		1	0	4	3

Equipment / Facilities required to conduct the Practical Course.

S.No	Name of the Equipment's	Quantity Required
1.	Computer	30 No
2.	MATLAB software	1 No

END SEMESTER EXAMINATIONS – PRACTICAL EXAM

Note:

All the exercises should be completed before the Board Practical Examinations. End Semester Practical examination should be conducted for all the exercises / experiments for 100 Marks. Students will be permitted to select any one exercise by lot or question paper supplied by the DOTE Exam section shall be used. The record of work done by the student should be submitted with a Bonafide Certificate.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Procedure	10
B	Coding	20
C	Execution	20
D	Result	10
E	Written Test	30
F	Viva Voce	10
	TOTAL	100

Note: For the written test 30 MCQ shall be asked from the theory portions.

1091235654	**Innovation & Startup**	L	T	P	C
PRACTICUM		1	0	2	2

Introduction

The integration of Innovation and Start-ups concept within the syllabus is testament to the forward thinking nature of educational institutions. By introducing this concept, students are provided with a solid foundation upon which they can build their skills in Innovation and Start-ups. This course can bridge the gap between theory and practice. It allows students to apply the knowledge they have acquired in a real world context, thereby enhancing their understanding and retention of the above concept. This experimental learning approach not only fosters a deeper level of engagement but also trains student with practical skills necessary to navigate the complexities of the business world. This also empowers students to become an Innovator or Entrepreneur. With necessary tools and knowledge, educational institutions are preparing the next generation of entrepreneurs to tackle the challenges and opportunities that lie ahead. This syllabus will explore the different facets of innovation, including its importance, types and strategies for fostering a culture of innovation within organizations

Course Objectives

The objective of this course is to enable the students

- To understand the concept of Innovation and Start-ups.
- To acquire knowledge of Prototype development, IPR, Patents and Copyrights.
- To have practical experience in preparing Business plan for Start-ups.
- To visit the existing nearby industry to prepare a project report about the present challenges of that industry.
- To know the different funding supports available from Government and Non-Government schemes for Start-ups.

1091235654	**Innovation & Startup**	L	T	P	C
PRACTICUM		1	0	2	2

Course Outcomes

After successful completion of this course, the students should be able to

CO 1: Differentiate between Innovation and Start-ups

CO 2: Explain the importance of IPR, Patents and Copyrights.

CO 3: Describe the methodology to be adopted for preparing the Business Plan

CO 4: Gain practical experience by Industrial training and visiting the nearby industry

Co 5: Explore and identify various funding facilities available from Government and Non-Government Schemes for Start-ups

Pre-requisites:

There are no specific prerequisites for this course, although a basic understanding of business and technology concepts would be beneficial.

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	-	-	1	-	2	3	3
CO2	-	-	1	-	2	3	3
CO3	-	-	1	-	2	3	3
CO4	-	-	1	-	2	3	3
CO5	-	-	1	-	2	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

1091235654	**Innovation & Startup**	L	T	P	C
PRACTICUM		1	0	2	2

Assessment Methodology

	Continuous Assessment (40 marks)			**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	
Mode	Class Assessment (Unit I, II & Unit III)	Seminar Presentations (Unit IV)	Submission of Industry Visit Project Report (Unit V)	Practical Examination (Project)
Duration	2 hours	---	---	3 hours
Exam Marks	50	20	30	100
Converted to	10	10	20	60
Marks	**10**	**10**	**20**	**60**

Continuous Assessment - 40 marks

S. No	**Description**	**Marks**
CA 1	**Class Assessment (50 marks) - Unit – I,II & III** Written Examination - Theory Questions 10 questions out of 15 questions (10 x 3 marks :30 marks) 4 questions out of 6 questions (4 x 5 marks : 20 marks)	10 marks
CA 2	**Seminar Presentations (20 marks- each topic carries 10 marks) - Unit IV** Students should present any two topics with PPTs	10 marks
CA 3	Submission of Industry Visit Project Report - **(30 marks) - Unit V**	20 marks
	Total	**40 marks**

1091235654	**Innovation & Startup**	L	T	P	C
PRACTICUM		1	0	2	2

Syllabus Contents

UNIT I	**INTRODUCTION TO INNOVATION**	
An Introduction to Innovation and Creativity- Innovation in current Environment - Types of Innovation - Challenges of Innovation - Steps of Innovation Management - Divergent v/s Convergent thinking - Design thinking and Entrepreneurship.		6
UNIT II	**INCUBATION CLUBS, IPR, PATENTS AND COPYRIGHTS**	
Idea Generation - Incubation Clubs - Prototype Development - Marketing of Innovation - Management of Innovation - Creation of IPR -Types of IPR - Patents and Copyrights - Patents in India - Technological and Non-Technological Innovation Process.		6
UNIT III	**GOVERNMENT AND NON-GOVERNMENT FUNDING SCHEMES FOR START-UPS**	
An introduction to Start-up - Start-ups in India - Procedure for registration of Start-ups - Business Model- Business Plan - Case Studies - Opportunities and Challenges - Funding supports from Government Schemes -MUDRA, TANSEED, NEEDS, PMEGP, UYEGP – Non-Government Schemes - CSR Fund - Angel Investors - Venture Capitalist.		6
UNIT IV		
All the students have to select a minimum of 2 topics from the list given below. They are expected to collect the resources with the help of faculty assigned to them to prepare PPTs for presentation 1. Idea Generation. 2. Innovation Management. 3. Product Development.		9

1091235654	**Innovation & Startup**	L	T	P	C
PRACTICUM		1	0	2	2

4. Business Model Innovation. 5. Organizational Culture and Change Management. 6. Leadership and Innovation. 7. Barriers to Innovation. 8. Innovation Marketing. 9. E-Commerce success stories (any one). 10. Role of Start-ups in Higher Education. 11. Professional Networking in Building Brands. 12. How to start a start-up in India.	
UNIT V	**EXPOSURE TO INDUSTRY**
All the students should visit and study the nearby industries, incubation centres, start-ups etc., and select any one to prepare a project report which covers the Name of the Industry/Organization, Introduction of the Industry, Type of the Industry, Scope of the Industry, Plant Layout and Location, Details of Plant and Machineries, Process flow chart, Manufacturing Methods, Process of Manufacturing, Product Manufacturing, Quality Control, Marketing, Product selling - Conclusion.	**18**
Total	**45**

1091235654	**Innovation & Startup**	L	T	P	C
PRACTICUM		1	0	2	2

End Semester Examination - Project Exam

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairman Board of Examinations.

Detailed Allocation of Marks

S. No	Description	Marks
Part A	Written Examination – Unit –I,II & III Theory Questions i) 10 questions out of 15 questions (10 x 3 marks = 30 marks) ii) 3 questions either or pattern (3 x 5 marks = 15 marks)	45
Part B i)	Presentation of Industry Visit Project Report	25
ii)	Interaction and Evaluation	30
	TOTAL	**100**

1091235773	**Industrial Training**	Summer Vacation	C
Internship			2

Introduction

Industrial training is a crucial component of the diploma engineering curriculum, designed to bridge the gap between theoretical knowledge and practical application. Typically conducted during vacation periods, this two-week training program provides students with hands-on experience in their respective engineering fields. The primary objectives are to enhance practical skills, familiarize students with industry standards, and prepare them for future employment.

Two-week industrial training during vacation periods is an invaluable part of diploma engineering education. It not only equips students with practical skills but also provides a comprehensive understanding of the industry, preparing them for successful engineering careers.

Objectives

1. Practical Exposure: Students gain direct exposure to real-world engineering practices, tools, and technologies.
2. Skill Enhancement: The training helps in developing technical and soft skills that are essential for professional growth.
3. Industry Insight: Students learn about the working environment, operational procedures, and challenges faced by industries.
4. Professional Networking: The training offers opportunities to interact with industry professionals, which can be beneficial for career prospects.
5. Application of Knowledge: It allows students to apply classroom knowledge to solve practical problems, enhancing their understanding and retention of engineering concepts.

Structure of the Training Program

- Orientation: Introduction to the company, its operations, and safety protocols.
- Project Assignment: Students are assigned specific projects or tasks relevant to their field of study.
- Supervision and Mentorship: Industry professionals guide and mentor students throughout the training.

1091235773	**Industrial Training**	Summer Vacation	C
Internship			2

- Skill Development Workshops: Sessions on technical skills, software tools, and industry best practices.
- Assessment and Feedback: Performance evaluations and constructive feedback to help students improve.

Benefits for Students

- Enhanced Employability: Practical experience makes students more attractive to potential employers.
- Confidence Building: Working in a real-world setting boosts confidence and professional demeanor.
- Clarified Career Goals: Exposure to various roles and responsibilities helps students define their career paths.

Course Outcomes

CO 1: Demonstrate proficiency in using industrial machinery, tools, and software.

CO 2: Able to identify, analyze, and solve engineering problems using industry-standard methods and practices.

CO 3: Gain a comprehensive understanding of industrial manufacturing processes, quality control, and safety practices.

CO 4: Exhibit improved communication, teamwork, and professional behavior in an industrial setting.

CO 5: Apply theoretical concepts learned in their coursework to practical engineering tasks and projects.

Duties Responsibilities of the Faculty Mentor.

One faculty mentor should be assigned for every 30 students by the HOD / Principal. Faculty mentors shall play a crucial role in overseeing and guiding students during their industrial training program in Diploma engineering.

Pre-Training Responsibilities:

1. Orientation and Preparation:
    - Conduct orientation sessions to familiarize students with the objectives, expectations, and guidelines of the industrial training program.

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Internship			2

- Assist students in understanding the importance of industrial training in their academic and professional development.

2. Placement Coordination:
   - Collaborate with the placement cell or industry liaison office to secure suitable training placements for students that align with their academic specialization and career interests.
   - Facilitate communication between the institution and host organizations to ensure smooth coordination of training arrangements.
3. Training Plan Development:
   - Help students develop a detailed training plan outlining learning objectives, tasks, and expected outcomes for the training period.
   - Guide students in setting SMART (Specific, Measurable, Achievable, Relevant, Time-bound) goals for their training experience.

During Training Responsibilities:

4. Monitoring and Support:
   - Regularly monitor the progress of students during their industrial training. Maintain communication with both students and industry supervisors to track performance and address any issues that may arise.
   - Provide ongoing support and guidance to students, offering advice on technical challenges, professional conduct, and workplace etiquette.
5. Technical Guidance:
   - Offer technical guidance and mentorship related to the specific engineering discipline or specialization of the students. Help them apply theoretical knowledge to practical situations encountered in the industry.
6. Problem-Solving Assistance:
   - Assist students in overcoming obstacles or challenges encountered during their training. Encourage them to develop problem-solving skills and resilience in real-world engineering scenarios.

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Internship			2

7. Feedback and Evaluation:
    - Provide constructive feedback on students' performance based on reports, assessments, and observations gathered from industry supervisors.
    - Evaluate students' achievements in relation to their training objectives and competencies developed during the program.

Post-Training Responsibilities:

8. Reflection and Debriefing:
    - Conduct debriefing sessions with students to reflect on their training experiences, discuss lessons learned, and identify areas for further improvement.
    - Help students articulate their learning outcomes and how these experiences contribute to their professional growth.
9. Documentation and Reporting:
    - Ensure comprehensive documentation of students' training activities, achievements, and feedback received from industry supervisors.
    - Prepare reports summarizing students' performance and submit these to relevant departments or committees for review and assessment.
10. Career Counseling:
    - Provide career guidance and counseling to students based on their industrial training experiences. Assist them in leveraging these experiences for future job applications or further academic pursuits.
11. Continuous Improvement:
    - Collaborate with industry partners to continuously improve the quality and relevance of the industrial training program.
    - Incorporate feedback from students and industry supervisors to enhance the effectiveness of future training placements.

By fulfilling these duties and responsibilities, faculty mentors contribute significantly to the overall educational experience and professional development of Diploma engineering students during their industrial training program.

1091235773	**Industrial Training**	Summer Vacation	C
Internship			2

Instructions to the students

Before Starting Industrial Training:

1. **Orientation and Preparation:**
    - Attend orientation sessions conducted by the institution or faculty mentors to understand the objectives, expectations, and guidelines of the industrial training program.
    - Familiarize yourself with the specific policies, procedures, and safety regulations of the host organization where you will be undergoing training.
2. Setting Goals:
    - Set clear and specific goals for your industrial training period. Define what skills, knowledge, and experiences you aim to gain during this time.
    - Discuss your goals with your faculty mentor and seek their guidance in developing a training plan that aligns with your career aspirations.
3. Professional Attire and Conduct:
    - Dress appropriately and professionally according to the standards of the industry and host organization.
    - Maintain a positive attitude, demonstrate punctuality, and adhere to workplace etiquette and norms.

During Industrial Training:

4. Learning and Engagement:
    - Actively engage in all assigned tasks and projects. Seek opportunities to learn new skills and technologies relevant to your field of study.
    - Take initiative in asking questions, seeking clarification, and participating in discussions with supervisors and colleagues.
5. Adaptability and Flexibility:
    - Adapt to the work environment and demonstrate flexibility in handling various responsibilities and challenges that arise during your training.
    - Be open to different roles and tasks assigned to you, as this will broaden your experience and skill set.

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Internship			2

6. Professionalism and Communication:
    - Communicate effectively with supervisors, colleagues, and clients as required. Practice clear and concise verbal and written communication.
    - Demonstrate professionalism in all interactions, respecting confidentiality, and adhering to company policies and procedures.
7. Safety and Compliance:
    - Prioritize safety at all times. Familiarize yourself with safety protocols, procedures, and emergency exits in the workplace.
    - Follow all safety guidelines and regulations to ensure your well-being and that of others around you.

After Completing Industrial Training:

8. Reflection and Documentation:
    - Reflect on your training experience. Evaluate what you have learned, the challenges you faced, and how you have grown professionally.
    - Maintain a journal or log documenting your daily activities, achievements, and lessons learned during the training period.
9. Feedback and Evaluation:
    - Seek feedback from your industry supervisor and faculty mentor on your performance and areas for improvement.
    - Use constructive feedback to enhance your skills and competencies for future career opportunities.
10. Career Planning:
    - Use your industrial training experience to inform your career planning and decision-making process.
    - Discuss your career goals and aspirations with your faculty mentor or career counselor for guidance on next steps after completing your diploma.

By following these instructions, Diploma engineering students can make the most of their industrial training experience, gain valuable insights into their chosen field, and prepare themselves effectively for future professional endeavors.

1091235773	**Industrial Training**	Summer Vacation	C
Internship			2

Attendance Certification

Every student has to get their attendance certified by the industrial supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the institution faculty mentor.

Training Reports

The students have to prepare reports: The report in the form of a diary to be submitted to the concerned faculty mentor of the institution. This will be reviewed while awarding Internal assessment.

Industrial Training Diary

Students are required to maintain the record of day-to-day work done. Such a record is called Industrial training Diary. Students have to write this report regularly. All days for the week should be accounted for clearly giving attendance particulars (Presence, absence, Leave, Holidays etc.). The concern of the Industrial supervisor is to periodically check these progress reports.

In addition to the diary, students are required to submit a comprehensive report on training with details of the organisation where the training was undergone after attestation by the supervisors. The comprehensive report should incorporate study of plant / product / process / construction along with intensive in-depth study on any one of the topics such as processes, methods, tooling, construction and equipment, highlighting aspects of quality, productivity and system. The comprehensive report should be completed in the last week of Industrial training. Any data, drawings etc. should be incorporated with the consent of the Organisation.

Scheme of Evaluation

Internal Assessment

Students should be assessed for 40 Marks by industry supervisor and polytechnic faculty mentor for the Internal Assessment.

Sl. No.	Description	Marks

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Internship			2

A	Punctuality and regularity. (Attendance)	10
B	Level / proficiency of practical skills acquired. Initiative in learning / working at site	10
C	Self expression / communication skills. Interpersonal skills / Human Relation.	10
D	Report and Presentation.	10
	Total	40

End Semester Examination - Project Exam

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairman Board of Examinations after the completion of industrial training. The marks scored will be converted to 60 marks for the End Semester Examination.

Scheme of Evaluation

Sl. No.	Description	Marks
A	Daily Activity Report and Attendance certificate.	20
B	Comprehensive report on Internship, Relevant Internship Certificate from the concerned department.	30
C	Presentation by the student at the end of the Internship.	30
D	Viva Voce	20
Total		100

1091236111	**Civil Aviation Requirements**	L	T	P	C
THEORY		3	0	0	3

Introduction

Diploma holders in Aircraft Maintenance must have a sound knowledge of various Aircraft Rules, 1937 VOL 1,. Aircraft Rules, 1937 VOL 3, AIRCRAFT MAINTENANCE Information Circular CAR - Section - 1, 2, & 8 SMS,CAR - 21, M, 145, 66 & 147 Special Federal Aviation Regulations (SFARs) - 14 CFR, SFAR 88 & JAA TGL 47,8. Airworthiness Procedure Manual .This subject is designed to give them an insight of rules and regulations.

Course Objectives

The objective of this course is to enable the student to

Study the basic knowledge of Regulatory Framework, CAR-M, CAR-145 Approved Maintenance Organizations, CAR-66 Certifying Staff ---Maintenance, CAR-147

To learn about Approved Maintenance Training Organization, Aircraft Operations and Aircraft Certification,

To understand Safety Management System, Fuel Tank Safety, Applicable National and International Requirements.

Course Outcomes

On successful completion of this course, the student will be able to

CO 1: Understand the significance of the Regulatory framework.

CO 2: Understand the significance of the CAR approval of maintenance.

CO 3: Describe air operator certificate.

CO 4: Describe Aircraft certification.

CO 5: Understand the maintenance and documentation.

Pre-requisites

Nil

1091236111	**Civil Aviation Requirements**	L	T	P	C
THEORY		3	0	0	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	-	1	-	-	-
CO2	2	2	1	1	-	-	-
CO3	2	2	1	1	-	-	-
CO4	2	2	-	1	-	-	-
CO5	2	2	-	2	2	-	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of

1091236111	Civil Aviation Requirements	L	T	P	C
THEORY		3	0	0	3

discrepancies.

- Regularly revise the core concepts of structure as they are fundamental to understanding aircraft.
- Focus on understanding the practical applications and operational principles rather than memorizing equations.
- Engage with practical lab sessions or virtual lab simulations to gain hands-on experience with this structure.

Assessment Methodology

	Continuous Assessment (40 marks)				End Semester Examination (60 marks)
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

1091236111	**Civil Aviation Requirements**	L	T	P	C
THEORY		3	0	0	3

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.

CA1and CA2, Assessment test should be conducted for two units as below.

Answer five questions (5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should write Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The answer scripts of every student (online / offline) for this assessment should be kept for records and future verification. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should write any two questions. The question may have two subdivisions only.

Syllabus Contents

Unit I	**Regulatory Framework**	**8**
Role of International Civil Aviation Organization; Introduction to Chicago Convention, 1944; Introduction to ICAO, Convention, Standards and Recommended Practices; The Aircraft Act, 1934; The Aircraft Rules, 1937 - Part - I, II, III, IV, VI, VII, IX, XIIA, XIIB,XIIC, XIII, XIV.		

1091236111	**Civil Aviation Requirements**	L	T	P	C
THEORY		3	0	0	3

Role of the DGCA; Relationship between CAR-21, CAR-M, CAR-145, CAR-66. CAR 147; AIRCRAFT MAINTENANCE Information Circulars (Applicable to Aircraft Maintenance and Release); CAR - Sections 1 and 2.

CAR-M:

Detail understanding of CAR M provisions related to Continuing Airworthiness; Detailed understanding of CAR.

Unit II	**CAR-145 — Approved Maintenance Organizations**	**8**

Detailed understanding of CAR-145 and CAR M Subpart F.

CAR-66 Certifying Staff - Maintenance

Detailed understanding of CAR-66.

Unit III	**CAR-147 Approved Maintenance Training Organization**	**8**

Detailed understanding of CAR-147.

Aircraft Operations:

Commercial Air Transport/Commercial Operations; Air Operators Certificates; Operators Responsibilities, in particular regarding continuing airworthiness and maintenance; Documents to be carried on board; Aircraft Placarding (Markings);

Unit IV	**Aircraft Certification**	**8**

(a) General - Certification rules: such as FAA & EACS 23/25/27/29; Type - Certification - Supplemental Type Certification; Type Approval; CAR-21 Sub-Part F, G, H, I, M, P & Q. Aircraft Modifications and repairs approval and certification; permit to fly requirements

(b) Documents - Certificate of Airworthiness; Certificate of Registration; Noise - Certificate; Weight Schedule; Radio Station Licence and Approval.

Safety Management System

State Safety Programme; Basic Safety Concepts; Hazards & Safety Risks; SMS Operation; SMS Safety performance; Safety Assurance.

1091236111	**Civil Aviation Requirements**	L	T	P	C
THEORY		3	0	0	3

Fuel Tank Safety Special Federal Aviation Regulations (SFARs) from 14 CFR SFAR 88 of the FAA and of JAA TGL 47; Concept of CDCCL, Airworthiness Limitations Items (ALI).		
UNIT V	**Applicable National and International Requirements**	**8**
Introduction to ICAO, FAR, EASA Regulations - Aircraft Maintenance and certification. (a) 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.; (b) Continuing airworthiness; Test flights; ETOPS /EDTO, maintenance and - dispatch requirements; RVSM, maintenance and dispatch requirements; RNP, - MNPS Operations - All Weather Operations; Category 2/3 operations and minimum equipment, maintenance, training and certification requirements		
Test + Revision		10
TOTAL HOURS		60

Suggested list of Students Activity,

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class quizzes conducted on a weekly / fortnightly based on the course.
- Mini project that shall be an extension of any practical lab exercise to real-world application.

1091236111	**Civil Aviation Requirements**	L	T	P	C
THEORY		3	0	0	3

Text Book for Reference:

1. The Aircraft Act, 1934.
2. The Aircraft Rules, 1937 VOL 1.
3. The Aircraft Rules, 1937 VOL 3.
4. AIRCRAFT MAINTENANCE Information Circular.
5. CAR - Section - 1, 2, & 8 SMS.
6. CAR - 21, M, 145, 66 & 147.
7. Special Federal Aviation Regulations (SFARs) - 14 CFR, SFAR 88 & JAA TGL 47.
8. Airworthiness Procedure Manual.

1091236111	**Civil Aviation Requirements**	L	T	P	C
THEORY		3	0	0	3

END SEMESTER QUESTION PATTERN - Theory Exam

Duration: 3 Hrs. **Max. Marks: 100**

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Instruction to the Question Setters

Four questions will be asked from every unit, students should write any two questions for 10 marks. The question may have two subdivisions only.

6000236112	**Entrepreneurship**	L	T	P	C
THEORY		3	0	0	3

Introduction

Development of a diploma curriculum is a dynamic process responsive to the society and reflecting the needs and aspirations of its learners. Fast changing society deserves changes in educational curriculum particularly to establish relevance to emerging socio-economic environments; to ensure equity of opportunity and participation and finally promote concern for excellence. In this context the course on entrepreneurship and start ups aims at instilling and stimulating human urge for excellence by realizing individual potential for generating and putting to use the inputs relevant to social prosperity and thereby ensuring good means of living for every individual, providing jobs and developing the Indian economy.

Course Objectives

After completing this subject, the student will be able to

- Acquire entrepreneurial spirit and resourcefulness
- Familiarize Acquire knowledge about the business idea and product selection
- Analyze the banking and financial institutions
- Understand the pricing policy and cost analysis
- Get knowledge about the business plan preparation

Course Outcomes

CO1: Explain the process of entrepreneurship

CO2: Analyse the importance of generation of ideas and product selection

CO3: Familiarization of various financial and non financial schemes

CO4: Acquire various cost components to arrive pricing of the product

CO5: Learn the preparation of project feasibility report

Pre-requisites

Knowledge of basics of Engineering and Industrial engineering

6000236112	**Entrepreneurship**	L	T	P	C
THEORY		3	0	0	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	-	-	-	-	3	1	3
CO2	-	-	-	-	3	3	3
CO3	-	-	-	1	-	3	2
CO4	-	1	3	3	2	3	2
CO5	-	2	3	3	3	3	3

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice- activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real- world scenarios when possible.

6000236112	**Entrepreneurship**	L	T	P	C
THEORY		3	0	0	3

Assessment Methodology

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.

CA1and CA2, Assessment test should be conducted for two units as below.

(5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should write Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

6000236112	**Entrepreneurship**	L	T	P	C
THEORY		3	0	0	3

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The answer scripts of every student (online / offline) for this assessment should be kept for records and future verification. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should write any two questions. The question may have two subdivisions only.

Syllabus Contents

Unit I	**Entrepreneurship – Introduction and Process**	
Concept of entrepreneurship - Importance, Myths about Entrepreneurship, Pros and Cons of Entrepreneurship, Process of Entrepreneurship, , Competencies and characteristics of an entrepreneur -, Ethical Entrepreneurship, Entrepreneurial Values and Attitudes, Creativity, Innovation and entrepreneurship- Entrepreneurs - as problem solvers, Mindset of an employee and an entrepreneur, - Risk Taking-Concepts		7
Unit II	**Business Idea**	
Types of Business: Manufacturing, Trading and Services, Stakeholders: sellers, vendors and consumers and Competitors, E- commerce Business Models, business idea generation -Types of Resources - Human, Capital and Entrepreneurial tools and resources, etc.,- setting business goals- Patent, copyright and Intellectual property rights, Customer Relations and Vendor Management, -Business Ideas vs. Business Opportunities, Opportunity – SWOT ANALYSIS of a business idea - Business Failure – causes and remedies.- Types of business risks,		7

6000236112	**Entrepreneurship**	L	T	P	C
THEORY		3	0	0	3

Unit III	**Banking**
Size and capital based classification of business enterprises- Role of financial institutions, Role of Government policy, Entrepreneurial support systems, Incentive schemes for state government, and Incentive schemes for Central governments.	7
Unit IV	**Pricing and Cost Analysis**
Types of Costs - Variable - Fixed- Operational Costs - Break Even Analysis - for single product or service, -financial Business Case Study, Understand the meaning and concept of the term Cash Inflow and Cash Outflow- Pricing- Calculate Per Unit Cost of a single product, , Understand the importance and preparation of Income Statement, Prepare a Cash Flow Projection- Factors affecting pricing.- GST.	7
Unit V	**Business Plan Preparation**
Feasibility Report – Technical analysis, financial analysis- Market Research - Concept, Importance and Process- tools for market research- Market Sensing and Testing, Marketing and Sales strategy, Digital marketing, Branding - Business name, logo, tag line, Promotion strategy, Business Plan Preparation, -Concept and Importance, , Execution of Business Plan.	7
Revision + Test	10
TOTAL HOURS	45

Suggested list of Students Activity.

1. Students can explore app development or web design. They'll learn about technology, user experience, and marketing.
2. Hosting events, workshops, or conferences allows students to practice project management, networking, and marketing skills.
3. Encourage students to address social or environmental issues through innovative business solutions. This fosters empathy and creativity.

6000236112	Entrepreneurship	L	T	P	C
THEORY		3	0	0	3

4. Part of entrepreneurship clubs or organizations provides networking opportunities, mentorship, and exposure to real-world challenges.
5. Competitions like business plan contests or pitch events allow students to showcase their ideas and receive feedback.
6. Students can create and sell handmade crafts, artwork, or other products. This teaches them about production, pricing, and customer relations.
7. Students can provide consulting services in areas they're knowledgeable about, such as social media marketing or financial planning.
8. Encourage students to create and manage their own small business or offer freelance services. This hands-on experience helps them understand various aspects of entrepreneurship.

Text and Reference Books:

1. G.K. Varshney, Fundamentals of Entrepreneurship, Sahitya Bhawan Publications, Agra., 2019.
2. H.Nandan, Fundamentals of Entrepreneurship, Prentice Hall India Learning Private Limited, Third Edition, 2013.
3. R.K. Singal, Entrepreneurship Development & Management, S K Kataria and Sons, 2013.

Web Reference:

- https://ocw.mit.edu/courses/15-390-new-enterprises-spring-2013/resources/lecture-1/
- https://onlinecourses.nptel.ac.in/noc20_ge08/preview

END SEMESTER QUESTION PATTERN - Theory Exam

Duration: 3 Hours. **Maximum Marks: 100**

Note: Answer Ten questions by selecting Two questions from each unit. Each question carries 10 marks.

Instruction to the question setters.

Each unit should have four questions. Each question carries 10 Marks. Each question may have two subdivisions only.

1091236113	**Airworthiness Requirements**	L	T	P	C
THEORY		3	0	0	3

Introduction

Diploma holders in Aircraft Maintenance must have a sound knowledge of various The Indian Aircraft Act and the Rules, Manual of Civil Aviation, DEF STANDARD 970

Civil Airworthiness Requirements. AIRCRAFT MAINTENANCE Information Circulars (relating to Airworthiness), Advisory Circulars - DGCA, Civil Aircraft Airworthiness Information and Procedures (CAP 562).

Course Objectives

The objective of this course is to enable the student to

To Study the basic knowledge of Aircraft Rules, AME Licenses, Testing of Flight and Certification.

To learn about different types aircraft maintenance aspects and its certification process.

To understand on aircraft maintenance manual, schedule, Technical publication and aircraft registration process.

To study about Accident investigations and rules of ICAO and IATA.

Course Outcomes

On successful completion of this course, the student will be able to

CO 1: Understand the significance of Airworthiness.

CO 2: Understand the significance of the AME licence.

CO 3: Describe the test flight and certification.

CO 4: Describe the aircraft maintenance products..

CO 5: Understand the accident investigation procedure.

Pre-requisites

Nil

1091236113	Airworthiness Requirements	L	T	P	C
THEORY		3	0	0	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	-	1	-	-	-
CO2	2	2	1	1	-	-	-
CO3	2	2	1	1	-	-	-
CO4	2	2	-	-	2	-	-
CO5	2	2	-	-	1	-	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy

- Engage and Motivate: Instructors should actively engage students to boost their learning confidence.
- Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.
- Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.
- Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.
- Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.
- Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of

discrepancies.

- Regularly revise the core concepts of structure as they are fundamental to understanding aircraft.
- Focus on understanding the practical applications and operational principles rather than memorizing equations.
- Engage with practical lab sessions or virtual lab simulations to gain hands-on experience with this structure.

Assessment Methodology

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Written test (Two units)	Written test (Another Two units)	Quiz MCQ (Online / Offline)	Model Examination	Written Examination
Duration	2 Periods	2 Periods	1 Hour	3 Hours	3 Hours
Exam Marks	50	50	60	100	100
Converted to	15	15	5	20	60
Marks	15		5	20	60
Tentative Schedule	6th Week	12th Week	13-14th Week	16th Week	

1091236113	**Airworthiness Requirements**	L	T	P	C
THEORY		3	0	0	3

CA1 and CA2: Assessment written test should be conducted for 50 Marks for two units. The marks scored will be converted to 15 Marks. Best of one will be considered for the internal assessment of 15 Marks.

CA1and CA2, Assessment test should be conducted for two units as below.

Answer five questions (5 X 10 Marks = 50 Marks).

Eight questions will be asked, students should write Five questions. Each unit Four questions can be asked. Each question may have subdivisions. Maximum two subdivisions shall be permitted.

CA3: 60 MCQ can be asked by covering the entire portion. It may be conducted by Online / Offline. The answer scripts of every student (online / offline) for this assessment should be kept for records and future verification. The marks scored should be converted to 5 marks for the internal assessment.

CA4: Model examination should be conducted as per the end semester question pattern. The marks should be converted to 20 marks for the internal assessment.

Question Pattern:

Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Four questions will be asked from every unit, students should write any two questions. The question may have two subdivisions only.

Syllabus Contents

Unit I	**Introduction**	7
Aircraft rules as far as they relate to airworthiness and safety of aircraft. Airworthiness requirements for civil and military aircraft CAA, FAA, JAR and ICAO, regulations, Defense standards. Military standards and specifications.		

1091236113	**Airworthiness Requirements**	L	T	P	C
THEORY		3	0	0	3

Unit II	**Privileges and responsibilities**	7
Various categories of AME license and approved persons. Knowledge of mandatory documents like certificate of Registration, certificate of Airworthiness - conditions of issue and validity. Export certificate of Airworthiness. Knowledge of Log Book, Journey Log Book, Technical Log Book, etc.		
Unit III	**Procedure for development**	7
Test flights and certification. Certificate of Flight release, Certificate of Maintenance, Approved Certificates. Technical Publications, Aircraft Manual, Flight Manual, Aircraft Schedules. Registration Procedure, Certification, Identification and Marking of Aircraft.);		
Unit IV	**Aircraft Certification**	7
Modifications, concessions, airworthiness directives, service bulletins. Crew training and their licenses, approved inspection, approved materials, identification of approved materials. Bonded and quarantine stores. Storage of various aircraft maintenance products like rubber goods, various fluids.		
UNIT V	**Accident investigation procedures**	7
Circumstances under which C of A is suspended. ICAO and IATA regulations, Chicago and Warsaw conventions.		
Test + Revision		10
TOTAL HOURS		45

Suggested list of Students Activity,

- Presentation/Seminars by students on any recent technological developments based on the course.
- Periodic class quizzes conducted on a weekly / fortnightly based on the course.

1091236113	**Airworthiness Requirements**	L	T	P	C
THEORY		3	0	0	3

- Mini project that shall be an extension of any practical lab exercise to real-world application.

Text Book for Reference:

1. The Indian Aircraft Act and the Rules.
2. Manual of Civil Aviation.
3. DEF STANDARD 970.
4. Gran E L, Statistical Quality Control, McGraw Hill.
5. Civil Airworthiness Requirements.
6. AIRCRAFT MAINTENANCE Information Circulars (relating to Airworthiness).
7. Advisory Circulars - DGCA.
8. Civil Aircraft Airworthiness Information and Procedures (CAP 562).
9. Civil Aviation Requirements Section 2 – Airworthiness.

END SEMESTER QUESTION PATTERN - Theory Exam

Duration: 3 Hrs. **Max. Marks: 100**

Note: Answer Ten questions by selecting two questions from each unit. Each question carries 10 marks each.

Instruction to the Question Setters

Four questions will be asked from every unit, students should write any two questions for 10 marks. The question may have two subdivisions only.

1091236241	**Helicopter Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Introduction:

This course forms the first exposure to the discipline of Aeronautical Engineering. It starts with the familiarization of helicopters. The subject is built up slowly and steadily by introducing the terminology and basis of Helicopter mechanics, structures, power plant, systems etc. At the end of the subject, the student will be fully acquainted with the basics of Aeronautical Engineering.

Course Objectives:

The objective of this course is to enable the student to

- To Study the basic knowledge of Helicopter Construction, Helicopter Engine Systems and Helicopter Maintenance and General Precautions.

Course Outcomes:

On successful completion of this course, the student will be able to

CO1: Describe the configurations of Helicopters.

CO2: Understand the construction of Helicopters.

CO3: Learn the Helicopter systems.

CO4: Describe the Helicopter engine system.

CO5: Demonstrate the Helicopter maintenance.

1091236241	**Helicopter Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	2	2	-	1
CO2	3	2	1	2	2	-	1
CO3	3	-	1	1	1	-	1
CO4	3	3	1	1	1	-	1
CO5	3	2	1	2	2	-	1

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

Engage and Motivate: Instructors should actively engage students to boost their learning confidence.

Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.

Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.

Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.

Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.

Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

1091236241	**Helicopter Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	Cycle I Experiments	Cycle II Experiments	All Units	All Experiments	All Experiments
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

  Practical documents should be maintained for every experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total

marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

The details of the documents to be prepared as per the instruction below.

Each experiment should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next experiment.

This documentation can be carried out in a separate notebook or a printed manual or a file with documents. The student should draw the Circuit Diagram and take readings, do calculations and prepare the Graph/Result manually in the documents.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad and DOTE Official.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Assembling	15
B	Servicing	20
C	Disassembling	15
TOTAL		50
D	Practical Documents (As per the portions)	10
Total Marks		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

1091236241	**Helicopter Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Question pattern – Written Test Theory

Description		**Marks**	
Part – A	30 MCQ Questions.	30 X 1 Mark	30 Marks
Part – B	7 Questions to be answered out of 10 Questions.	7 X 10 Marks	70 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	**DESCRIPTION**	**MARKS**
A	Procedure	10
B	Assembling	15
C	Servicing	20
D	Disassembling	15
E	Written Test	30
F	Viva Voce	10
	TOTAL	100

Note: For the written test 30 MCQ shall be asked from the theory portions.

1091236241	**Helicopter Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Syllabus Contents

Theory Portion	
UNIT - I **INTRODUCTION TO HELICOPTETRS**	3
History of development of Helicopter - Glossary of terms used in helicopter technology and their definition- Various configurations of helicopter.- Various controls, rotors and engines with their type currently in use of helicopter.	
UNIT - II : **HELICOPTER CONSTRUCTION**	3
Main Structural components of helicopter their types, material, purpose and location Fuselage(cabin, centre section, ,tail boom Stabilizer Landing gears.	
UNIT – III **HELICOPTER SYSTEMS**	3
Main mechanical systems their construction , purpose and location - Transmission system - Main gear box - Tail gear box - Clutch - Freewheeling unit - Main rotor head - Tail drive shaft - Main drive shaft- Main Flight Control Systems their purpose, construction and location - Collective Pitch Control - Throttle Control – Governor - Cyclic Pitch Controls - Anti torque pedals - Swash plates - Hydraulic System - Purpose components and their function.	
UNIT - IV **HELICOPTER ENGINE SYSTEMS**	3
Engines :Purpose of engines - Types,construction,uses - Fuel Systems - Fuel supply System - Engine fuel control system(For reciprocating and turbine engines) - Lubricating system, its purpose and functioning.	
UNIT – V: **HELICOPTER MAINTENANCE AND GENERAL PRECAUTIONS**	3
Types of Inspections, Maintenance done on Helicopters - Introduction to Rigging and Control setting - Precautions to be observed during – Jacking – Towing – Braking - Supply of ground power- Refueling and Defueling.	
Practical Exercises:	

Ex.No	**Name of the Experiment**	**Period**
1	Develop a Model of Helicopter using balsa wood with four to five	50

1091236241	**Helicopter Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

	members group.	
	Practice + Test + Revision	10
	Total	75

Suggested List of Students Activity:

Presentation/Seminars by students on any recent technological developments based on the course.

Periodic class quizzes conducted on a weekly/fortnightly based on the course.

Text book for Reference:

1. 1. The Helicopter -John Fay
2. 2.Training Notes on Chetak Helicopter
3. 3 .Helicopter Engineering- Lalit Gupta
4. 4.Basic Helicopter Maintenance- Joseph Scchafer
5. 5 .Principles of Helicopter Flight-WJ Wagttendonk

1091236241	**Helicopter Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Equipment / Facilities required to conduct the Practical Course.

S.No	Name of the Equipment's	Quantity Required
1.	Serviceable Helicopter	1 No
2.	Assembling and dis assembling Tools	1 No

END SEMESTER EXAMINATIONS – PRACTICAL EXAM

Note:

All the exercises should be completed before the Board Practical Examinations. End Semester Practical examination should be conducted for all the exercises / experiments for 100 Marks. Students will be permitted to select any one exercise by lot or question paper supplied by the DOTE Exam section shall be used. The record of work done by the student should be submitted with a Bonafide Certificate.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Procedure	10
B	Assembling	15
C	Servicing	20
D	Disassembling	15
E	Written Test	30
F	Viva Voce	10
	TOTAL	100

Note: For the written test 30 MCQ shall be asked from the theory portions.

1091236242	**Rocket Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Introduction:

The subject deals with the Rocket engineering science & technology and its applications. It covers the types of rocket engines and how it works. Students will learn about the testing of rockets. They also study rocket dynamics and control systems of rockets.

Course Objectives:

Students will gain a basic understanding of rockets: how they work, why we have so many different types, and why they are important in space exploration.

To learn about the history of rockets and key rocketry pioneers.

To study different types of propulsion and control systems.

Course Outcomes:

On successful completion of this course, the student will be able to

CO1: Describe the history of rockets.

CO2: Understand how rockets work.

CO3: Learn working of rocket engines.

CO4: Describe the type of rocket engine.

CO5: Demonstrate the testing of rocket.

1091236242	**Rocket Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	2	2		1
CO2	3	2	2	2	2		1
CO3	3	-	1	1	2		1
CO4	3	3	1	1	2		1
CO5	3	2	3	2	2		1

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

Engage and Motivate: Instructors should actively engage students to boost their learning confidence.

Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.

Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.

Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.

Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.

Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

1091236242	**Rocket Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	Cycle I Experiments	Cycle II Experiments	All Units	All Experiments	All Experiments
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

  Practical documents should be maintained for every experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total

marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

The details of the documents to be prepared as per the instruction below.

Each experiment should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next experiment.

This documentation can be carried out in a separate notebook or a printed manual or a file with documents. The student should draw the Circuit Diagram and take readings, do calculations and prepare the Graph/Result manually in the documents.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad and DOTE Official.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Assembling	15
B	Servicing	20
C	Disassembling	15
TOTAL		50
D	Practical Documents (As per the portions)	10
Total Marks		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

1091236242	**Rocket Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Question pattern – Written Test Theory

Description		**Marks**	
Part – A	30 MCQ Questions.	30 X 1 Mark	30 Marks
Part – B	7 Questions to be answered out of 10 Questions.	7 X 10 Marks	70 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	**DESCRIPTION**	**MARKS**
A	Procedure	10
B	Assembling	15
C	Servicing	20
D	Disassembling	15
E	Written Test	30
F	Viva Voce	10
	TOTAL	100

Note: For the written test 30 MCQ shall be asked from the theory portions.

1091236242	**Rocket Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Syllabus Contents

Theory Portion	
UNIT - I **Introduction of Rockets**	3
History of Rockets – Rockets of the Modern ERA. **Why rockets needed.** Mission and payload – Trajectories – orbits – basic missile Trajectories.	
UNIT - II : **How Rockets Works**	3
Trust – Specific Impulse – weight flow rate – Tsio/kovsky's Rocket Equation - Staging – Rocket Dynamic, Control and guidance.	
UNIT – III **How Rockets Engine Works**	3
Basic rocket engine – Thermodynamic Expansion and the Rocket Nozzle – Exit Velocity – Rocket Engine Design Example.	
UNIT - IV **Types of Rocket Engine**	3
Solid Rocket – liquid propellant rocket engine – hybrid rocket engine – electric rocket engine – nuclear rocket engine – solar rocket engine – photon – based engine.	
UNIT – V: **Test the Rocket**	3
The system engineering process and rocket development – measuring trust – pressure vessel test – shake's bake test – drop & landing test – environment test – Destructiive Test – Modeling& simulation – roll out Test – Flight Test.	

Practical Exercises:

Ex.No	**Name of the Experiment**	**Period**
1	Develop a Model of Rocket using balsa wood with four to five members group	50
	Practice + Test + Revision	10
	Total	75

1091236242	**Rocket Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Suggested List of Students Activity:

Presentation/Seminars by students on any recent technological developments based on the course.

Periodic class quizzes conducted on a weekly/fortnightly based on the course.

Text book for Reference:

1. Travis. S. Taylor Cec Pras, Taylor & Francis Group Ration, London, New York.

Equipment / Facilities required to conduct the Practical Course.

S.No	**Name of the Equipment's**	**Quantity Required**
1.	Serviceable Rocket	1 No
2.	Assembling and dis assembling Tools	1 No

1091236242	**Rocket Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

END SEMESTER EXAMINATIONS – PRACTICAL EXAM

Note:

All the exercises should be completed before the Board Practical Examinations. End Semester Practical examination should be conducted for all the exercises / experiments for 100 Marks. Students will be permitted to select any one exercise by lot or question paper supplied by the DOTE Exam section shall be used. The record of work done by the student should be submitted with a Bonafide Certificate.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Procedure	10
B	Assembling	15
C	Servicing	20
D	Disassembling	15
E	Written Test	30
F	Viva Voce	10
	TOTAL	100

Note: For the written test 30 MCQ shall be asked from the theory portions.

1091236243	**Flight Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Introduction:

This course forms the first exposure to the discipline of Aeronautical Engineering. It starts with familiarization of Flight. The subject is built up slowly and steadily by introducing the terminology and basis of Flight mechanics, structures, power plant, systems etc. At the end of the subject, the student will be fully acquainted with the basics of Aeronautical Engineering.

Course Objectives:

Understand the Fundamentals of Aeromodelling.

Comprehend Principles of Aerodynamics for Model Aircraft.

Acquire Knowledge of Materials, Construction Techniques, and Control Systems.

Familiarize with Aeromodelling Engines and Power Systems.

Develop Proficiency in Flight Stability and Safety Considerations.

Course Outcomes:

On successful completion of this course, the student will be able to

CO1: Describe the history of flight modelling.

CO2: Understand the principle of aerodynamics.

CO3: Learn the construction of flight and its material.

CO4: Describe the aircraft engine and power systems.

CO5: Demonstrate the flight stability and dynamics.

1091236243	**Flight Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

CO/PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	2	2	1	-	-
CO2	3	2	2	2	2	-	-
CO3	3	-	2	2	1	-	-
CO4	3	3	3	2	1	-	-
CO5	3	2	3	2	1	-	-

Legend: 3-High Correlation, 2-Medium Correlation, 1-Low Correlation

Instructional Strategy:

Engage and Motivate: Instructors should actively engage students to boost their learning confidence.

Real-World Relevance: Incorporate relatable, real-life examples and engineering applications to help students understand and appreciate course concepts.

Interactive Learning: Utilize demonstrations and plan interactive student activities for an engaging learning experience.

Application-Based Learning: Employ a theory-demonstrate-practice-activity strategy throughout the course to ensure outcome-driven learning and employability.

Simulation and Real-World Practice: Conduct demonstrations and hands-on activities in a simulated environment, transitioning to real-world scenarios when possible.

Encourage Critical Analysis: Foster an environment where students can honestly assess experiment outcomes and analyze potential sources of error in case of discrepancies.

1091236243	**Flight Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Assessment Methodology:

	Continuous Assessment (40 marks)				**End Semester Examination (60 marks)**
	CA1	**CA2**	**CA3**	**CA4**	
Mode	Practical Test	Practical Test	Written Test Theory	Practical Test	Practical Examination
Portion	Cycle I Experiments	Cycle II Experiments	All Units	All Experiments	All Experiments
Duration	2 Periods	2 Periods	3 Hours	3 Hours	3 hours
Exam Marks	60	60	100	100	100
Converted to Marks	10	10	15	15	60
Marks	10		15	15	60
Tentative Schedule	7th Week	14th Week	15th Week	16th Week	

Note:

- **CA1 and CA2:** All the exercises/experiments should be completed as per the portions above and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation as below. The marks awarded shall be converted to 10 Marks for each assessment test. Best of one will be considered for the internal assessment of 10 Marks.

  Practical documents should be maintained for every experiment immediately after completion of the practice. The practical document should be submitted for the practical test. The same should be evaluated for 10 Marks for each exercise/experiment. The total

marks awarded should be converted to 10 Marks for the practical test as per the scheme of evaluation as below.

The details of the documents to be prepared as per the instruction below.

Each experiment should be completed on the day of practice. The same shall be evaluated for 10 marks on the day or next day of practice before commencement of the next experiment.

This documentation can be carried out in a separate notebook or a printed manual or a file with documents. The student should draw the Circuit Diagram and take readings, do calculations and prepare the Graph/Result manually in the documents.

The detailed date of the practices and its evaluations should be maintained in the course logbook. The log book and the practical documents should be submitted for the verification by the Flying Squad and DOTE Official.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Assembling	15
B	Servicing	20
C	Disassembling	15
TOTAL		50
D	Practical Documents (As per the portions)	10
Total Marks		60

- **CA 3:** Written Test for complete theory portions should be conducted for 100 Marks as per the question pattern below. The marks scored will be converted to 15 Marks for internal assessment.

1091236243	**Flight Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Question pattern – Written Test Theory

Description		**Marks**	
Part – A	30 MCQ Questions.	30 X 1 Mark	30 Marks
Part – B	7 Questions to be answered out of 10 Questions.	7 X 10 Marks	70 Marks
TOTAL			100 Marks

- **CA 4:** All the exercises/experiments should be completed and kept for the practical test. The students shall be permitted to select any one by lot for the test. The practical test should be conducted as per the scheme of evaluation below. After completion of all the exercises the practical test should be conducted as per End Semester Examination question pattern scheme of evaluation. The marks awarded should be converted to 15 Marks for the internal assessment.

SCHEME OF EVALUATION

Model Practical Examination and End Semester Examination - Practical Exam

PART	**DESCRIPTION**	**MARKS**
A	Procedure	10
B	Assembling	15
C	Servicing	20
D	Disassembling	15
E	Written Test	30
F	Viva Voce	10
	TOTAL	100

Note: For the written test 30 MCQ shall be asked from the theory portions.

1091236243	**Flight Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Syllabus Contents

Theory Portion	
UNIT - I **Introduction to Flight Modelling**	3
Definition and Scope of Flight Modeling, History and Evolution of Flight modeling, Types of Model Aircraft, Importance and Applications of Aeromodelling in Aeronautical Engineering.	
UNIT - II : **Principles of Aerodynamics for Model Aircraft:**	3
Basics of Aerodynamics, Newton's Laws of Motion and Aircraft Motion, Understanding the Four Forces in Equilibrium, Aerodynamic Shapes and Airfoils Characteristics, Wing Design and Aerodynamic Efficiency	
UNIT – III **Materials, Construction Techniques, and Control Systems**	3
Materials for Model Aircraft, Selection of Suitable Materials, Properties and Advantages of Commonly Used Materials, Building Techniques for Different Components, Wing Construction and Wing Loading, Fuselage and Tail Construction, Joining and Fastening Methods, Gluing and Bonding Techniques, Mechanical Fasteners and Their Application, Control Systems in Aero modelling, Mechanical Control Linkages	
UNIT - IV **Aero modelling Engines and Power Systems**	3
Types of Model Aircraft Engines, Glow Engines and Their Operation, Understanding Power-to-Weight Ratio, Importance of Power-to-Weight Ratio in Model Aircraft Performance.	
UNIT – V: **Flight Stability and Dynamics**	3
Stability and Balance in Model Aircraft, Static and Dynamic Stability, Center of Gravity (CG) and Center of Lift (CL) Considerations, Aerobatic Maneuvers and Their Principles, Loop, Roll, Immelmann Turn, and More, Understanding the Aerodynamics Behind Aerobatics	
Practical Exercises:	

Ex.No	**Name of the Experiment**	**Period**
1	Develop a Model of a two-seater Flight using balsa wood with four to five members of a group.	50

1091236243	**Flight Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

Practice + Test + Revision	10
Total	75

Suggested List of Students Activity:

Presentation/Seminars by students on any recent technological developments based on the course.

Periodic class quizzes conducted on a weekly/fortnightly based on the course.

Text book for Reference:

1. E H J Pallet: Aircraft Instruments - Principles and Applications, Himalayan Books.
2. Mechanics of Flight By - A.C.Kermode.
3. E H J Pallet, Automatic Flight Control, Blackwell.
4. Leach Malvino, Digital Principles and Applications, Tata McGraw Hill.
5. "The Basics of Aeromodelling" by David Boddington.
6. "Model Aircraft Aerodynamics" by Martin Simons.
7. "Aeromodelling: An Introduction to Flight for Hobbyists" by Roger Winger.
8. "RCadvisor's Model Airplane Design Made Easy" by Carlos Reyes.
9. "The Art of Flying Model Aircraft: A Beginner's Guide" by Chris Chianelli Geared towards beginners.

Equipment / Facilities required to conduct the Practical Course.

S.No	Name of the Equipment's	Quantity Required
1.	Serviceable Flight	1 No
2.	Assembling and disassembling Tools	1 No

1091236243	**Flight Modeling**	L	T	P	C
PRACTICUM		1	0	4	3

END SEMESTER EXAMINATIONS – PRACTICAL EXAM

Note:

All the exercises should be completed before the Board Practical Examinations. End Semester Practical examination should be conducted for all the exercises / experiments for 100 Marks. Students will be permitted to select any one exercise by lot or question paper supplied by the DOTE Exam section shall be used. The record of work done by the student should be submitted with a Bonafide Certificate.

SCHEME OF EVALUATION

PART	DESCRIPTION	MARKS
A	Procedure	10
B	Assembling	15
C	Servicing	20
D	Disassembling	15
E	Written Test	30
F	Viva Voce	10
	TOTAL	100

Note: For the written test 30 MCQ shall be asked from the theory portions.

1091236351	**Internship**	540 Periods	C
PROJECT			12

Introduction

Internships in educational institutions are designed to provide students with practical experience in their field of study and to bridge the gap between academic knowledge and professional practice.

Objectives

After completing Internship, Interns will be able to,

- Apply the theoretical knowledge and skill during performance of the tasks assigned in internship.
- Demonstrate soft skills such as time management, positive attitude and communication skills during performance of the tasks assigned in internship.
- Document the Use case on the assigned Task.
- Enable interns to apply theoretical knowledge gained in the classroom to real-world practical applications.
- Provide hands-on experience in the industrial practices.
- Develop essential skills such as communication, organization, teamwork, and problem-solving.
- Enhance specific skills related to the intern's area of focus.
- Offer a realistic understanding of the daily operations and responsibilities.
- Provide opportunities to work under the guidance of experienced supervisors and administrators.
- Allow interns to explore different career paths.
- Help interns make informed decisions about their future career goals based on first hand experience.
- Facilitate the establishment of professional relationships with supervisor, administrators, and other professionals in the field.
- Provide access to a network of contacts that can be beneficial for future job opportunities and professional growth.

1091236351	**Internship**	540 Periods	C
PROJECT			12

- Foster personal growth by challenging interns to step out of their comfort zones and take on new responsibilities.
- Build confidence and self-efficacy through successful completion of internship tasks and projects.
- Give insight into the policies, regulations, and administrative practices.
- Allow interns to observe and understand the implementation of standards and policies in practice.
- Provide opportunities for constructive feedback from supervisors and mentors, aiding in the intern's professional development.
- Enable self-assessment and reflection on strengths, areas for improvement, and career aspirations.
- Encourage sensitivity to the needs and backgrounds of different groups, promoting inclusive and equitable industrial practices.

Course Outcomes

CO 1: Demonstrate improved skills.

CO 2: Exhibit increased professional behavior.

CO 3: Apply theoretical knowledge and principles in real-world practices.

CO 4: Develop and utilize assessment tools to evaluate the learning and practices.

CO 5: Engage in reflective practice to continually improve their learning and professional growth.

Facilitating the Interns by an Internship Provider.

Orient intern in the new workplace. Give interns an overview of the organization, Explain the intern's duties and introduce him or her to co-workers.

Develop an internship job description with clear deliverables and timeline.

Allow the interns in meetings and provide information, resources, and opportunities for professional development.

1091236351	**Internship**	540 Periods	C
PROJECT			12

The interns have never done this kind of work before, they want to know that their work is measuring up to organizational expectations, hence provide professional guidance and mentoring to the intern.

Daily progress report of Intern is to be evaluated by industry supervisor. examine what the intern has produced and make suggestions. Weekly supervision meetings can help to monitor the intern's work.

Duties Responsibilities of the Faculty Mentor

To facilitate the placement of students for the internship

To liaison between the college and the internship provider

To assist the Industrial Training Supervisor during assessment

Instructions to the Interns

- Students shall report to the internship provider on the 1st day as per the internship schedule.
- Intern is expected to learn about the organization, its structure, product range, market performance, working philosophy etc.
- The interns shall work on live projects assigned by the internship provider.
- The Intern shall record all the activities in the daily log book and get the signature of the concerned training supervisor.
- Intern shall have 100% attendance during internship programme. In case of unavoidable circumstances students may avail leave with prior permission from the concerned training supervisor of the respective internship provider. However, the maximum leave permitted during internship shall be as per company norms where they are working and intern shall report the leave sanctioned details to their college faculty mentor.
- The interns shall abide all the Rules and Regulations of internship provider
- Intern shall follow all the safety Regulations of internship provider.
- On completion of the internship, the intern shall report to the college and submit the internship certificate mentioning duration of internship, evaluation of interns by internship provider, Student's Diary and Comprehensive Training Report.

1091236351	**Internship**	540 Periods	C
PROJECT			12

Attendance Certification

Every month students have to get their attendance certified by the industrial supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the institution supervisor. Regularity in attendance and submission of report will be duly considered while awarding the Internal Assessment mark.

Training Reports

The students have to prepare two types of reports: Weekly reports in the form of a diary to be submitted to the concerned staff in-charge of the institution. This will be reviewed while awarding Internal

Industrial Training Diary

Students are required to maintain the record of day-to-day work done. Such a record is called Industrial training Diary. Students have to write this report regularly. All days for the week should be accounted for clearly giving attendance particulars (Presence, absence, Leave, Holidays etc.). The concern of the Industrial supervisor is to periodically check these progress reports.

Comprehensive Training Report

In addition to the diary, students are required to submit a comprehensive report on training with details of the organisation where the training was undergone after attestation by the supervisors. The comprehensive report should incorporate study of plant/product/process/construction along with intensive in-depth study on any one of the topics such as processes, methods, tooling, construction and equipment, highlighting aspects of quality, productivity and system. The comprehensive report should be completed in the last week of Industrial training.

Any data, drawings etc. should be incorporated with the consent of the Organisation.

1091236351	**Internship**	540 Periods	C
PROJECT			12

Scheme of Evaluation

Internal Assessment

Students should be assessed for 50 Marks by industry supervisor and polytechnic faculty mentor during 8th Week and 15th Week. The total marks (50 + 50) scored shall be converted to 40 marks for the Internal Assessment.

Sl. No.	Description	Marks
A	Punctuality and regularity. (Attendance)	10
B	Level / proficiency of practical skills acquired. Initiative in learning / working at site	10
C	Ability to solve practical problems. Sense of responsibility	10
D	Self expression / communication skills. Interpersonal skills / Human Relation.	10
E	Report and Presentation.	10
Total		50

1091236351	**Internship**	540 Periods	C
PROJECT			12

End Semester Examination - Project Exam

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairman Board of Examinations after the completion of internship period (Dec - May). The marks scored will be converted to 60 marks for the End Semester Examination.

Sl. No.	Description	Marks
A	Daily Activity Report.	20
B	Comprehensive report on Internship, Relevant Internship Certificate from the concerned department.	30
C	Presentation by the student at the end of the Internship.	30
D	Viva Voce	20
Total		100

1091236353	**Fellowship**	540 Periods	C
PROJECT			12

Introduction

The Fellowship in the Diploma in Engineering program is designed to provide aspiring engineers with a comprehensive educational experience that combines theoretical knowledge with practical skills. This fellowship aims to cultivate a new generation of proficient and innovative engineers who are equipped to meet the challenges of a rapidly evolving technological landscape.

Participants in this fellowship will benefit from a robust curriculum that covers core engineering principles, advanced technical training, and hands-on projects. The program emphasizes interdisciplinary learning, encouraging fellows to explore various branches of engineering, from mechanical and civil to electrical, electronics & communication and computer engineering. This approach ensures that graduates possess a versatile skill set, ready to adapt to diverse career opportunities in the engineering sector.

In addition to academics, the fellowship offers numerous opportunities for professional development. Fellows will engage with industry experts through seminars, workshops, and internships, gaining valuable insights into real-world applications of their studies. Collaborative projects and research initiatives foster a culture of innovation, critical thinking, and problem-solving, essential attributes for any successful engineer.

By offering this fellowship, participants become part of a vibrant community of learners and professionals dedicated to advancing the field of engineering. The program is committed to supporting the growth and development of each fellow, providing them with the tools and resources needed to excel both academically and professionally.

The Fellowship in the Diploma in Engineering is more than just an educational endeavor; it is a transformative journey that equips aspiring engineers with the knowledge, skills, and experiences necessary to make significant contributions to society and the engineering profession.

1091236353	**Fellowship**	540 Periods	C
PROJECT			12

Objectives

After completing students will be able to,

- Provide fellows with a solid foundation in core engineering principles and advanced technical knowledge across various engineering disciplines.
- Equip fellows with hands-on experience through laboratory work, projects, and internships, ensuring they can apply theoretical knowledge to real-world scenarios.
- Promote interdisciplinary understanding by encouraging exploration and integration of different engineering fields, fostering versatility and adaptability in fellows.
- Encourage innovation and creativity through research projects and collaborative initiatives, enabling fellows to develop new solutions to engineering challenges.
- Facilitate professional growth through workshops, seminars, and interactions with industry experts, preparing fellows for successful careers in engineering.
- Develop critical thinking and problem-solving skills, essential for tackling complex engineering problems and making informed decisions.
- Strengthen connections between academia and industry by providing opportunities for internships, industry visits, and guest lectures from professionals.
- Foster leadership qualities and teamwork skills through group projects and collaborative activities, preparing fellows for leadership roles in their future careers.
- Instill a sense of ethical responsibility and awareness of the social impact of engineering practices, encouraging fellows to contribute positively to society.
- Promote a culture of lifelong learning, encouraging fellows to continually update their knowledge and skills in response to technological advancements and industry trends.
- Prepare fellows to work in a global engineering environment by exposing them to international best practices, standards, and cross-cultural experiences.

1091236353	**Fellowship**	540 Periods	C
PROJECT			12

Course Outcomes

CO 1: Demonstrate a strong understanding of core engineering principles and possess the technical skills necessary to design, analyze, and implement engineering solutions across various disciplines.

CO 2: Apply theoretical knowledge to practical scenarios, effectively solving engineering problems through hands-on projects, laboratory work, and internships.

CO 3: Exhibit the ability to conduct research, develop innovative solutions, and contribute to advancements in engineering through critical thinking and creative approaches to complex challenges.

CO 4: Understand and adhere to professional and ethical standards in engineering practice, demonstrating responsibility, integrity, and a commitment to sustainable and socially responsible engineering.

CO 5: Enhance strong communication skills, both written and verbal, and be capable of working effectively in teams, demonstrating leadership and collaborative abilities in diverse and multidisciplinary environments.

Important points to consider to select the fellowship project.

Selecting the right fellowship project is crucial for maximizing the educational and professional benefits of a Diploma in Engineering program.

- **Relevance to Future Plans**: Choose a project that aligns with your long-term career aspirations and interests. This alignment will ensure that the skills and knowledge you gain will be directly applicable to your desired career path.
- **Industry Relevance**: Consider the current and future relevance of the project within the industry. Opt for projects that address contemporary challenges or emerging trends in engineering.
- **Access to Facilities**: Ensure that the necessary facilities, equipment, and materials are available to successfully complete the project. Lack of resources can hinder the progress and quality of your work.

1091236353	**Fellowship**	540 Periods	C
PROJECT			12

- **Mentorship and Guidance**: Select a project that offers strong mentorship and support from experienced faculty members or industry professionals. Effective guidance is crucial for navigating complex problems and achieving project objectives.
- **Project Scope**: Assess the scope of the project to ensure it is neither too broad nor too narrow. A well-defined project scope helps in setting clear objectives and achievable milestones.
- **Feasibility**: Evaluate the feasibility of completing the project within the given timeframe and with the available resources. Consider potential challenges and ensure you have a realistic plan to address them.
- **Technical Skills**: Choose a project that allows you to develop and enhance important technical skills relevant to your field of study. Practical experience in using specific tools, technologies, or methodologies can be highly beneficial.
- **Soft Skills**: Consider projects that also offer opportunities to develop soft skills such as teamwork, communication, problem-solving, and project management.
- **Innovative Thinking**: Select a project that encourages creativity and innovative problem-solving. Projects that push the boundaries of traditional engineering approaches can be particularly rewarding.
- **Societal Impact**: Consider the potential impact of your project on society or the engineering community. Projects that address significant challenges or contribute to social good can be highly fulfilling and make a meaningful difference.

Guidelines to select Fellowship

- Ensure the program is accredited by a recognized accrediting body and has a strong reputation for quality education in engineering.
- Ensure it covers core engineering principles that align with your interests and career goals.
- Investigate the qualifications and experience of the faculty mentor. Look for programs with faculty who have strong academic backgrounds, industry experience, and active involvement in research.

1091236353	**Fellowship**	540 Periods	C
PROJECT			12

- Check if the program provides adequate hands-on training opportunities, such as laboratory work, workshops, and access to modern engineering facilities and equipment.
- Assess the program's connections with industry. Strong partnerships with companies can lead to valuable internship opportunities, industry projects, and exposure to real-world engineering challenges.
- Explore the availability of research opportunities. Participation in research projects can enhance your learning experience and open doors to innovative career paths.
- Look for programs that offer professional development resources, such as workshops, seminars, and networking events with industry professionals and alumni.
- Ensure the program provides robust support services, including academic advising, career counseling, mentorship programs, and assistance with job placement after graduation.
- Consider the cost of the program and available financial aid options, such as scholarships, grants, and fellowships. Evaluate the return on investment in terms of career prospects and potential earnings.
- Research the success of the program's alumni. High employment rates and successful careers of past graduates can indicate the program's effectiveness in preparing students for the engineering field.

Duties Responsibilities of the Faculty Mentor

Each student should have a faculty mentor for the Institute.

- Get the approval from the Chairman Board of Examinations with the recommendations of the HOD/Principal for the topics.
- Provide comprehensive academic advising to help fellows select appropriate specializations, and research projects that align with their interests and career goals.
- Guide fellows through their research projects, offering expertise and feedback to ensure rigorous methodology, innovative approaches, and meaningful contributions to the field.
- Assist fellows in developing technical and professional skills through hands-on projects, laboratory work, and practical applications of theoretical knowledge.

1091236353	**Fellowship**	540 Periods	C
PROJECT			12

- Offer career advice and support, helping fellows explore potential career paths, prepare for job searches, and connect with industry professionals and opportunities.
- Provide personal mentorship, fostering a supportive relationship that encourages growth, resilience, and a positive academic experience.
- Facilitate connections between fellows and industry professionals, alumni, and other relevant networks to enhance their professional opportunities and industry exposure.
- Ensure fellows have access to necessary resources, including research materials, lab equipment, software, and academic literature.
- Regularly monitor and evaluate the progress of fellows, providing constructive feedback and guidance to help them stay on track and achieve their goals.
- Instill and uphold high ethical and professional standards, encouraging fellows to practice integrity and responsibility in their work.
- Assist with administrative tasks related to the fellowship program, such as preparing progress reports, writing recommendation letters, and facilitating grant applications.
- Organize and participate in workshops, seminars, and other educational events that enhance the learning experience and professional development of fellows.
- Address any issues or conflicts that arise, providing mediation and support to ensure a positive and productive academic environment.

Instructions to the Fellowship Scholar

- Regularly meet with your faculty mentor for guidance on academic progress, research projects, and career planning. Be proactive in seeking advice and support from your mentor.
- Develop strong organizational skills. Use planners, calendars, and task management tools to keep track of assignments, project deadlines, and study schedules. Prioritize tasks to manage your time efficiently.
- Take advantage of opportunities to participate in research projects and hands-on activities. These experiences are crucial for applying your theoretical knowledge and gaining practical skills.

1091236353	**Fellowship**	540 Periods	C
PROJECT			12

- Focus on improving essential professional skills such as communication, teamwork, problem-solving, and leadership. Participate in workshops and seminars that enhance these competencies.
- Actively seek networking opportunities through industry events, seminars, and meetings. Establish connections with peers, alumni, and professionals in your field to build a strong professional network.
- Seek internships, co-op programs, or part-time jobs related to your field of study. Real-world experience is invaluable for understanding industry practices and enhancing your employability.
- Uphold high ethical standards in all your academic and professional activities. Practice integrity, honesty, and responsibility. Adhere to the ethical guidelines and standards set by your institution and the engineering profession.
- Adopt a mindset of lifelong learning. Stay updated with the latest developments and trends in engineering by reading industry journals, attending conferences, and taking additional courses.

Documents to be submitted by the student to offer fellowship.

- **Completed Application Form**: This is typically the standard form provided by the institution or fellowship program that includes personal information, educational background, and other relevant details.
- **Detailed CV/Resume**: A comprehensive document outlining your educational background, knowledge experience, interest in research experience, publications, presentations, awards, and other relevant achievements if any.
- **Personal Statement**: A document explaining your motivation for applying to the fellowship, your career goals, how the fellowship aligns with those goals, and what you intend to achieve through the program.
- **Recommendation Letters**: Letters from faculty mentor, employer, or professionals who can attest to your academic abilities, professional skills, and suitability for the fellowship.

1091236353	**Fellowship**	540 Periods	C
PROJECT			12

- **Proposal/Description**: A detailed proposal or description of the fellowship project or study you plan to undertake during the fellowship. This should include objectives, methodology, expected outcomes, and significance of the project.
- **Enrollment Verification**: Documentation verifying your current acceptance status in the academic institution or industry where the fellowship will be conducted.
- **Funding Information**: Details about any other sources of funding or financial aid you are receiving, if applicable. Some fellowships may also require a budget proposal for the intended use of the fellowship funds.
- **Samples of Work**: Copies of the relevant work that demonstrates your capabilities and accomplishments in your field.
- **Endorsement Letter**: A letter from your current academic institution endorsing your application for the fellowship, if required.
- **Ethical Approval Documents**: If your research involves human subjects or animals, you may need to submit proof of ethical approval from the relevant ethics committee.
- **Additional Documents**: Any other documents requested by the fellowship program required by the institution.

Attendance Certification

Every month students have to get their attendance certified by the supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the faculty mentor. Regularity in attendance and submission of report will be duly considered while awarding the Internal Assessment mark.

1091236353	**Fellowship**	540 Periods	C
PROJECT			12

Rubrics for Fellowship. Review I & II.

Sl. No.	Topics	Description
1	Alignment with Objectives	Assess how well the project aligns with the stated objectives and requirements. Determine if the student has addressed the key aspects outlined in the project guidelines.
2	Depth of Research:	Evaluate the depth and thoroughness of the literature review. Assess the student's ability to identify and address gaps in existing research.
3	Clarity of Objectives:	Check if the student has clearly defined and articulated the objectives of the project. Ensure that the objectives are specific, measurable, achievable, relevant, and time-bound (SMART).
4	Methodology and Data Collection:	Evaluate the appropriateness and justification of the research methodology. Assess the methods used for data collection and their relevance to the research questions.
5	Analysis and Interpretation:	Examine the quality of data analysis techniques used. Assess the student's ability to interpret results and draw meaningful conclusions.
6	Project Management:	Evaluate the project management aspects, including adherence to timelines and milestones. Assess the student's ability to plan and execute the project effectively.

1091236353	**Fellowship**	540 Periods	C
PROJECT			12

7	Documentation and Reporting:	Check the quality of documentation, including code, experimental details, and any other relevant materials. Evaluate the clarity, structure, and coherence of the final report.
8	Originality and Creativity:	Assess the level of originality and creativity demonstrated in the project. Determine if the student has brought a unique perspective or solution to the research problem.
9	Critical Thinking:	Evaluate the student's critical thinking skills in analyzing information and forming conclusions. Assess the ability to evaluate alternative solutions and make informed decisions.
10	Problem-Solving Skills:	Evaluate the student's ability to identify and solve problems encountered during the project. Assess adaptability and resilience in the face of challenges.

1091236353	**Fellowship**	540 Periods	C
PROJECT			12

INTERNAL MARKS - 40 Marks

As per the rubrics each topic should be considered for the Review I and Review II. Equal weightage should be given for all the topics. It should be assessed by a faculty mentor and the industrial professional or research guide.

Review 1 shall be conducted after 8th week and Review 2 shall be conducted after 14th week in the semester. Average marks scored in the reviews shall be considered for the internal assessment of 30 Marks.

Scheme of Evaluation

PART	DESCRIPTION	MARKS
A	Assessment as per the rubrics.	30
B	Attendance	10
Total		**40**

1091236353	**Fellowship**	540 Periods	C
PROJECT			12

END SEMESTER EXAMINATION - Project Exam

Students should be assessed for 100 Marks both by the internal examiner and external examiner appointed by the Chairman Board of Examinations after the completion of fellowship. The marks scored will be converted to 60 marks for the End Semester Examination.

Sl. No.	Description	Marks
A	Daily Activity Report.	20
B	Comprehensive report of the Fellowship Work.	30
C	Presentation by the student.	30
D	Viva Voce	20
Total		100

1091236374	**In-house Project**	540 Periods	C
PROJECT			12

Introduction

Every student must do one major project in the Final year of their program. Students can do their major project in Industry or R&D Lab or in-house or a combination of any two for the partial fulfillment for the award of Diploma in Engineering.

For the project works, the Department will constitute a three-member faculty committee to monitor the progress of the project and conduct reviews regularly.

If the projects are done in-house, the students must obtain the bonafide certificate for project work from the Project supervisor and Head of the Department, at the end of the semester. Students who have not obtained the bonafide certificate are not permitted to appear for the Project Viva Voce examination.

For the projects carried out in Industry, the students must submit a separate certificate from Industry apart from the regular bonafide certificate mentioned above. For Industry related projects there must be one internal faculty advisor / Supervisor from Industry (External), this is in addition to the regular faculty supervision.

The final examination for project work will be evaluated based on the final report submitted by the project group **of not exceeding four students**, and the viva voce by an external examiner.

Objectives

Academic project work plays a crucial role in the education of Diploma in Engineering students, as it helps them apply theoretical knowledge to practical situations and prepares them for real-world engineering challenges.

- **Integration of Knowledge**: Consolidate and integrate theoretical knowledge acquired in coursework to solve practical engineering problems.
- **Skill Development**: Enhance technical skills related to the specific field of engineering through hands-on experience and application.
- **Problem-Solving Abilities**: Develop critical thinking and problem-solving abilities by addressing complex engineering issues within a defined scope.
- **Project Management**: Gain experience in project planning, execution, and management, including setting objectives, timelines, and resource allocation.

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- **Teamwork and Collaboration**: Foster teamwork and collaboration by working in multidisciplinary teams to achieve project goals and objectives.
- **Research Skills**: Acquire research skills by conducting literature reviews, gathering relevant data, and applying research methodologies to investigate engineering problems.
- **Innovation and Creativity**: Encourage innovation and creativity in proposing and developing engineering solutions that may be novel or improve upon existing methods.
- **Communication Skills**: Improve communication skills, both oral and written, by presenting project findings, writing technical reports, and effectively conveying ideas to stakeholders.
- **Ethical Considerations**: Consider ethical implications related to engineering practices, including safety, environmental impact, and societal concerns.
- **Professional Development**: Prepare for future professional roles by demonstrating professionalism, initiative, and responsibility throughout the project lifecycle.

Course Outcomes

CO 1: Demonstrate the ability to apply theoretical concepts and principles learned in coursework to solve practical engineering problems encountered during the project.

CO 2: Develop and enhance technical skills specific to the field of engineering relevant to the project, such as design, analysis, simulation, construction, testing, and implementation.

CO 3: Apply critical thinking and problem-solving skills to identify, analyze, and propose solutions to engineering challenges encountered throughout the project lifecycle.

CO 4: Acquire project management skills by effectively planning, organizing, and executing project tasks within defined timelines and resource constraints.

CO 5: Improve communication skills through the preparation and delivery of project reports, presentations, and documentation that effectively convey technical information to stakeholders.

Important points to consider to select the In-house project.

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- Selecting a project work in Diploma Engineering is a significant decision that can greatly influence your learning experience and future career prospects.
- Choose a project that aligns with your career aspirations and interests within the field of engineering. Consider how the project can contribute to your professional development and future opportunities.
- Ensure the project aligns with your coursework and specialization within the Diploma program. It should complement and build upon the knowledge and skills you have acquired in your studies.
- Evaluate the scope of the project to ensure it is manageable within the given timeframe, resources, and constraints. Avoid projects that are overly ambitious or impractical to complete effectively.
- Assess the availability of resources needed to conduct the project, such as equipment, materials, laboratory facilities, and access to relevant software or tools. Lack of resources can hinder project progress.
- Select a project that genuinely interests and motivates you. A project that captures your curiosity and passion will keep you engaged and committed throughout the project duration.
- Consider the availability and expertise of faculty advisors or industry mentors who can provide guidance and support throughout the project. Effective mentorship is crucial for success.
- Clearly define the learning objectives and expected outcomes of the project. Ensure that the project will help you achieve specific learning goals related to technical skills, problem-solving, and professional development.
- Look for opportunities to propose innovative solutions or explore new methodologies within your project. Projects that encourage creativity can set you apart and enhance your learning experience.
- Consider ethical implications related to the project, such as safety protocols, environmental impact, and compliance with ethical guidelines in research and engineering practices.

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- Evaluate whether the project offers opportunities for collaboration with peers, experts from other disciplines, or industry partners. Interdisciplinary projects can broaden your perspective and enhance your teamwork skills.
- Consider the potential impact of your project on society or the engineering community. Projects that address significant challenges or contribute to social good can be highly fulfilling and make a meaningful difference.

By carefully considering these points, Diploma Engineering students can make informed decisions when selecting project work that not only enhances their academic learning but also prepares them for successful careers in engineering.

Duties Responsibilities of the internal faculty advisor.

Each group should have an internal faculty advisor assigned by the HOD/Principal.

- The in-house project should be approved by the project monitoring committee constituted by the Chairman Board of Examinations.
- The in-house project should be selected in the fifth semester itself. Each in-house project shall have a maximum of four students in the project group.
- Provide comprehensive academic advising to help in the selection of appropriate in-house project that align with their interests and career goals.
- Offer expertise and feedback to ensure rigorous methodology, innovative approaches, and meaningful contributions to the field.
- Assist in developing technical and professional skills through hands-on projects, laboratory work, and practical applications of theoretical knowledge.
- Provide personal mentorship, fostering a supportive relationship that encourages growth, resilience, and a positive academic experience.
- Facilitate connections between students and industry professionals, alumni, and other relevant networks to enhance their professional opportunities and industry exposure.
- Ensure students have access to necessary resources, including research materials, lab equipment, software, and academic literature.

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- Regularly monitor and evaluate the progress of the in-house project, providing constructive feedback and guidance to help them stay on track and achieve their goals.
- Instill and uphold high ethical and professional standards, encouraging students to practice integrity and responsibility in their work.
- Assist in preparing progress reports, writing recommendation letters, and facilitating grant applications.
- Organize and participate in workshops, seminars, and other educational events that enhance the learning experience and professional development .
- Address any issues or conflicts that arise, providing mediation and support to ensure a positive and productive academic environment.

Instructions to the students.

- Regularly meet with your internal faculty advisor for guidance on academic progress, research projects, and career planning. Be proactive in seeking advice and support from your faculty advisor.
- Use planners, calendars, and task management tools to keep track of assignments, project deadlines, and study schedules. Prioritize tasks to manage your time efficiently.
- Take advantage of opportunities to participate in in-house projects and hands-on activities. These experiences are crucial for applying your theoretical knowledge and gaining practical skills.
- Focus on improving essential professional skills such as communication, teamwork, problem-solving, and leadership. Participate in workshops and seminars that enhance these competencies.
- Actively seek networking opportunities through industry events, seminars, and meetings. Establish connections with peers, alumni, and professionals in your field to build a strong professional network.
- Seek internships, co-op programs, or part-time jobs related to your field of study. Real-world experience is invaluable for understanding industry practices and enhancing your employability.

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- Uphold high ethical standards in all your academic and professional activities. Practice integrity, honesty, and responsibility. Adhere to the ethical guidelines and standards set by your institution and the engineering profession.
- Adopt a mindset of lifelong learning. Stay updated with the latest developments and trends in engineering by reading industry journals, attending conferences, and taking additional courses.

Documents to be submitted by the student for an in-house project.

Submit a printed report of your in-house project work along with the fabrication model / analysis report for the End Semester Examination.

Rubrics for In-House Project Work

Sl. No.	Topics	Description
1	Objectives	Clearly defined and specific objectives outlined. Objectives align with the project's scope and purpose.
2	Literature Review	Thorough review of relevant literature. Identification of gaps and justification for the project's contribution.
3	Research Design and Methodology	Clear explanation of the research design. Appropriateness and justification of chosen research methods.
4	Project Management	Adherence to project timeline and milestones. Effective organization and planning evident in the project execution.

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5	Documentation	Comprehensive documentation of project details. Clarity and completeness in recording methods, results, and challenges.
6	Presentation Skills	Clear and articulate communication of project findings. Effective use of visuals, if applicable.
7	Analysis and Interpretation	In-depth analysis of data. Clear interpretation of results in the context of research questions.
8	Problem-Solving	Demonstrated ability to identify and address challenges encountered during the project. Innovative solutions considered where applicable.
9	Professionalism and Compliance	Adherence to ethical standards in research. Compliance with project guidelines and requirements.
10	Quality of Work	Overall quality and contribution of the project to the field. Demonstrated effort to produce high-quality work.

SCHEME OF EVALUATION

The mark allocation for Internal and End Semester Viva Voce are as below.

Internal Marks (40 Marks)*		
Review 1 (10 Marks)	Review 2 (15 Marks)	Review 3 (15 marks)
Committee: 5 Marks. Supervisor: 5 Marks	Committee: 7.5 Marks Supervisor: 7.5 Marks	Committee: 7.5 Marks Supervisor: 7.5 Marks

Note: * The rubrics should be followed for the evaluation of the internal marks during reviews.

END SEMESTER EXAMINATION - Project Exam

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The performance of each student in the project group would be evaluated in a viva voce examination conducted by a committee consisting of an external examiner and the project supervisor and an internal examiner.

End Semester (100)#			
Record (20 Marks)	Presentation (20 Marks)	Viva Voce (20 Marks)	Model / Analysis Report (40 Marks)
External: 10 Internal: 5 Supervisor: 5	External: 10 Internal: 5 Supervisor: 5	External: 10 Internal: 5 Supervisor: 5	External: 20 Internal: 10 Supervisor: 10

 # The marks scored will be converted to 60 Marks.