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

THIRD SEMESTER (FT)

Subject Code	Subjects	HOURS PER WEEK			
		Theory Hours	Tutorial / Drawing	Practical Hours	Total Hours
4092310	Basics of Electronics & Microprocessor Engineering	5	-	-	5
4092320	Components of Aircraft Structures	5	-	-	5
4092330	Basic of Thermodynamics and Fluid Mechanics	5	-	-	5
4092340	Basics of Electronics & microprocessor practical	-	-	4	4
4092350	Components of Aircraft Structures practical	-	-	4	4
4092360	Basic of Thermodynamics and Fluid Mechanics Practical			5	5
4092370	Aero Modeling practical using CAD	-	-	4	4
		15	-	17	32
Extra / Co-Curricular activities					
Physical Education		-	-	-	2
Library		-	-	-	1
TOTAL					35

ANNEXURE- II

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

THIRD SEMESTER (FT)

SUBJECTCODE NO.	SUBJECT	EXAMINATION MARKS		TOTALMARKS	MINIMUM FOR PASS	DURATION OF EXAM(HOURS)
		INTERNAL ASSESSMENTMARKS	BOARD EXAM MARKS (CONVERTEDTO 75)			
4092310	Basics of Electronics & Microprocessor Engineering	25	100	100	40	3
4092320	Components of Aircraft Structures	25	100	100	40	3
4092330	Basic of Thermodynamics and Fluid Mechanics	25	100	100	40	3
4092340	Basics of Electronics & microprocessor practical	25	100	100	40	3
4092350	Components of Aircraft Structures practical	25	100	100	50	3
4092360	Basic of Thermodynamics and Fluid Mechanics Practical	25	100	100	50	3
4092370	Aero Modeling practical using CAD	25	100	100	50	3

ANNEXURE- I

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 : 4092310
Semester : III
Subject Title : Basics of Electronics and Microprocessor Engineering

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	
BASICS OF ELECTRONICS AND MICROPROCSSOR ENGINEERING	**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	Diodes, transistor functions	15
II	Concept of Amplifiers	15
III	Digital electronics Fundamentals	15
IV	Flip-flops and Counters	14
V	Micro Processor and controller	14
	Test & Model Exam	7
	Total	**80**

RATIONALE

Diploma holders in Aeronautical Engineering should have knowledge and skills about electronics instruments being used on the Aircraft. Basic electronic components checking characteristics must be studied by the Aeronautical engineers before they go for further applications. Aircraft building and high-level servicing of equipment may cause heavy budgets to the users of the electronic equipment. So, chip level/component level servicing is motivated / encouraged for the diploma students. For this basic subject must be taught in full understanding of the principles

OBJECTIVES:

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

- To Understand the working principle of PN junction diode
- To Understand the working principle of different types of rectifiers
- To Understand the different transistor configurations
- To Differentiate various types of amplifiers
- To Study the performance of different transistor oscillators
- To Study the different types of Logic gates
- To Construction and working principles of FET
- To Understand the principle of operation and truth table of S-R, D, JK % T flip-flops
- To Understand the 8051 Micro controllers.
- Introduction to 16-bit Micro controllers

Basics of Electronics and Microprocessor Engineering

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	PN junction diode – forward and Reverse bias characteristics - applications. NPN and PNP transistor – operation-transistor as a characteristics - CB,CE,CC configurations Construction ,working and VI-characteristics of FET	15
II	LINEAR IC's - OP-AMP specifications, applications, voltage comparator SIGNAL GNERATORS -Monostable, A stable and Bi stable mutivibrators. Schmitt Trigger. Conditions for oscillation, RC phase shift oscillator, Wien bridge oscillator, Crystal oscillator. LC oscillators. Relaxation oscillators	15
III	Number systems and their conversions (Decimal, binary and Hexadecimal), Binary arithmetic (1's and 2's complement) Logic gates:OR, AND, NOT, NOR, NAND, EXOR AND EXNOR gates – Universal logic Gates: NAND, and NOR.. Half adder/ subtractor, full adder/full subtractor	15
IV	Flip flops: Basic principle of operation and truth table of S-R, D, JK and T flip-flops Counters- Types of counters- Mod N Counter-Decade Counter Shift register -Applications of Registers. Introduction to Multiplexer/Demultiplexer, Encoder/Decoder.	14
V	8051 Micro controllers: – Architecture- Assembly language Programming- External Memory interfacing –- D/A and A/D conversions – Introduction to 16-bit Microcontrollers.	14

Text Books:

1. Bapat, Electronics Circuits and Systems Analog and Digital, Tata McGraw Hill, Delhi
2. H C Rai and Mahesh Popli, Fundamentals of Electronics, Dhapat Rai & Sons, Naisarak, Delhi
3. Mehta V K, Principles of Electronics, S Chand & Co., New Delhi
4. K Ayala, Introduction to 8051 Microcontroller, Prentice Hall
5. P D Choudhari, Computer Organization and Design, Prentice Hall
6. Glenn A Gibson, Microcomputer Systems, Prentice Hall

Reference Books:

1. Mathur, Kulsheshtra and Chadha, Electronic Devices: Applications and Integrated Circuits, Umesh Pulbilcations
2. C Millman and Holkias, Electronic Devices and Circuits, McGraw-Hill
3. Ramachandran S, Electronic, Principles and Techniques, Hindustan Publishing Corporation (I)
4. Microprocessor and Microcontroller by R.Theagarajan, Sci Tech Publication, Chennai.

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 : 4092320
Semester : III

Subject Title : Components of Aircraft Structures

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	
Components of Aircraft Structures	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	Principles of Communication Systems	15
II	Transmission, Aerials and Propagation	15
III	Devices	15
IV	Microwave Engineering	14
V	Radar Engineering	14
Test & Model Exam		7
Total		**80**

RATIONALE:

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

OBJECTIVES:

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

- To Study the basic knowledge of Introduction to Aircraft Structures.
- To Study Airframe Structures construction principles and assembly aspects of primary structural members
- To know the construction details of major structures like fuselage, Vertical Fin and Horizontal Tail.
- To know about different types of surface coatings used in structures
- To Study about aircraft primary and secondary control surface function and its attachment aspects.
- To study on mass and balancing of airplane using control surfaces'
- To understand the windows and windscreen construction and its assemblies.
- To study on Firewalls and engine mount of Airplane

Components of Aircraft Structures

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	Introduction to aircraft, major aircraft components, aircraft systems and their Functions, reference lines, station and zone identification systems	15
II	**Aircraft Structures** Introduction Principal Aircraft Structures Fuselage – Trusses, Construction, Various types Main plane – Basic features of Construction, main parts Empennage – Horizontal and vertical stabilizers Primary control surfaces (Ailerons, Rudder and Elevators) Secondary control surfaces (Flaps, Slats, spoilers and tabs)	15
III	**Structural Assembly** Structured components of wing, fuselage and empennage (H.T + V.T) Structural assembly techniques: riveting, bolting, bonding methods of surface protection, such as chromatin, anodizing, painting; Surface cleaning	15
IV	**Airframe Structures — Aero plane** Fuselage (ATA 52/53/56): Construction and pressurization sealing; Wing, stabilizer, pylon and undercarriage attachments; Seat installation and cargo loading system; Doors and emergency exits : Construction, Mechanisms, operation and safety devices; Windows and windscreen construction and mechanisms.	14
V	**Stabilizers** Construction; Control surface attachment. **Flight Control Surfaces (ATA 55/57)** Construction and attachment; Balancing — mass and aerodynamic. **Nacelles/Pylons (ATA 54)** Construction; Firewalls; Engine mounts	14

Text Books:

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

Reference Books:

1. G F Titterton, Aircraft Materials and Processes, Himalayan Books, New Delhi
2. E T Hill, The Materials for Aircraft Construction, Pitman, London
3.Dictionary of Aeronautical terms (Dale Crane)
4.Aircraft handbook FAA (AC 65-15 A)
5.Aircraft structure Ch. 01 (FAA)
6.Aircraft Construction Repair and Inspection-By Joe Christy
7.Aviation Maintenance Technician Hand book by FAA
8.Aircraft Maintenance and Repair- Delp/Bent/McKinley,AC 43.13

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 with equal 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 : 4092330

Semester : III

Subject Title : Basics of Thermodynamics and Fluid Mechanics

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	
Basics of Thermodynamics and Fluid Mechanics	**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	Basics of Thermodynamics and Processes of Perfect Gases	15
II	Perfect Gases, Thermodynamic Processes	15
III	Thermodynamic Air Cycles and Steady Flow Energy Equation & Application	15
IV	Properties of Fluids and pressure Measurements	14
V	Flow of Fluids and Flow of Through Pipes	14
Test & Model Exam		7
Total		**80**

RATIONALE:

The students are required to understand all the mechanical aspects of the aircraft in terms of thermodynamics and its application. Knowledge of relationships between pressure, volume and temperature under various operating conditions become necessary to understand functioning of aircraft engines and other power systems.

The purpose of this subject is to teach the students the fundamentals of engineering fluid mechanics in a very general manner so that they can understand the way that forces are produced and transmitted by fluids that are, first, essentially at rest and, second, in motion. These basic concepts will help them to understand the aerodynamic forces in the aircrafts.

OBJECTIVES:

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

- To Study the basic knowledge of basics of Thermodynamics
- Explain the basics of systems and laws of thermodynamic and Thermodynamic processes.
- To understand the General Gas & Characteristic Equation
- To Know about Thermodynamic process; Constant volume, Constant pressure, Constant temp.(isothermal), Isentropic (reversible adiabatic) and, polytrophic processes.
- Fluid pressure and measurements and fluid flow through pipes
- To study the basic fluid properties and types of flow;
- To understand the transmission of pressure in liquids and its application to hydraulics;
- To calculate hydrostatic forces on plane and curved submerged surfaces;
- To employ the concept of continuity of flow and use Bernoulli's equation to measure flow rate and velocity;
- To apply the momentum principle to liquids in jets and pipes.

Basics of Thermodynamics and Fluid Mechanics

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**BASICS OF THERMODYNAMICS AND ROCESSES OF PERFACT GASES** **Introduction:-** definitions and units of mass, weight, volume, density, specific weight, specific gravity and specific volume- pressure – units of pressure – temperature – absolute temperature – S.T.P and N.T.P conditions – heat – specific heat capacity at constant volume and at constant pressure – work – power – energy - types – law of conservation of energy – thermodynamic system – types – thermodynamic equilibrium – properties of system – intensive and extensive properties – State of System – process – cycle – point and path functions – zeroth, first and second laws of thermonamics – Simple problems	15
II	**Perfect gases: -** laws of perfect gases – Boyle's, Charles', Joule's Renault's and Avogadro's laws – General Gas Equation – Characteristic gas equation – relation between specific heats and gas constant – Universal gas constant – Change in Internal Energy – enthalpy – change in enthalpy -, - Simple problems **Thermodynamic processes: -** Constant volume, Constant pressure, Constant temp.(isothermal), Isentropic (reversible adiabatic) and, polytrophic processes – P- V and T – s diagrams, work done, change in internal energy, heat transfer, change in enthalpy, change in entropy for above processes – Simple problems – hyperbolic expansion and Throttling processes (Description).	15
III	**THERMODYNAMIC AIR CYCLES AND STEADY FLOW ENERGY EQUATION & APPLICATIONS** **Air cycles:-** air standard efficiency - reversible and processes – assumptions in deriving air standard efficiency – Carnot cycle – Otto cycle – Diesel cycles – Comparison of ideal and actual P-V diagrams of Otto and Diesel cycles - Simple problems steady flow system:- control volume – steady flow energy equation – assumptions – Engineering applications – steam boiler- condenser – nozzles – steam and gas turbines – reciprocating and rotary compressors – Centrifugal pump – non flow energy equation – simple problems.	15
IV	**PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENTS** Introduction- Definition of fluid – Classifications of Fluids – ideal and real fluids – Properties of a fluid – definition and units – Pressure – units of Pressure - pressure head – atmospheric , gauge and absolute pressure – problems – Pascal's law – proof –	14

	applications of Pascal's law –hydraulic press – Hydraulic jack – Pressure measurement Piezometer tube – Simple U – tube manometer – Differential U – tube manometer – Inverted Differential manometer – Micro – manometer –inclined tube micro – manometer – Mechanical Gauges- Bourdon's Tube pressure Gauge – Diaphragm pressure gauge – Dead weight pressure gauge.	
V	**FLOW OF FLUIDS AND FLOW THROUGH PIPES** Types of fluid flow – path line and steam line – mean velocity of flow-discharge of a flowing fluid – equation of continuity of fluid flow – energies of fluid – Bernoulli's theorem – statement, assumptions and proof –applications and limitations of Bernoulli's theorem – problems on Bernoulli's theorem – venturimeter – derivation for discharge – orifice meter derivation for discharge – difference between venturimeter and orifice meter – problems on venturimeter and orifice meter – Pilot tube description only – orifice types – applications – hydraulic co- efficient – determining hydraulic co – efficient – problems discharge through a small orifice discharging freely – problems – experimental method of finding Cv,Cc and Cd – Flow through pipes – laws of fluid friction - hydraulic gradient line- total energy line –wetted perimeter – hydraulic mean radius – loss of head due to friction – Darcy – Weisbach equation and Chezy's formula – problems – Minor losses (description only) – Power transmission through pipes – problems.	**14**

Text Books:

1.Thermal Engg, R.K. Rajput, 8th Edition, Laxmi publications, Pvt Ltd, New Delhi.

2.Applied Thermodynamics, P.K. 2nd Edition, TATA Mcgraw – Hill Publishing company.

3.A Text Book of Hydraulics, Fluid Mechanics and Hydraulic Machines, R.S.Khurmi, - Edn. 18, S. Chand & Co., Ram Nagar, New Delhi – 110 055,

Reference Books:

1.Thermal Engineering, P.L. Ballaney, 24th Edition, Khanna Publisher's New Delhi.

2.Thermal Engineering, B.K. Sarkar, 3rd Edition, Dhanpat Raj & Sons New Delhi.

3.Hydraulic Machines, Jagadishlal, Metropolitan Book Co. Pvt. Ltd., 1, Faiz Bazaar, New Delhi – 110 006.

4.Hydraulics, Andrew Parr (A Technician's and Engineer's Guide)

5.P.L. Ballaney, Thermal engineering, Edn. 24, Khanna Publishers, 2B, North Market, Naisarak, New Delhi 110 006 - 2005.

6.B.K. Sarkar, Thermal engineering, Edn. 3, 1998, published by Dhanpat Raj & Sons, 1982, Naisarak, New Delhi 110 006

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 with qual 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 : 4092340
Semester : III

Subject Title : Basics of Electronics & Microprocessor 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	
Basics of Electronics & Microprocessor 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 practical knowledge to the Diploma Students for servicing of aerospace electronics devices. This Subject is assigned to develop Skill on Basic electronics fundamentals and microprocessors. It will help the student in the next semester courses.

OBJECTIVES:

At the end of the practical the Students will be able to:

- To understand the PN junction diode and characteristics of CE transistor
- Verification of different types of truth table and for half adder and subtractor.
- To learn the construction of Decoder and Encoder truth table
- To learn the assembly language program for addition, subtraction and division of 8-bit numbers & Execute the same using 8051 kit

Exercise

1. Construct and plot the VI characteristics of PN junction diode.
2. Construct and draw the Input and output characteristics of CE Transistor configuration
3.Verification of truth table of OR, AND, NOT,
4. Verification of truth table of NOR, NAND, EX-OR gates.
5. Construct and verify the truth table of Half Adder/ subtractor.
6.Construct and verify the truth table of Full Adder.
7. Construction and verification of truth table for Decoder
8. Construction and verification of truth table for Encoder
9. Write an Assembly Language Program for Addition of two 8-bit numbers
10. Write an Assembly Language Program for Multiplication two 8-bit numbers and execute the same in the 8051 Kit.
11.Write an Assembly Language Program for Subtraction of two 8 bit numbers and executes the same in the 8051 Kit .
12.Write an Assembly Language Program for Division of two 8 bit numbers and executes the same in the 8051 Kit.

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 (R)
1	Regulated Power Supply: 0 – 15 V D.C	5
2	Circuit Connection Boards	5
3	Semiconductor devices like Diode, NPN Transistors,	10
4	Resistors, Capacitors and inductors	10
5	Bread boards	5
6	Oscilloscope (20 MHz).	2
7	8051 Microcontroller with Power Supply	5
8	IC Trainer kit	5
9	Digital IC's 7400,7402,7404,7408,7432,7486,	10

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 : 4092350
Semester : III

Subject Title : Aircraft Structure Practical

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 Structure 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 aircraft structural manufacturing methods like sheet metal parts, different types of mechanical joints used in the aircraft parts. Practice of welding for different cross sections and its quality checking will give welding exposure the students. Applications of measuring instruments also will be demonstrated. To understand the defect identification and repair of aluminium structures.

OBJECTIVES:

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

- Acquire skills on different types of sheet metal fabrication process.
- To understand working principles of welding equipment.
- Practice on welding of sheet metal with different configuration
- Inspection of different configuration welded sheet metal parts.
- To learn soldering and quality check of the soldiered work piece.
- To learn the cable splicing and swaging of cables.
- To understand different thread cutting methods and using taps and dies demonstrate the thread production process.
- To understand simple repair of composite and non-metallic materials and structures.
- Identification of defect in the aluminium panel and repair of aluminium structures

Exercise

1.Sheet metal marking, cutting, sheet metal structural defects

2. Practice of 1st model. Butt Joint and inspect

3. Practice of 2nd model. Lap Joint and inspect

4. Practice of 3rd model. V-Joint and inspect

5. Practice of 4th model. T-Joint and inspect

6. Demonstration of 2nd model- Radius Gauge

7. Soldering Exercises, inspection and defects

8. Cable splicing and swaging

9. Taps and Dies, thread cutting and inspection

10. Detection of defects in aluminium material and structures

11. Simple repair of Composite and non-metallic materials and structures

12. Repair of aluminium structures

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
Marking	:	15 Marks
Dimensioning	:	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	Set of basic tools for dismantling and assembly	1 set
2	Micrometers, depth gauges, vernier callipers	2 each
3	Shear cutter pedestal type	1
4	Drilling Machine	1
5	Bench Vices	5
6	Radius Bend bars	1
7	Pipe Flaring Tools	1
8	Welding machine	1
9	Glass fibre, epoxy resin	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	:	4092360
Semester	:	III
Subject Title	:	Basics of Thermodynamics and Fluid Mechanics 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	
Basics of Thermodynamics and Fluid Mechanics Practical	**5 Hrs**	**80 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 thermodynamic and fluid mechanics subject. This basic may help to the student to understand aircraft propulsion and aerodynamic subjects' better way. The practical understanding of basic petrol & diesel engine functions, port timing diagram and lubrication used in the engines will give insight to the thermal engineering. Fluid mechanics practical will give the basic understanding of interaction between fluid flow over the outer surface of the aircraft.

OBJECTIVES:

- Study the petrol and diesel engines components and functions.
- To understand to Determine the flash and fire points of the given oil using open Cup apparatus
- To understand to absolute viscosity of the given lubricating oil using Redwood viscometer.
- To Draw the port timing diagram of four stroke petrol engines.
- To Draw the port timing diagram of four stroke diesel engines.
- Verification of the Bernoulli's Theorem
- Learn to determine the co-efficient of discharge of venturi meter and orifice meter, mouth piece and orifice.
- Learn to determine the co-efficient of discharge mouth piece and orifice.

Exercise

1. Study of petrol engine & diesel engine and its components.
3. Determining flash and fire points of the given oil using close cup apparatus.
4. Determining the absolute viscosity of the given lubricating oil using Redwood viscometer.
5. Determining the absolute viscosity of the given lubricating oil using Saybolt viscometer.
6. Valve timing diagram of four-stroke cycle petrol engine.
7. Valve timing diagram of four-stroke cycle diesel engine.
8. Verifying the Bernoulli's Theorem
9. Determination of co-efficient of discharge of a mouth piece and orifice by variable head method.
10. Determination of co-efficient of discharge of a venturimeter and orifice meter.

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/Observation	: 25 Marks
Calculation/Graph	: 35 Marks
Result	: 20 Marks
Viva Voice	: 5 Marks
Total Marks	**: 100 Marks**

LIST OF EQUIPMENT

Sl. No.	Description of Equipment	Quantity required (R)
1	Open and closed cup apparatus for flash and fire point	1
2	Closed cup apparatus for flash and fire point	1
3	Redwood Viscometer	1
4	Saybold Viscometer	1
5	Cut section of petrol engine model	1
6	Cut section of diesel engine model	1
7	Bernoulli's theorem – Verification Apparatus	1
8	Calibration of flow through mouth piece Tank with provisions for fixing mouth pieces Via external	1
9	Orifice meter, with all necessary fittings in pipe lines of different diameters	1
10	Venturimeter,U tube manometer fixtures like Valves, collecting tank	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 : 4092370
Semester : III

Subject Title : Aero Modeling Practical using CAD

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	
Aero Modeling practical using CAD	**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:

Aeronautical Engineering Diploma Engineer is expected to possess a thorough understanding of drawing, which includes clear visualization and proficiency in reading and interpreting a wide variety of production drawing. Manufacturing of various parts start from the basic drawing of components. The assembly of components is also carried out from the drawing. Most of the aircraft structural members are in shell construction with 3D contour. Hence, students are expected to have 3D modelling capability. So, drawing and 3D modelling is an important subject to be studied by the students to carry and complete the production and assembly process successfully.

OBJECTIVES:

- To learn the parts and assembly of the aircraft components.
- To appreciate the need for sectional view and types of sections.
- To draw sectional views.
- To practice 2D drawings of aircraft parts in Autocad
- To draw a typical control surface of an aircraft in Autocad
- To develop 3D Model of basic mechanical elements using CATIA
- To understand the surface modelling of in CATIA
- 3D modelling of wing outer structure with winglet using CATIA software
- To prepare geometrical model of various aircraft structural members.
- To Draw Leading edge & Leading-edge Rib of an aircraft using CATIA Software.

Exercise

1. AutoCAD Lab

1. Design of basic mechanical 2D diagrams using ACAD software with dimensions.
2. Draw an isometric view of typical aircraft using ACAD software showing all major aircraft structures.
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)
4. Design of 3D drawings of basic mechanical parts in ACAD software.
5. Draw a typical aircraft control surface in 2D drawing using ACAD software.

2. CATIA Lab

1. Design of Basic Mechanical 3D Elements (like Hex Bolt, Nut, split pin, Dome Nut Tap washer etc. using CATIA software.
2. 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.
3. Design a wing outer structure with winglet using CATIA software.
4. Design a Leading edge & Leading-edge Rib of an aircraft using CATIA Software
5. Design a torsional box using two skins, one spar and 3 ribs and assemble using aerospace fasteners using CATIA software

Board of Examination

Note: All the exercises have to be completed. Two exercises will be given for examination by selecting one exercise in each PART.

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

	Part A	Part B
Editing /Creation:	10 Marks	10 Marks
Formatting :	10 Marks	10 Marks
Assembly :	10 Marks	10 Marks
Dimensioning :	10 Marks	10 Marks
Printout :	5 Marks	5 Marks
Viva voice :	5 Marks	5 Marks
Total (Part A + Part B) :	**100 Marks**	

LIST OF EQUIPMENT

1. Personal computer – 30 Nos.
2. Printer – 1 No.
3. Required Software's :

CAD and Catia Package – Sufficient to the strength.