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

FIFTH SEMESTER (FT)

Subject Code	Subjects	HOURS PER WEEK			
		Theory Hours	Tutorial / Drawing	Practical Hours	Total Hours
4092510	Aircraft System	5	-	-	5
4092520	Aircraft Engine Propulsion	5	-	-	5
	Elective Theory – I				
4092531	Helicopter Modelling	5	-	-	5
4092532	Advanced Airframe Structure	5	-	-	5
4092540	Aircraft System Practical	-	-	5	5
4092550	Aircraft Engine Propulsion Practical	-		4	4
4092560	Helicopter Modeling Practical	-	-	4	4
4092570	Entrepreneurship & Startups	-	-	4	4
		15		17	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

FIFTH SEMESTER (FT)

SUBJECT CODE NO.	SUBJECT	EXAMINATION MARKS		TOTALMARKS	MINIMUM FOR PASS	DURATION OF EXAM(HOURS)
		INTERNAL ASSESSMENT MARKS	BOARD EXAM MARKS (CONVERTED TO 75)			
4092510	Aircraft System	25	100	100	40	3
4092520	Aircraft Engine Propulsion	25	100	100	40	3
4092531	Helicopter Modelling	25	100	100	40	3
4092532	Advanced Airframe Structure	25	100	100	40	3
4092540	Aircraft System Practical	25	100	100	40	3
4092550	Aircraft engine Propulsion Practical	25	100	100	40	3
4092560	Helicopter Modeling Practical	25	100	100	50	3
4092570	Entrepreneurship & Startups	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 AIERONAUTICAL ENGINEERING
Course Code : 1092
Subject Code : 4092510
Semester : V

Subject Title : Aircraft Systems

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 Systems	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	Fuselage, Wings, Stabilizing Surfaces, Landing Gear	15
II	Flight Controls	15
III	Hydraulics	15
IV	Air-conditioning Systems, Anti-ice Systems	14
V	Fuel System	14
Test & Model Exam		7
Total		**80**

RATIONALE:

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.

OBJECTIVES:

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

- To Study the basic knowledge of Fuselage, Wings, Stabilizing Surfaces
- To Study the Landing Gear and locking devices.
- To know about wheels and tyres
- To understand anti-skid and breaking system.
- To study about flight control systems like mechanical, hydraulic, electrical and fly-by-wire controls.
- To study about aircraft operations, indicators and warning devices.
- To Learn on Basic principles of hydromechanics.
- To understand the schematic construction and functioning of hydraulic systems
- To learn on heating and cooling - temperature regulation on aircraft Air-condition
- To know about Anti-ice systems.
- To understand aircraft fuel systems and fuel lines.
- To know on the fuel tanks location in aircrafts
- To study about the aircraft refueling system

AIRCRAFT SYSTEMS

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**Fuselage** 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 - parking brake - Mode of operation of anti-skid system - mode of system of auto brake system - operation, indications and warning systems	15
II	**Flight Controls** - 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) - danger situations and potential failures	15
III	**Hydraulics** - 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	15
IV	**Air-conditioning systems** - construction, functioning, operation, indicators and warning devices - heating and cooling - temperature regulation - automatic and manual - ram air ventilation - schematic construction- Anti-ice systems - aerofoil and control surfaces, power plant, air intakes, windshield- schematic construction, operating limitations and initiation, timing of de-icing system usage - ice warning system - Pressurization - cabin altitude, maximum cabin altitude,	14

	differential pressure	
V	**Fuel system** 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 - operating, indicators, warning systems - fuel management (sequencing of fuel tank switching) - dip stick	14

Text books

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

Reference Books

1. W Thomson, Thrust for Flight, Sir Issac Pitman.1992

2. Michacl J. Kroes Thomas W.Wild, Aircraft Power Plants, McGraw Hill

3. Michacl J. Kroes, William A Watkins and Frank Delp, Aircraft Maintenance and Repair, McGraw Hill 1993

4. Airframe and Power Plant, Mechanics General Hand Book (EA-AC 65-9A), Himalayan

5.Airframe and Powerplant Mechanics (AC 65-15A) -Airframe Hand Book FAA

6.Civil Aircraft Inspection Procedure (CAP 459) Part II Aircraft

7.A& P technician Air Frame Text Book by Jeppesen

8.Aircraft Repair Manual (FAA-AC-43.13)-By Larry Reithmaier

9.Aviation Maintenance Technician Hand book by FAA

10.Hydraulic Servo Systems by M. GUILLON:

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

12.Aircraft Electrical System-by E.H.J.Pallett

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 : 4092520
Semester : V

Subject Title : Aircraft Engine Propulsion

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 Engine Propulsion	**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	Fundamentals of Piston & Gas Turbine Engine	15
II	Fuel Injection System, Starting and Ignition System	15
III	Inlet &Compressors for Turbine Engine	15
IV	Combustion, Turbine & Exhaust Section of turbine	14
V	Aircraft Engine Performances	14
Test & Model Exam		7
Total		**80**

RATIONALE:

The diploma holder in Aeronautical Engineering and Aircraft maintenance must have required knowledge and skills about the construction and maintenance of Pistol Engine and Turbine Engine. Students should know about the different systems involved in the aircraft engine propulsion. The comparison of piston engine and gas turbine engine construction, engine performance and its efficiency.

OBJECTIVES:

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

- To Study the basic knowledge of aircraft piston and gas turbine engine.
- To know about Otto & Diesel cycles of the engine
- To understand of Piston Engine configuration and its firing order
- To learn of gas turbine engine working principles & operation of turbojet, turbofan, turbo shaft, turboprop.
- To know the piston Engine fuel system construction and principles of operation
- To learn on Magneto types, construction and principles of operations
- To understand Exhaust and Cooling Systems of Piston Engine
- To learn on effects of various inlet configurations and Ice protection of turbine engine
- To know about airflow constructional features and operating principles and applications
- To Study of operation and characteristics of different turbine blade types.
- To understand the combustion chambers, classification and principles of operation.
- To study about different exhaust nozzle systems like Convergent, divergent and variable area nozzles.
- To study about aircraft performance by computing thrust horsepower, equivalent shaft horsepower and specific fuel consumption etc.

AIRCRAFT ENGINE PROPULSION

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**Fundamentals of Piston & Gas Turbine Engine** **Piston Engine: Mechanical**, thermal and volumetric efficiencies operating principles — 2 stroke, 4 stroke, Otto and Diesel, Piston displacement and compression ratio; Engine configuration and firing order. **Turbine Engine:** Potential energy, kinetic energy, Newton's laws of motion, Braxton cycle; The relationship between force, work, power, energy, velocity, acceleration; Constructional arrangement and operation of turbojet, turbofan, turbo shaft, turboprop.	15
II	**Fuel injection systems of Piston Engine** Types, construction and principles of operation. **Starting and Ignition Systems** Starting systems, pre-heat systems; Magneto types, construction and principles of operation; Ignition harnesses, spark plugs; Low- and high-tension systems **Induction, Exhaust and Cooling Systems of Piston Engine** Construction and operation of: induction systems including alternate air systems; Exhaust systems, engine cooling systems — air and liquid	15
III	**Inlet &Compressors for Turbine Engine** Compressor inlet ducts; Effects of various inlet configurations; Ice protection. Axial and centrifugal types; Constructional features and operating principles and applications; Methods of air flow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades; Compressor ratio.	15
IV	**Combustion, Turbine & Exhaust Section of turbine** Constructional features and principles of operation, combustion chambers, Types of combustion chambers. **Turbine Section** Operation and characteristics of different turbine blade types; Blade to disk attachment; Nozzle guide vanes; **Exhaust** Constructional features and principles of operation; Convergent, divergent and variable area nozzles; Engine noise reduction; Thrust reversers	14
V	**Aircraft Engine Performances** Power calculation and measurement; Factors affecting engine power; Mixtures/leaning, pre-ignition. Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption	14

Text Books:

1. J D Mattingly, Elements of Gas Turbine Propulsion, McGraw Hill, 1st Ed., 1997

2. H Cohen, G F C Rogers and H I H Sarvanmutto, Gas Turbine Theory, John Wiely

3. P G Hill & C R Peterson, Mechanics and Thermodynamics of Propulsion, Additson- Wesley, 1970

Reference Books:

1. Gorden C Oates, Aircraft Propulsion Systems Technology & Design, AIAA Publication

2. J L Kererbrock, Aircraft Engines and Gas Turbine, MIT Press, 1991

3.Airframe and Power plant Mechanics (EA-AC 65- 12A) -Power Plant Hand FAA

4.Power Plant-By Bent and McKinley

5.Civil Aircraft Inspection Procedure (CAP 459) Part II Aircraft

6.Aircraft Propeller and Controls-by Frank Delph

7.Powerplant Section Text book- (EA-ITP-P)

8.Aircraft Piston Engines-By Herschel Smith

9.Aviation Maintenance Technician Series by Dale Crane

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 : 4092531
Semester : V

Subject Title : Helicopter Modelling

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	
Helicopter Modeling	**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 Helicopters	15
II	Helicopter Construction	15
III	Helicopter Systems	15
IV	Helicopter Engine Systems	14
V	Helicopter Maintenance and General Precautions	14
	Test & Model Exam	7
	Total	**80**

RATIONALE:

This course forms the first exposure to the discipline of Aeronautical Engineering. It starts with 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

OBJECTIVES:

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

- To study the various configuration of helicopter
- To understand different terminology used in helicopter
- To learn & understand various structural components purpose and its location
- To know the main and gear box function and its locations.
- To understand the main and tail drive shaft of the transmission system
- To learn the construction and purpose of flight control system
- To learn about hydraulic system of helicopter
- To study on the different types of helicopter engines
- To understand the engine fuel control system
- To learn about engine lubricating systems
- To study about the types of inspection methods of helicopter
- To understand the helicopter rigging and control setting
- To learn on the Jacking Towing and Braking of helicopter
- To study about Refueling and Defueling of helicopter.

Helicopter Modelling

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**INTRODUCTION TO HELICOPTETRS** 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 inuse of helicopter	15
II	**HELICOPTER CONSTRUCTION** Main Structural components of helicopter their types, material, purpose and location Fuselage (cabin, centre section, ,tail boom Stabilizer Landing gears).	15
III	**HELICOPTER SYSTEMS** 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	15
IV	**HELICOPTER ENGINE SYSTEMS** 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	14
V	**HELICOPTER MAINTENANCE AND GENERAL PRECAUTIONS** 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	14

REFERENCE BOOKS

1. The Helicopter -John Fay

2.Training Notes on Chetak Helicopter

3. Helicopter Engineering- Lalit Gupta

4.Basic Helicopter Maintenance- Joseph Scchafer

5. Principles of Helicopter Flight-WJ Wagttendonk

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 : 4092532
Semester : V

Subject Title : Advanced Airframe Structure

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	
Advanced Airframe Structure	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	Under Carriages	15
II	Layout of Controls	15
III	Aircraft plumbing	15
IV	Theory of weight and balance	14
V	Aircraft rigging and symmetry checks	14
Test & Model Exam		7
Total		**80**

RATIONALE:

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 functions of under carriage and Types of under carriage
- To know the method of attachment of aircraft
- To understand the primary and secondary control of aircraft
- To learn the balancing of control surfaces of the aircraft
- To know the aircraft plumping of Metal Pipe lines and Flexible pipelines.
- To understand the installation process of pipeline and its color coding.
- To learn about aircraft loading systems
- To understand the aircraft levelling and rigging
- To know the aircraft symmetry check
- To learn the aircraft control surface rigging
- To learn the aircraft rigging equipment and instruments.

Advanced Airframe Structure

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**Under Carriages** Functions of under carriage - Types of under carriage -Method of attachment of aircraft	15
II	**Layout of Controls** Layout of primary control surfaces - Layout of Secondary control surfaces - Balancing of control surfaces	15
III	**Aircraft plumbing** Metal Pipe lines - Flexible pipelines - Cutting and flaring process of pipelines - Process of Installation of pipelines - Color coding	15
IV	**Theory of weight and balance** Weighing the Aircraft - Aircraft loading	14
V	**Aircraft rigging and symmetry checks** Leveling of Aircraft - Rigging of Aircraft laterally and longitudinally Rigging of control surfaces - Symmetry check of aircraft Rigging instruments and equipment	14

Reference Books :

1. W T Thomson, Vibration Theory and Application
2. Perry, D.E Azar, Aircraft Structures, McGraw Hill
3. Bruhn, Fundamentals of Aircraft Structures, McGraw Hill
4. E Torenbeek, Synthesis of Airplane Design
5. L M Nicholai, Fundamentals of airplane Design, Univ. of Dayton DHIO, 1975
6. T H G Megson, Aircraft Structures for Engineering Students, Edward Arnold, U.K.
7. R M Rivello, Theory and Analysis of Flight Structure, McGrawHill Book Co.
8. N G R Iyengar, Structural Stability of Columns and Plates, Affiliated East West Press (P) Ltd, New Delhi.

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 : 4092540
Semester : V

Subject Title : Aircraft System - 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 System – 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:

This practical aim to attain basic knowledge of structural requirements of all lift surfaces, fuselage, landing gear and control surfaces of an aircraft and these are installed each other. This also helps students to acquire good skills in servicing and maintenance of these structures. It is aimed to demonstrate functions of each system of an aircraft and minimum level of servicing also covered.

OBJECTIVES:

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

- To understand the Jacking and levelling of an aircraft and other Record caution warnings and procedure etc.
- To learn service, inspect components of air-conditioning system of an aircraft.
- To learn servicing and reassembling of Replace passenger seats.
- To know how to service the seat belts.
- To understand the primary and secondary control of aircraft
- To learn the balancing of control surfaces of the aircraft
- To understand aircraft rigging and operational check flight control systems
- To learn the servicing and reassembling of landing gear systems.
- To understand the reassembling of Wheel and Brake removal.
- To learn the checking of tyre air pressure with tolerance.
- To Check the functionality of various system like pressure, vacuum and temperature indicator on the display panel.

Exercise

1. Dismantling, servicing and reassembling of Jacking and levelling of an aircraft. Record caution, warnings and procedure
2. Dismantling, servicing and reassembling of Locate and inspect components of air-conditioning system
3. Dismantling, servicing and reassembling of Replace passenger seats and Check seat belts for serviceability.
4. Dismantling, servicing and reassembling of Rigging and operational check flight control systems
5. Dismantling, servicing and reassembling of landing gear systems.
6.Dismantling, servicing and reassembling of Wheel and Brake removal /installation and checking of tyre air pressure.
7.Dismantling, servicing and reassembling of various fire exchangers.
8.Checking of various system like pressure, vacuum and temperature indicator on the display panel.

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	:	25 Marks
Dismantling	:	20 Marks
Servicing	;	25 Marks
Assembling	:	25 Marks
Viva Voice	:	5 Marks
Total	**:**	**100 Marks**

LIST OF EQUIPMENT

Sl. No.	Description of Equipment	Quantity required (R)
1	Serviceable aircraft with all systems	01
1	Assembling and dis assembling tools	01 Set

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 : 4092550
Semester : V

Subject Title : Aircraft Engine Propulsion 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 Engine Propulsion Practical	4Hrs	64 Hrs	25	100*	100	3 Hrs

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

RATIONALE:

The diploma holder in Aeronautical Engineering and Aircraft maintenance must have required knowledge and skills about the construction and maintenance of aircraft engines. Students should know about the different systems involved in the aircraft engine propulsion. The comparison of piston engine and gas turbine engine construction, engine performance and its efficiency. The practical of propulsion will help them to understand different types of parts of the engine and functions of them. They get some knowledge on the maintenance of the aircraft engine

OBJECTIVES:

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

- To Study the basics of aircraft piston and gas turbine engine.
- To know how to assembly and disassembly of sub parts of piston engine.
- To know the piston Engine fuel system and understand carburetor functions/ operations
- To service the engine fuel injection system and electronic fuel control.
- To Checks the functions of Magneto.
- To verify the engine starting and ignition systems and Engine indicating systems
- Check and service the components and function of lubrication system.
- To know how to assembly and disassembly of sub parts of turbine engine.
- To demonstrate Starting/Shut down Procedure for the gas Turbine Engine
- To learn integration of the turbine engine in aircraft & its procedures.

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 : 4092560
Semester : V

Subject Title : Helicopter Modelling 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	
Helicopter Modeling 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:

Helicopter Modelling practical aims to give exposure to the developments of helicopter models using balsa wood and other available materials. It starts with familiarization of different types of helicopters and development of helicopter 3D model using various manufacturing process.

Part of this practical, an aircraft industrial visit will be organised to understand the different types of manufacturing process being performed and work culture in the aircraft industries.

OBJECTIVES:

This practical will be done by group of students, after this practical the students must be able to:

- To study the various configuration of helicopter
- To learn 2D drawing of helicopter
- To learn the surface development using flexible film.
- Manufacture the helicopter parts using balsa wood.
- To understand the different parts of helicopter, if any.
- To learn, how to finish the balsa wood outer surface of the model

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 : 4092570
Semester : V

Subject Title : ENTREPRENERUSHIP AND STARTS UPS

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	
ENTREPRENEURSHIP AND STARTUPS	4 Hrs	64 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

Sl. No.	Topics	Time, Hours
1	Entrepreneurship – Introduction and Process	12
2	Business Plan Preparation	12
3	Business idea and banking	12
4	Pricing and cost analysis	12
5	Start-ups, E-cell and success stories	12
	Test and Model Exam	04
	Total	64

RATIONALE:

Development of diploma curriculum is a dynamic process responsive to the society and reflecting the needs and aspiration of its learners. Fast changing society deserves changes in educational curriculum particularly to establish relevance to emerging socio-economic environment; to ensure equity of opportunity and participation and finally promoting 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 ensure good means of living for every individual, provides jobs and develop Indian economy.

OBJECTIVES:

At the end of the study of 5th semester the students will be able to

- Acquiring Entrepreneurial spirit and resourcefulness
- Familiarization with various uses of human resource for earning dignified means of living
- Understanding the concept and process of Entrepreneurship - its contribution in and role in the growth and development of individual and the nation
- Acquiring entrepreneurial quality, competency and motivation
- Learning the process and skills of creation and management of entrepreneurial venture
- E-cell
- Market study
- To excite the students about Entrepreneurship.
- To understand business concepts - planning, organizing, staffing, marketing.
- Survey and analyse the market to understand customer needs.
- To understand the importance of earning/profits.
- To understand the importance of sales and turnover.

ENTREPRENEURSHIP AND START UPS

Detailed syllabus

Unit	Name of the Topics	Hours
1	**Entrepreneurship – Introduction and Process** • Concept, Functions and Importance • Myths about Entrepreneurship • Pros and Cons of Entrepreneurship • Process of Entrepreneurship • Benefits of Entrepreneur • Competencies and characteristics • Ethical Entrepreneurship • Entrepreneurial Values and Attitudes • Motivation • Creativity • Innovation • Entrepreneurs - as problem solvers • Mindset of an employee and an entrepreneur • Business Failure – causes and remedies • Role of Networking in Entrepreneurship	12
2	**Business Idea and Banking** • Types of Business: Manufacturing, Trading and Services. • Stakeholders: sellers, vendors and consumers and Competitors • E- commerce Business Models • Types of Resources - Human, Capital and Entrepreneurial tools and resources • Selection and utilization of human resources and professionals, etc. • Goals of Business; Goal Setting • Patent, copyright and Intellectual property rights • Negotiations - Importance and methods • Customer Relations and Vendor Management • Size and capital based classification of business enterprises • Various sources of Information • Role of financial institutions • Role of Government policy • Entrepreneurial support systems • Incentive schemes for state government • Incentive schemes for Central governments	12

3	**Startups, E-cell and Success Stories** • Concept of Incubation centre's • Visit and report of DIC , financial institutions and other relevance institutions • Success stories of Indian and global business legends • Field Visit to MSME's • Study visit to Incubation centers and start ups • Learn to earn • Startup and its stages • Role of Technology – E-commerce and Social Media • Role of E-Cell • E-Cell to Entrepreneurship	**12**
4	**Pricing and Cost Analysis** • Unit of Sale, Unit Price and Unit Cost - for single product or service • Types of Costs - Start up, Variable and Fixed • Income Statement • Cash flow Projections • Break Even Analysis - for single product or service • Taxes • Financial Business Case Study • Understand the meaning and concept of the term Cash Inflow and Cash Outflow • Price • Calculate Per Unit Cost of a single product • Operational Costs • Understand the importance and preparation of Income Statement • Prepare a Cash Flow Projection • Projections • Pricing and Factors affecting pricing. • Launch Strategies after pricing and proof of concept	**12**
5	**Business Plan Preparation** • Generation of Ideas. • Business Ideas vs. Business Opportunities • Opportunity Assessment – Factors, Micro and Macro Market Environment • Selecting the Right Opportunity • Product selection • New product development and analysis • Feasibility Study Report – Technical analysis, financial	**12**

	analysis and commercial analysis • Market Research - Concept, Importance and Process • Market Sensing and Testing • Marketing and Sales strategy • Digital marketing • Branding - Business name, logo, tag line • Promotion strategy • Business Plan Preparation • Social Entrepreneurship as Problem • Solving - Concept and Importance • Risk Taking-Concept • Types of business risks • Execution of Business Plan	

Note: (i) Unit 1, 2 & 3 contents are common for all diploma programs
(ii) Unit 4 & Unit 5 contents are optional with their branch specific contents.

REFERNCE BOOKS:

1. Dr. G.K. Varshney, Fundamentals of Entrepreneurship, Sahitya Bhawan Publications, Agra - 282002
2. Dr. G.K. Varshney, Business Regulatory Framework, Sahitya Bhawan Publications, Agra - 282002
3. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Entrepreneurship , McGraw Hill (India) Private Limited, Noida - 201301
4. M.Scarborough, R.Cornwell, Essentials of Entrepreneurship and small business management, Pearson Education India, Noida - 201301
5. Charantimath Poornima M. Entrepreneurship Development and Small Business Enterprises, Pearson Education, Noida - 201301
6. Trott, Innovation Management and New Product Development, Pearson Education, Noida - 201301
7. M N Arora, A Textbook of Cost and Management Accounting, Vikas Publishing House Pvt. Ltd., New Delhi-110044
8. Prasanna Chandra, Financial Management, Tata McGraw Hill education private limited, New Delhi

9. I. V. Trivedi, Renu Jatana, Indian Banking System, RBSA Publishers, Rajasthan
10. Simon Daniel, HOW TO START A BUSINESS IN INDIA, BUUKS, Chennai - 600018
11. Ramani Sarada, The Business Plan Write-Up Simplified - A practitioners guide to writing the Business Plan, Notion Press Media Pvt. Ltd., Chennai 600095.

Board Examination – Evaluation Pattern

Internal Mark Allocation

Assignment (Theory portion)*	-	10
Seminar Presentation	-	10
Attendance	-	5
Total	**-**	**25**

Note: * Two assignments should be submitted. The same must be evaluated and converted to 10 marks.

Guidelines for assignment:

First assignment – Unit I

Second assignment – Unit II

Guidelines for Seminar Presentation- Unit III

Each assignment should have five three marks questions and two five marks questions.

BOARD EXAMINATION

Note

1. The students should be taught all units and proper exposure and field visit also arranged. All the portions should be completed before examinations.
2. The question paper consists of theory and practical portions. All students should write the answers for theory questions (45 Marks) and practical portions (55 Marks) should be completed for board examinations.
3. All exercises should be given in the question paper and students are allowed to select by lot. If required the dimensions of the exercises may be varied for every batch. No fixed time allotted for each portion and students have liberty to do the examination for 3Hrs.

4. For Written Examination: theory question and answer: 45 Marks
   Ten questions will be asked for 3 marks each. Five questions from each unit 1 & 2. (10 X 3 = 30).
   Three questions will be asked for 5 marks each. One question from each unit 1, 2 & 3. (3 X 5 = 15)
5. For Practical Examination: The business plan/Feasibility report or Report on Unit 4 & 5 should be submitted during the board practical examinations. The same have to be evaluated for the report submission (40 marks).

DETAILED ALLOCATION OF MARKS

Sl. No	Description	Marks
Part A	Written Examination - Theory Question and answer (10 questions x 3 marks:30 marks & (3 questions x 5 marks: 15 marks)	45
Part B	Practical Examination – Submission on Business Plan/Feasibility Report or Report on Unit 4 & 5	40
Part C	Viva voce	15
	Total	100