ANNEXURE- I

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

1092 DIPLOMA IN AERONAUTICAL ENGINEERING SYLLABUS

N – SCHEME

(Implemented from the Academic year 2020-2021 onwards)

CURRICULUM OUTLINE

FOURTH SEMESTER (FT)

Subject Code	Subjects	HOURS PER WEEK			
		Theory Hours	Tutorial / Drawing	Practical Hours	Total Hours
4092410	Materials and Testing processes	5	-	-	5
4092420	Aircraft Electrical Systems	5	-	-	5
4092430	Aerodynamics	5	-	-	5
4092440	Metrology and Measurements	5	-	-	4
4092450	Materials and Testing processes practical	-	-	4	5
4092460	Aircraft Electrical Systems practical			4	4
4092470	Aerodynamics practical	-	-	4	4
		20	-	12	32
Extra / Co-Curricular activities					
Physical Education		-	-	-	2
Library		-	-	-	1
TOTAL					35

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

1092 DIPLOMA IN AERONAUTICAL ENGINEERING SYLLABUS

N – SCHEME

(To be implemented for the students admitted from the year 2020-21 onwards)

SCHEME OF EXAMINATION

FOURTH SEMESTER (FT)

SUBJECT CODE NO.	SUBJECT	EXAMINATION MARKS		TOTALMARKS	MINIMUM FOR PASS	DURATION OF EXAM(HOURS)
		INTERNAL ASSESSMENTMARKS	BOARD EXAM MARKS (CONVERTED TO 75)			
4092410	Materials and Testing processes	25	100	100	40	3
4092420	Aircraft Electrical Systems	25	100	100	40	3
4092430	Aerodynamics	25	100	100	40	3
4092440	Metrology and Measurements	25	100	100	40	3
4092450	Materials and Testing processes practical	25	100	100	50	3
4092460	Aircraft Electrical Systems practical	25	100	100	50	3
4092470	Aerodynamics practical	25	100	100	50	3

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS N-SCHEME

(Implements from the Academic year 2020-2021onwards)

Course Name : DIPLOMA IN AERONAUTICAL ENGINEERING
Course Code : 1092
Subject Code : 4092410
Semester : IV
Subject Title : Materials and Testing Processes

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
Materials and Testing Processes	**5 Hrs**	**80 Hrs**	**25**	**100***	**100**	**3 Hrs**

*** Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Topics and Allocation of Hours

UNIT	Topic	Hrs.
I	Aircraft Material Ferrous & Non-Ferrous	15
II	Aircraft Materials - Composite and Non- Metallic & Wooden Structure	15
III	Fabric covering & Non-Metals & Fasteners, Screw threads	15
IV	Bolts, studs and screws & Locking devices	14
V	Aircraft rivets and Riveting	14
Test & Model Exam		7
Total		**80**

RATIONALE:

The high strength over weight ratio of materials required in Aeronautical Engineering, calls for study of sub materials by students at this stage. The need for surface treatments against corrosion and for improved strengths is essential. In this regard, various processes of manufacturing are studied in this subject by the students

OBJECTIVES:

On completion of the following units of syllabus contents, the students must be able to:

- To Study the basic knowledge of Aircraft Material Ferrous & Non-Ferrous
- To understand the different aerospace material properties.
- To know about different metallic materials testing methods.
- To know about the non-metallic materials like sealant, bonding agents etc.
- To understand the wooden structure characterisations, maintenance of wooden structures.
- To study about aerospace fasteners like Bolts, studs and screws & locking devices and Aircraft rivets.
- To Study the new class of composite materials.
- To know about NDE of composites and understand the different types of mechanical testing of composites

Aircraft Material and Processes
DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**Material Properties** This part presents the basic concepts of material properties. Drivers for aircraft material development: Lightweight, Elasticity, Plasticity Strength, Stiffness, Corrosion resistance, Fatigue and Damage Tolerance etc. Stress-strain curves for metals. Tension, compression and shear loading.	15
II	**Aircraft Metallic Materials** (a) Characteristics, properties and identification of common alloy steels used in aircraft; Heat treatment and application of alloy steels; (b) Testing of ferrous materials for hardness, tensile strength, fatigue strength and Impact resistance. (c) Characteristics, properties and identification of common non-ferrous materials used in aircraft; Heat treatment and application of non-ferrous materials; (d) Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance.	15
III	**Aircraft Materials - Composite and Non- Metallic** (a) Characteristics, properties and identification of common composite and nonmetallic materials, other than wood, used in aircraft; Sealant and bonding agents. (b) The detection of defects/deterioration in composite and non-metallic material. Repair of composite and non-metallic material **Wooden structures** c) Construction methods of wooden airframe structures; Characteristics, properties and types of wood and glue used in airplanes; Preservation and maintenance of wooden structure; Types of defects in wood material and wooden structures; d) The detection of defects in wooden structure; Repair of wooden structure	15
IV	**Aircraft Fasteners & Standard Parts** **a) Fasteners, Screw threads** Screw nomenclature; Thread forms, dimensions and tolerances for standard threads used in aircraft; measuring screw threads **b) Bolts, studs and screws** Bolt types: specification, identification and marking of aircraft bolts, international standards; Nuts: self-locking, anchor, standard types; Machine screws: aircraft specifications; Studs: types and uses, insertion and removal; Self tapping screws, dowels. **c) Aircraft rivets** Types of solid and blind rivets: specifications and identification,	14

	heat treatment. Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints	
V	**Testing of Aircraft Materials** Materials testing studies the behavior of materials under different loads. In particular, the relationship between the acting forces and the resulting deformation and the limit stresses that lead to failure of components are considered. **a)** Tension Testing: Elastic-limit Determination; Proof-stress Determination; Yield-strength Determination; Yield-point Determination ... b) Hardness Testing: Brinell Hardness; Rockwell Hardness, Diamond Pyramid (Vickers) Hardness; c) Bending Tests: Reverse Bend Test; Flattening Test d) Impact Test, **Tests for composites:** NDE of Composites, tensile, compression and shear tests, Inter laminar Shear Stress (ILSS), Three point flexure test, Single lap shear test using room temperature adhesives.	14

Reference Books:

1.Aircraft handbook FAA (AC 65-15 A)

2.Civil Aircraft Inspection Procedures (CAIP 459-Part I, Basic)

3.Airframe & Powerplant Mechanics (General Handbook EA-AC 65-9A) FAA

4.Aircraft Materials & Processes by Titterton

5.Machine Drawing by AC Parkinson

6.Advanced Composites (EA-358) by Cindy Foreman Electricity,CAIP 56

Board Examination Question Paper Pattern

Time: 3 Hrs. Max.Marks:100

PART - A Five questions will be asked covering all the units. All questions are to be answered. Each question carries 1 mark.

PART- B Fifteen questions will be asked covering all the units. Three questions from each unit. Answer any ten questions. Each question carries 2 marks.

PART-C Five questions will be asked Either / Or type. One question from every unit. Answer either A or B. Each question carries 15 marks.

The questions are to be numbered from 1 to 25. All the units are to be covered withequal weightage.

PART A Definitions and Statements. Question Number 1 to 5	5 X 1= 5 Marks
PART B Short answer type questions Question Number 6 to 20	10 X 2 = 20 Marks
PART C Descriptive answer type questions (Either A or B) Question number 21 to 25	5 X 15 = 75 Marks
TOTAL	**100 Marks ***

Note: Board Examinations will be conducted for 100 Marks and converted to 75 Marks

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS N-SCHEME

(Implements from the Academic year 2020-2021 onwards)

Course Name : DIPLOMA IN AERONAUTICAL ENGINEERING
Course Code : 1092
Subject Code : 4092420
Semester : IV

Subject Title : Aircraft Electrical System

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instruction		Examination			
			Marks			Duration
	Hours /Week	Hours /Semester	Internal Assessment	Board Examinations	Total	
Aircraft Electrical System	**5 Hrs**	**80 Hrs**	**25**	**100***	**100**	**3 Hrs**

*** Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Topics and Allocation of Hours

UNIT	Topic	Hrs.
I	Electrical Terminology, DC circuits, AC Theory	15
II	Resistive, Capacitive and Inductive Circuits, Transformers, Filters	15
III	DC Motor/Generator, AC Generators, AC Motor, Power	15
IV	Aircraft Electrical Cables, Connectors and Switches	14
V	Electrical Wiring Interconnection System (EWIS	14
Test & Model Exam		7
Total		**80**

RATIONALE:

The students are required to have basic knowledge of electrical engineering. Electrical engineering is required in the systems.

Aircraft engine starting, Giving power for communication and radio system for pilot/engineer operation of various instruments, Operation of machine, General lighting galley etc.

The individual must be able to operate external power trolleys, APU's and internal batteries, monitor their performance and take remedial actions in case of abnormalities.

OBJECTIVES:

On successful completion of the course, the students must be able to:

- Understand the Different electrical Terminologies
- State ohm's law and Kirchoff's laws.
- Understand the DC circuit and network theorems.
- Understand series and parallel circuits.
- Define various terms related to AC circuits.
- Get knowledge on 3 Phase AC circuits.
- Transformer construction principles and operations.
- Know the types of aircraft electrical switches, cables and connectors
- Know the aircraft wiring insulation and bonding techniques and Testing.
- To understand the use of crimp tools for aircraft wiring
- To understand the aircraft wiring protection techniques
- To know Cable looming and loom support, cable clamps, and protective Sleeving techniques.

Aircraft Electrical System
DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**Electrical Terminology** Definition, Symbol and units of voltage, current, resistance, Power, Energy Capacitance, Inductance, Reactance, Impedance. **DC Circuits** Ohms Law, Kirchhoff's Voltage and Current Laws- voltage and current in Series and Parallel Circuits. **AC Theory** Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak to peak value. Introduction to 3 phase Circuits.	15
II	**RLC Circuits** Phase relationship of voltage and current in L, C and R circuits, Power dissipation in L, C and R circuits; **Transformers** Transformer construction principles and operation- Transformer action under load and no-load conditions – Phase Diagram **Filters** Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.	15
III	**DC Motor/Generator:** Basic motor; Construction and purpose of components in DC generator; Types of DC machines - Need for Starter -types of Starter. **AC Generators:** Operation and construction of revolving armature and revolving field type AC generators- Three phase alternators. **AC Motors: Construction**, principle of operation and characteristics of 1 phase /3 phase Induction motor.	15
IV	**Aircraft Electrical Cables, Connectors and Switches** Cable types- High tension and co-axial cables, Crimping, Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes. Switches-Types of aircraft electrical switches- Toggle and Rocker Switches-Relays and Solenoids (Electromagnetic Switches) electrical system components-fuse-circuit breaker-circuit breaker panel-connectors-types of connectors	14
V	**Electrical Wiring Interconnection System (EWIS)** -Continuity, insulation and bonding techniques and Testing; Use of crimp tools: hand and hydraulic operated; testing of crimp joints; Connector pin removal and insertion; Co-axial cables: testing and installation Precautions; Identification of wire types, their inspection criteria and damage tolerance Wiring protection techniques: Cable looming and loom support, cable clamps, and protective Sleeving techniques including heat shrink wrapping, shielding. EWIS installations, Inspection, repair, maintenance and cleanliness standards	14

Text books

1."B.L. Theraja, A.K.Theraja" A Text book of Electrical Technology", S. Chand & co-publisher, New Delhi 2005.

2. "R.K.Rajput" Electronic Measurements and Instrumentation", S. Chand (Third Edition)-2008.

Reference Books:

1. Aircraft Electrical System- by E.H.J.Pallett
2. Aircraft Electricity and electronics-by Bent McKinley and also by Eismin/Bent Kinley

Board Examination Question Paper Pattern

Time: 3 Hrs. Max.Marks:100

PART - A Five questions will be asked covering all the units. All questions are to be answered. Each question carries 1 mark.

PART- B Fifteen questions will be asked covering all the units. Three questions from each unit. Answer any ten questions. Each question carries 2 marks.

PART-C Five questions will be asked Either / Or type. One question from every unit. Answer either A or B. Each question carries 15 marks.

The questions are to be numbered from 1 to 25. All the units are to be covered withequal weightage.

PART A Definitions and Statements. Question Number 1 to 5	5 X 1= 5 Marks
PART B Short answer type questions Question Number 6 to 20	10 X 2 = 20 Marks
PART C Descriptive answer type questions (Either A or B) Question number 21 to 25	5 X 15 = 75 Marks
TOTAL	**100 Marks ***

Note: Board Examinations will be conducted for 100 Marks and converted to 75 Marks

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS N-SCHEME

(Implements from the Academic year 2020-2021onwards)

Course Name : DIPLOMA IN AERONAUTIC ENGINEERING
Course Code : 1092
Subject Code : 4092430
Semester : IV
Subject Title : Aerodynamics

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
Aerodynamics	5 Hrs	80 Hrs	25	100*	100	3 Hrs

*** Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Topics and Allocation of Hours

UNIT	Topic	Hrs.
I	Physics of the Atmosphere and Aerodynamics	15
II	Transmission, Aerials and Propagation	15
III	Theory of Flight – Aeroplane Aerodynamics and Flight Controls	15
IV	Wind Tunnels	14
V	High Speed Flight	14
Test & Model Exam		7
Total		**80**

RATIONALE:

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

OBJECTIVES:

On completion of the following units of syllabus contents, the students must be able to:

- To Study the basic knowledge of Physics of the Atmosphere and Aerodynamics.
- To understand the different types of fluid flow like laminar and turbulent flow, free stream flow and relative airflow.
- To study about aerodynamic terminologies/terms
- To understand the loads act on an aircraft and associate effects of structures
- To Study about Theory of Flights.
- To know about steady state of flight, theory of turn, stall and flight envelope
- To understand the Aero plane Aerodynamics and Flight Controls.
- To study on aircraft roll, pitch and yaw controls
- To study on operation and effect of trim tabs, balance
- To understand different types of Wind tunnels and classifications for pressures & measurement techniques
- To understand Speed of Sound and Mach number
- To study on high-speed flights like subsonic, transonic and supersonic flight.
- To study the factors affecting airflow in engine intakes of high-speed aircraft.

AERODYNAMICS
DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**Physics of the Atmosphere** International Standard Atmosphere (ISA), application to aerodynamics. **Aerodynamics** Airflow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, up wash and downwash, vortices, stagnation; The terms: camber, chord, mean aerodynamic chord, aerodynamic centre, centre of pressure, stagnation point, profile (parasite) drag, induced drag, angle of attack, wash in andwash out, fineness ratio, wing shape and aspect ratio; Thrust, Weight. Generation of Lift and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall; Aerofoil contamination including ice, snow, frost.	15
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.	15
III	**Theory of Flight - Aero plane Aerodynamics and Flight Controls** Operation and effect of: — roll control: ailerons and spoilers; — pitch control: elevators, stabilators, variable incidence stabilizers and canards; — yaw control, rudder limiters; Control using 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; Boundary layer control using, vortex generators, stall wedges or leading edge devices; Operation and effect of trim tabs, balance and ant balance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;	15
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.	14

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.	14

Text Books

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

Reference Books:

1.Aerodynamics - By Clancey

2.Mechanics of Flight By - A.C.Kermode

3.Force measurement on symmetric airfoil.

4.Force measurement on cambered airfoil.

5.Aircraft Instruments-by E.H.J.Pallett

6.Aircraft Instruments-by C.A.Williams

7.wind tunnel testing-by pope

Board Examination Question Paper Pattern

Time: 3 Hrs. Max.Marks:100

PART - A Five questions will be asked covering all the units. All questions are to be answered. Each question carries 1 mark.

PART- B Fifteen questions will be asked covering all the units. Three questions from each unit. Answer any ten questions. Each question carries 2 marks.

PART-C Five questions will be asked Either / Or type. One question from every unit. Answer either A or B. Each question carries 15 marks.

The questions are to be numbered from 1 to 25. All the units are to be covered withequal weightage.

PART A Definitions and Statements. Question Number 1 to 5	5 X 1= 5 Marks
PART B Short answer type questions Question Number 6 to 20	10 X 2 = 20 Marks
PART C Descriptive answer type questions (Either A or B) Question number 21 to 25	5 X 15 = 75 Marks
TOTAL	**100 Marks ***

Note: Board Examinations will be conducted for 100 Marks and converted to 75 Marks

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS N-SCHEME

(Implements from the Academic year 2020-2021onwards)

Course Name : DIPLOMA IN AERONAUTIC ENGINEERING
Course Code : 1092
Subject Code : 4092440
Semester : IV
Subject Title : Metrology and Measurements

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
Metrology and Measurements	**5 Hrs**	**80 Hrs**	**25**	**100***	**100**	**3 Hrs**

*** Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

Topics and Allocation of Hours

UNIT	Topic	Hrs.
I	Introduction to Methods of Measurement	15
II	Data presentation	15
III	Measurements of following physical quantities	15
IV	Pressure and Temperature	14
V	Engineering Metrology	14
Test & Model Exam		7
Total		**80**

RATIONALE:

As an aeronautical engineer, it is required to understand the various metrology measurement methods, quality standards and Quality management systems. In-addition should have some exposure for latest inspection methods like CMM and laser technique. Engineer should know the quality system like ISO and in particular for aerospace should about AS 9100D standards.

OBJECTIVES:

On completion of the following units of syllabus contents, the students must be able to:

- To Study the basic knowledge of Introduction to Principles of Engineering Metrology & Methods of Measurements.
- To know about Metrology of Gears and Screw Threads.
- To Study on quality tools like QC & QA, SQC, Six Sigma, QMS, and ISO & As 9100D.
- To understand methods of measurements and its terms; mean, mode, median
- To know the measurement terminology like accuracy, reliability, sensitivity
    - reproducibility and Calibration
- To learn about physical quantities like Mechanical, Electrical and Optical systems
- To Learn about Data presentation, Measurements of following physical quantities Pressure, Temperature and Flow velocity and Flow rate.
- To exposure on the latest quality check instruments like Contour Measuring Machine (CMM) and Laser tracker (LT)

Metrology and Measurements

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**Introduction to Methods of Measurement:** Basic Principles of Engineering Metrology -. Standards of Measurement - Limits, Fits, and Tolerances - Linear Measurement - Angular Measurement - Comparators - Optical Measurement and Interferometer - Metrology of Gears and Screw Threads - Metrology of Surface Finish	15
II	**Data presentation:** Mean, Mode, Median Fundamental methods of measurement, general instrument terminology, Conversion of measuring unit from one system to another Measurements and their accuracy, reliability, sensitivity and reproducibility, Calibration.	15
III	**Measurements of following physical quantities:** Displacement: Mechanical, electrical and optical systems Force and Torque: Mechanical, elastic, electrical, fluid cell. Dynamometers	15
IV	**Pressure and Temperature:** Pressure: Mechanical, Manometers, transducers, low- and high-pressure Measurements Temperature: Thermo-mechanical electrical calibration Strain: Strain-gauge theory, types, calibration	14
V	**Engineering Metrology:** CMM, Precision Instrumentation Based on Laser Principles, Automated Inspection - Inspection and Quality Control -Quality Control and Quality Assurance - Statistical Quality Control, - Six Sigma - Quality Standards, - Quality Management Principles of ISO 9000 & AS 9100 D.	14

Reference Books:

1. A K Sawhney: Electrical Measurements and Measuring Instruments.

2. C.A. Williams: Aircraft Instruments, Galgotia

3. Civil, Aircraft Inspection Procedures (CAP459) Two Volumes, Himalayan Books

4. E H J Pallet: Aircraft Instruments - Principles and Applications, Himalayan Books

5. E H J Pallet, Automatic Flight Control, Blackwell

6. Leach Malvino, Digital Principles and Applications, Tata McGraw Hill

7. Engineering Metrology and Measurements, Oxford university press

Board Examination Question Paper Pattern

Time: 3 Hrs. Max.Marks:100

PART - A Five questions will be asked covering all the units. All questions are to be answered. Each question carries 1 mark.

PART- B Fifteen questions will be asked covering all the units. Three questions from each unit. Answer any ten questions. Each question carries 2 marks.

PART-C Five questions will be asked Either / Or type. One question from every unit. Answer either A or B. Each question carries 15 marks.

The questions are to be numbered from 1 to 25. All the units are to be covered withequal weightage.

PART A Definitions and Statements. Question Number 1 to 5	5 X 1= 5 Marks
PART B Short answer type questions Question Number 6 to 20	10 X 2 = 20 Marks
PART C Descriptive answer type questions (Either A or B) Question number 21 to 25	5 X 15 = 75 Marks
TOTAL	**100 Marks ***

Note: Board Examinations will be conducted for 100 Marks and converted to 75 Marks

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS N-SCHEME

(Implements from the Academic year 2020-2021onwards)

Course Name : DIPLOMA IN AERONAUTICAL ENGINEERING
Course Code : 1092
Subject Code : 4092450
Semester : IV
Subject Title : Material and Testing Processes Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
Material and Testing Processes Practical	4 Hrs	64 Hrs	25	100*	100	3 Hrs

*** Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

RATIONALE:

This subject deals with the testing and behavior of metals at various testing condition and to create better understanding of the metallic and composite material properties differences. In addition, the various assembly aspects of the sheet metal parts and composites parts are explored. The handling of rivet guns and assembling of two sheet metal parts by rivets also will be practiced.

OBJECTIVES:

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

- Acquire skills on different types of testing methods of metals.
- Conduct material testing on tension, compression, Hardness and Bending
- To lean the fabrication of composite laminate using vacuum bag moulding.
- Mechanical characterisation of composite laminates for Tension, ILSS & Flexure strength of laminate.
- Determine the single lap shear strength using adhesive bonded joints.
- Handling of rivets guns and practice of single & double of riveting on sheet metal part.
- To understand sheet metal operation like cutting & bending
- To know the riveting process using Pneumatic rivet gun.

Exercise

Part A:

1. Testing of metal / non-metals materials for

a) Tensile

b) Compression

c) Hardness

d) Bending

2. Fabrication of Composite materials –

a) Make 300x300mm Glass fabric with epoxy resin system with room temperature curing system. Thickness min 2mm and above.

3. Testing Composite laminates

a) Tension

b) Inter laminar shear stress (ILSS)

c) Flexure Test

Part B:

4. Single Lap Shear Strength Test.

Single Lap shear strength using aluminium adherents and room temperature curable adhesives (like AV 130 + HV 998 or any commercially available adhesives)

5. Sheet Metal Shop

a) Single row riveting exercises

b) Double row riveting practice

6.Riveting repair by insertion

a) Cutting and bending exercises on Aluminium sheets

b) Pneumatic Riveting Exercise

Board of Examination

Note:.

All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during examination.

	Part A	Part B
Procedure	:10 Marks	10 Marks
Tabulation/Marking	:15 Marks	15 Marks
Calculation/Dimensioning	:15 Marks	15 Marks
Result	: 05 Marks	05 Marks
Viva Voice	: 05 Marks	05 Marks
Total (Part A + Part B)	**: 100 Marks**	

LIST OF EQUIPMENT

Sl. No.	Description of Equipment	Quantity required (R)
1	Universal Tensile Testing machine	1
2	Torsion Testing Machine	1
3	Brinell Hardness Testing Machine	1
4	Shear cutter pedestal type	1
5	Riveting gun mechanical	2
6	Riveting gun pneumatic	
7	Bench Vices	5
8	Radius Bend bars	1

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS N-SCHEME

(Implements from the Academic year 2020-2021onwards)

Course Name : DIPLOMA IN AERONAUTICAL ENGINEERING
Course Code : 1092
Subject Code : 4092460
Semester : IV

Subject Title : Aircraft Electrical Systems Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
Aircraft Electrical Systems Practical	**4 Hrs**	**64 Hrs**	**25**	**100***	**100**	**3 Hrs**

*** Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

RATIONALE:

To Impart Knowledge to the Students in the basic Principles of electrical systems in general. Constructional Details and Operation Details of Various air Electrical & Electronic Components and Systems – Batteries, Charging System, Starting System, Ignition System, Lighting System and Auxiliary System and Electronic Management Vehicle.

OBJECTIVES:

- To understand electrical connections of domestic application like ceiling fan and test the connections and run the fan with speed regulator.
- To know the application of two-way switches and connection for one lamp and test.
- Verification of ohms law and kirchoff's Law
- To learn the construction of RLC Circuit for Series Resonance and understand the frequency curve.
- To learn the basics in Aircraft Electrical system and its principles
- To know the basic symbols of Electrical & Electronic Components, Wire & Cables etc.
- To learn all about construction and testing of different types of filters used in the aircraft electrical systems.
- To study about the 3 phase alternators and its working condition.
- To study about crimping of cables used in the aircraft and crimping cable ends or plug / socket terminals.

Exercise

1. Verification of Ohm's Law
2. Verification of kirchoff's Law
3. Construct RLC Circuit for Series Resonance and draw the Frequency curve
4. Construction and testing of Low pass filter
5. Construction and testing of High pass filter.
6. Construction and testing of Band stop filter
7. Load test on 3 phase alternators
8. Using at least two crimping systems, select appropriate cable crimping tools and crimp cables to prepare cable ends or plug / socket terminals and check for continuity using computers
9. Assembling the accessories of ceiling fan,test the connections and run the fan with speed regulator.
10. Assemble the board and test a board in wall to control one lamp at two different positions. Using two-way switches.

Board of Examination

Note:.

All the exercises should be given in the question paper and students are allowed to select by a lot.
Record note book should be submitted during examination.

ALLOCATION OF MARKS

Procedure	:	15 Marks
Connection	:	25 Marks
Execution	:	35 Marks
Result	:	20 Marks
Viva Voice	:	5 Marks
Total	**:**	**100 Marks**

LIST OF EQUIPMENT

Sl. No.	Description of Equipment	Quantity required ®
1	Ammeter, Voltmeter	5 Nos.
2	Different Resistor	10 sets
3	Different capacitors	10 sets
4	Switches	10 sets
5	Board	10 sets
6	Three phase alternator	1
7	wires	--
8	Insulating tape	1
9	Electrical maintenance tool set	2 Nos.
10	Ceiling Fan and wires	2
11	Crimping tool	1
12	Desktop computer	2
13	socket	1

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU

DIPLOMA IN ENGINEERING / TECHNOLOGY SYLLABUS N-SCHEME

(Implements from the Academic year 2020-2021onwards)

Course Name : DIPLOMA IN AERONAUTICAL ENGINEERING
Course Code : 1092
Subject Code : 4092470
Semester : IV

Subject Title : Aerodynamics Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours /Semester	Marks			Duration
			Internal Assessment	Board Examinations	Total	
Aerodynamics Practical	4 Hrs	64 Hrs	25	100*	100	3 Hrs

*** Examinations will be conducted for 100 marks and it will be reduced to 75 marks.**

RATIONALE:

As an aeronautical engineering student needs to understand that aircraft operates in the air the properties of air that affect aircraft control and performance. The understanding of basic aerodynamics – the possibility of flight, forces acting on aircraft in flight and aerodynamics gives laws determining forces acting on aircraft and its behavior in interaction with atmosphere. In aviation aerodynamics is concerned with three distinct parts. These parts may be defined as the aircraft, the relative wind, and the atmosphere and aerofoil and its shape also an important parameter of Aerodynamics.

OBJECTIVES:

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

- To understand different types of airflow like laminar flow, turbulent flow using water channel with section holes like Square, Cylinder & Aerofoil.
- To Understand other terminology like stagnation point, flow separation, boundary layer etc. through experiments.
- To fabricate aerofoil model
- To understand the effect of angle of attack and airflow velocity on lift and Stalling using the aerofoil section
- practical understanding of their effect on lift with respect to aircraft speed (Air flow)
- To learn the installation and calibration of Pitot Static Instruments
- To study of various factors affecting lift and drag on an aerofoil.

Exercise

1. Flow around various objects in a 'Water Channel' - Square, Cylinder, Aerofoil - Understanding laminar flow, turbulent flow, stagnation point, flow separation, boundary layer etc.

2. Fabricate Aerofoil Model - Understanding associated terms

3. Effect of angle of attack and airflow velocity on lift and Stalling

4. Servicing of flow over streamlined bodies with different angle of attack by flow visualization technique

5. Identifying High lift devices and practical understanding of their effect on lift with respect to aircraft speed (Air flow)

6. Removal / installation of Pitot Static Instruments.

7. Calibration of a Pitot Static System using a Pitot Static Leak tester.

8. Practical study of various factors affecting lift and drag on an aerofoil.

9. Factors affecting flow of fluid over an aerofoil surface and demonstrate the entire effect

Board of Examination

Note:.

All the exercises should be given in the question paper and students are allowed to select by a lot.

Record note book should be submitted during examination.

ALLOCATION OF MARKS

Procedure	:	15 Marks
Tabulation	:	15 Marks
Calculation	:	20 Marks
Execution	:	25 Marks
Result	:	20 Marks
Viva Voice	:	05 Marks
Total	**:**	**100 Marks**

LIST OF EQUIPMENT

Sl. No.	Description of Equipment	Quantity required (R)
1	Subsonic Wind tunnel	1
2	Water tunnel	1
3	Models(aerofoil, rough and smooth cylinder , flat plate)	5
4	Flow measurement device	1