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

SIXTH SEMESTER (FT)

Subject Code	Subjects	HOURS PER WEEK			
		Theory Hours	Tutorial / Drawing	Practical Hours	Total Hours
4092610	UAV System Design	5	-	-	5
4092620	Aircraft Structure Repair	5	-	-	5
	Elective Theory – II				
4092631	Aircraft maintenance & practice	5	-	-	5
4092632	Introduction to Rocket	5	-	-	5
4092640	UAV System Design Practical	-	-	5	5
4092650	Aircraft Structure Repair Practical	-		6	6
4092660	Project work and internship	-	-	6	6
		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

SIXTH SEMESTER (FT)

SUBJECT CODE NO.	SUBJECT	EXAMINATION MARKS		TOTALMARKS	MINIMUM FOR PASS	DURATION OF EXAM(HOURS)
		INTERNAL ASSESSMENTMARKS	BOARD EXAM MARKS (CONVERTED TO 75)			
4092610	UAV System Design	25	100	100	40	3
4092620	Aircraft Structure Repair	25	100	100	40	3
4092631	Aircraft maintenance & practice	25	100	100	40	3
4092632	Introduction to Rocket	25	100	100	40	3
4092640	UAV System Design Practical	25	100	100	40	3
4092650	Aircraft Structure Repair Practical	25	100	100	50	3
4092660	Project work and Internship	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 : 4092610
Semester : VI

Subject Title : UAV System Design

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	
UAV System Design	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 UAV	15
II	BASICS OF AIRFRAME	15
III	AVIONICS HARDWARE	15
IV	COMMUNICATION PAYLOADS AND CONTROLS	14
V	PATH PLANNING AND MAV	14
Test & Model Exam		7
Total		**80**

RATIONALE:

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

OBJECTIVES:

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

- To Study the basic knowledge of Unmanned Arial Vehicle (UAV),
- To learn on different raw materials used in the fabrication of UAV
- To get exposure to the avionics hardware's used in auto pilot.
- To understand the different communication systems used in the UAV
- To learn about way point navigation systems used in the UAV

UAV System Design

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**INTRODUCTION TO UAV** History of UAV –classification –basic terminology-models and prototypes –applications	15
II	**BASICS OF AIRFRAME** Airframe –dynamics –modeling- structures –wing design-engines types-equipment maintenance and management-control surfaces-specifications.	15
III	**AVIONICS HARDWARE** Autopilot –AGL-pressure sensors-servos-accelerometer –gyros-actuators- power supplyprocessor, integration, installation, configuration, and testing	15
IV	**COMMUNICATION PAYLOADS AND CONTROLS** Payloads-Telemetry-tracking-Aerial photography-controls-PID feedback-radio control frequency range –SAS-flight director-commands and videos-elements of control loops-flight computer sensor-displays-parameter settings-modems-memory system-simulation-ground test-analysistrouble shooting	14
V	**PATH PLANNING AND MAV** Waypoints navigation-ground control software-Recent trends in UAV-Case Studies	14

REFERENCES Books:

1. Jane's Unmanned Aerial Vehicles and Targets, Jane's Information Group; ASIN: 0710612575,1999
2. R. Said and H. Chayeb, "Power supply system for UAV", KTH, 2002.
3. Robert C. Nelson, Flight Stability and Automatic Control, McGraw-Hill, Inc, 1998.
4. Skafidas, "Microcontroller Systems for a UAV", KTH, TRITA-FYS 2002:51 ISSN 0280-316 X.34, 2002
5. Kimon P. Valavanis, "Advances in Unmanned Aerial Vehicles: State of the Art and the Roadto Autonomy", Springer, 2007
6. Paul G Fahlstrom, Thomas J Gleason, "Introduction to UAV Systems", UAV Systems, Inc,1998,
7. Dr. Armand J. Chaput, "Design of Unmanned Air Vehicle Systems", Lockheed Martin Aeronautics Company, 2001
8. P.J.Swatton , "Ground studies for pilots' flight planning", Sixth edition, 2002.

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 : 4092620
Semester : VI
Subject Title : Aircraft Structural Repair

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 Structure Repair	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 Aircraft Structural Repair	15
II	Repair Materials	15
III	Aircraft Sheet metal Repair	15
IV	Aircraft Composite Repair	14
V	Repair Qualification & Acceptance of Repair	14
	Test & Model Exam	7
	Total	**80**

RATIONALE:

The subject deals with the aircraft structural repair and practices as applicable to aeronautical field. The students will acquire knowledge and skill in the repair materials, repair methodologies, aircraft sheet metal and composite repair types and procedures. The student briefly explained about repair acceptance and qualification by airworthiness authorities.

OBJECTIVES:

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

- To Study the basic knowledge of Aircraft Repair Materials.
- To understand the different types of drill & rivet guns used in Repair
- To learn more on structural and non-structural repairs
- To study about different type of repair methods for sheet metal and composite aircraft structures.
- To learn on, How to control corrosion and prevention in metallic aircraft structures
- To know about NDI/NDT techniques currently available in the industry
- To learn about cost effective inspection method like Visual and Tap tests.
- To learn about different types of hand tools used in aircraft repairs.
- To understand different types of repair and assembly Techniques for composite structures
- To learn on post repair acceptance test requirements etc.
- To learn about Indian aircraft certification agencies

Aircraft Structural Repair

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**Introduction to Aircraft Structural Repair** Causes of aircraft Damage, Repair Classifications, Temporary and permanent Repairs. Types of tools used in the structural repair. Hand tools, Drill guns, Rivet guns, sheet metal tools etc.	15
II	**Repair Materials** Introduction to repair structural materials their structural properties. Both metallic and composite material, Rivets, Sealants, Primer & Paints etc Includes specifications and standards	15
III	**Aircraft Sheet Metal Repair** Principles and procedures for fuselage, wing, and empennage sheet metal repair. Includes safety, hand tools, layout methods, materials, fasteners, repair techniques, parts fabrication, and corrosion prevention and control	15
IV	**Aircraft Composite Repair** Introduction to Composite materials & Repair of composites, Basic Repair Process. Types of repairs. Cosmetic, Resin Injection, Semi-structural Plug/Patch, Structural Mechanically–fastened Doublers, Structural Bonded External Doublers, Structural Flush Repair, Bolted or Bonded Scaring vs. Stepping, Repair Patch. Manufacturing method, equipment and qualification methods.	14
V	**Repair Qualification & Acceptance of Repair.** Describe NDI/NDT techniques currently available, including visual inspection, tap test, and ultrasonic pulse echo inspection. Describe various post-repair acceptance inspections, including visual inspection, tap test, etc. Introduction of Indian a repair certification agency	14

REFERENCE Books: -

1. Advances in the Bonded Composite Repair of Metallic Aircraft Structure, Elsevier Science
2. Composite Repair: Theory and Design, Elsevier Science
3. Aircraft Metal Structural Repair - Chapter -4 of FAA
4. Composites repair -https://www.compositesworld.com/articles/composites-repair
5. The ABC's of Composite Repair - https://www.aviationpros.com/engines-components/aircraft-airframe-accessories/composites/article/11105657/the-a-b-cs-of-aircraft-composite-repair

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 : 4092631
Semester : VI
Subject Title : Aircraft Maintenance & Practice

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 Maintenance & Practice	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	Safety Precautions-Aircraft	15
II	Corrosion, Welding, Brazing, Soldering and Bonding	15
III	Disassembly, Inspection, Repair and Assembly Techniques, Maintenance Procedures	15
IV	Bearings, Transmission, Control Cables	14
V	Pipes and Unions, Pipes and Hoses, Springs	14
Test & Model Exam		7
Total		**80**

RATIONALE:

The subject deals with the maintenance concepts and practices in the general and as applicable to aeronautical field. The students will acquire knowledge and skill in the maintenance of aircraft and its system, organization required controls and economics of maintenance. The teaching is to be practice oriented.

OBJECTIVES:

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

- To understand the aspects of safe working practices when working with electricity, gases especially oxygen, oils and chemicals;
- To learn the types of corrosion and their identification; Causes of corrosion etc.
- To know the Welding, soldering and brazing methods; Inspection of these joints
- To understand the different defects identification on aircraft structures
- To learn more on the general repair technique and inspection methods.
- To know the different non-destructive inspection techniques for metallic parts.
- To learn the aircraft Maintenance planning and its procedures to implement
- To understand the maintenance inspection and difference between quality control and quality Assurance.
- To understand purpose bearing, types and its applications.
- To learn the different transmission elements used in aircraft
- To know the different types of control cables for effective control systems.
- To understand different types of pipes, connectors and spring used in the aircraft.

Aircraft Maintenance & Practice

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**Safety Precautions-Aircraft** Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals; Instructions on the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.	15
II	**Corrosion** a) Chemical fundamentals; Formation by, galvanic action process, microbiological, stress; (b) Types of corrosion and their identification; Causes of corrosion; Material types, susceptibility to corrosion. **Welding, Brazing, Soldering and Bonding** (a) Soldering methods; inspection of soldered joints. (b) Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints	15
III	**Disassembly, Inspection, Repair and Assembly Techniques** (a) Types of defects and visual inspection techniques. Corrosion removal, assessment and re-protection. (b) General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programs; (c) Non-destructive inspection techniques including, penetrate, radiographic, eddyCurrent, ultrasonic and borescope methods. (d) Disassembly and re-assembly techniques. (e) Trouble shooting techniques **Maintenance Procedures** Maintenance planning; Modification procedures; Stores procedures; Certification/release procedures; Interface with aircraft operation; Maintenance Inspection/Quality Control/Quality Assurance; Additional maintenance procedures; Control of life limited components	15

IV	**Bearings** Purpose of bearings, loads, material, construction; Types of bearings and their Application. Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes. **Transmissions** Gear types and their application; Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns; Belts and pulleys, Chains and sprockets. Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod Systems. **Control Cables** Types of cables; End fittings, turnbuckles and compensation devices; Pulleys andcable system components; Bowden cables; Aircraft flexible control systems. Swaging of end fittings; Inspection and testing of control cables; Bowden cables; Aircraft flexible control systems.	**14**
V	**Pipes and Unions** (a) Identification of pipes and types of rigid and flexible pipes and their connectors used in aircraft; (b) Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes. **Pipes and Hoses** Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipesand hoses; Installation and clamping of pipes. **Springs** Types of springs, materials, characteristics and applications. Inspection and testingof springs.	**14**

Reference Books:

1.Airframe and Power plant Mechanics (AC 65-15A)-Airframe Hand Book FAA

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

3.Aircraft Maintenance and Repair By Kroes, Watkin and Delph

4.Acceptable Methods, Techniques and practices (FAA)-EA-AC 43.13-1 A&2A

5.Aviation Maintenance Technician Hand book by FAA

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 : 4092632
Semester : VI
Subject Title : Introduction to Rocket

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	
Introduction to Rocket	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 of Rockets	15
II	How Rocket Works	15
III	How Rocket Engine Works	15
IV	Types of Rocket Engine	14
V	Test the Rocket	14
Test & Model Exam		7
Total		**80**

RATIONALE:

The subject deals with the Rocket engineering science & technology and its applications. It covers with the types of rocket engines and how it works. Students will be learned about the testing of rockets. They also study about the rocket dynamic and control systems of rocket. It also covers the different test conducted during the rocket testing.

OBJECTIVES:

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

- Students will gain a basic understanding of rockets: how they work, why we have so many different types, and why they are important in space exploration.
- To learn about the history of rockets and key rocketry pioneers.
- To study about different types of rocket propulsion
- To understand on the rocket dynamic, control and guidance systems.
- To study thermodynamic Expansion and the Rocket Nozzles of Engine.
- To study about the different types of rocket engines and its applications.
- To understand about the rocket propellants
- To study about different types of rocket tests
- To know the rocket, drop & landing test
- To understand the flight test and roll out test.

Introduction to Rocket

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**Introduction of Rockets** History of Rockets – Rockets of the Modern ERA **Why rockets needed** Mission and payload – Trajectories – orbits – basic missile Trajectories	15
II	**How Rockets Works** Trust – Specific Impulse – weight flow rate – Tsio/kovsky's Rocket Equation - Staging – Rocket Dynamic, Control and guidance	*15*
III	**How Rockets Engine Works** Basic rocket engine – Thermodynamic Expansion and the Rocket Nozzle – Exit Velocity – Rocket Engine Design Example	15
IV	**Types of Rocket Engine** Solid Rocket – liquid propellant rocket engine – hybrid rocket engine – electric rocket engine – nuclear rocket engine – solar rocket engine – photon – based engine	14
V	**Test the Rocket** The system engineering process and rocket development – measuring trust – pressure vessel test – shake's bake test – drop & landing test – environment test – Destructiive Test – Modeling & simulation – roll out Test – Flight Test	14

Text Books :

1. Travis.S. Taylor 'Introduction to Rocket Science and Engineering' CRC Press, Taylor & Francis Group Ration, London, New York

Reference Books:

1. *DP Mishra* 'Fundamentals of Rocket Propulsion' CRC Press, 1st Edition-2017
2. George P. Sutton, Oscar Biblarz 'Rocket Propulsion Elements' Publisher Wiley, 9th Edition (2017)
3. John Drury Clark 'An Informal History of Liquid Rocket Propellants' Rutgers University Press; Reprint edition (1 January 2018)

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 : 4092640
Semester : VI
Subject Title : UAV System Design- 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	
UAV System Design- 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:

UAV system design deals with the development of UAV using available resources in the institute. This will boost the student's innovation thinking and also hands on experience in the development of UAV. It cultivates problem solving skills, working in a group and it develops leadership quality, which may help students in the industry later. This design practice will help them to understand different types of mandatory systems required for the development of UAV. They also get chance to inter connect different systems to verify the functionality/working of UAV.

OBJECTIVES:

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

- Students will gain a basic understanding of UAV like how they work? what are the different parts required to make the working model.
- To understand the different class of UAV and drones.
- To learn about different manufacturing process to make UAV model.
- To study about systems required to make UAV.
- To understand on different tools and accessories required for assembly.
- Identification of different parts used in the drone/UAV assembly and understand its functions of each parts.
- To understand circuit to connect all the system together like mechanical system, power and electrical systems
- To demonstrate the working drone by proper assembly and connections.

Exercise

This practical will be done by group of students, which involves the following activities/exercises

1) Develop a working model of Drone by assembly of all the required systems.
2) Check the working condition of the drone
3) Install a working camera on the drone
4) Check again camera working on the ground
5) Demonstrate a working drone with camera functioning well.

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
Assembling	:	20 Marks
Execution	;	25 Marks
Result	:	25 Marks
Viva Voice	:	5 Marks
Total	**:**	**100 Marks**

LIST OF EQUIPMENT

Sl. No.	Description of Equipment	Quantity required (R)
1	Drone	1
2	Set of basic tools for dismantling and assembly	1 set

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 : 4092650
Semester : VI
Subject Title : Aircraft Structural Repair – 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 Structural Repair – Practical	**6 Hrs**	**96 Hrs**	**25**	**100***	**100**	**3 Hrs**

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

RATIONALE:

Aeronautical engineers should understand the minimum level of aircraft structural repair and practices followed in the aeronautical field. The students will acquire knowledge and skill in the repair materials, repair methodologies, aircraft sheet metal and composite repairs normally adopted in the aerospace industry. Briefly explained about repair inspection methods and handling of those instruments, repair acceptance and qualification by airworthiness authorities. The post repair checks also will be covered in this practical.

OBJECTIVES:

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

- To Study the basic knowledge of Aircraft Repair Materials.
- To learn more on structural and non-structural repairs
- To study about different type of patch repair using metallic and composite patches.
- To learn about the scarf repair used in the aircraft structures
- To know about NDI/NDT techniques currently available in the industry
- To learn about cost effective inspection method like Visual and Tap tests.
- To learn about different types of hand tools used in aircraft repairs.
- Defect identification using metrological instruments on the structural parts
- To learn wiring and repair of electrical items in cabin.
- To understand how to remove the control surface of an aircraft and check its interface connections for its quality.

Exercise
PART-A

1. Metallic patch repair of cracked Al. Alloy plate by Riveting.
2. Metallic patch repair of a cracked Al. Alloy plate using room temperature curable adhesives
3. Fabrication of Glass fiber epoxy laminate by vacuum bag moulding /press molding method.
4. Demonstration of cosmetic repair on the laminates using room temperature curable adhesives (AV138 + HV998) or Commercial Araldite.
5. Composite Circular patch repair on the Al. alloy structures
6. Scarf repair using glass composite on metallic structures
7. Qualification of repairs visual inspection by coin tapping method qualitatively

PART- B

1. Use metrological methods of various types of surface defects of aircraft structure using simple aids like magnifying glass, light and mirror. Use zone and station numbers to record defect location

2. Use metrological methods of various types of surface defects of aircraft structure and system components like bearings, gears, chain, pulley, spring and cables using simple aids like magnifying glass, light and mirror and record defects

3.Wiring and repair of electrical items in cabin crew.

4.Removal of control surface and checking of attachment links / bearing and lubrication of bearing and refix the control surface check rotation

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

		Part A	Part B
Procedure	:	10 Marks	10 Marks
Preparation/Marking	:	15 Marks	15 Marks
Assembling/Fabrication	;	15 Marks	15 Marks
Visual inspection	:	5 Marks	5 Marks
Viva Voice	:	5 Marks	5 Marks
Total (Part A + Part B)	:	**100 Marks**	

LIST OF EQUIPMENT

Sl. No.	Description of Equipment	Quantity required (R)
1	Micrometers, depth gauges, vernier callipers	1
2	Shear cutter pedestal type	1
3	Bench vices	4
4	Rivet Guns	2
5	Al.Alloy sheet	As required
6	Different Size drill bits	As required
7	Glass fabric & epoxy resin	As required
8	Room Temperature curable adhesives	As required
9	Serviceable aircraft with all systems	1
10	Set of basic tools for disassembling and assembly	1 set

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 : 4092660
Semester : VI
Subject Title : Project Work & Internship

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	
Project Work & Internship	6 Hrs	96 Hrs	25	100*	100	3 Hrs

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

RATIONALE:

This subject 'Project Work and Internship' is the continuation of the previous semester subjects. The students are to implement the detailed project plan, which they have prepared. This project is generally an integration of the various types of skills acquired during their course of study. Hence it is essential that students are given opportunity to develop and integrate the highly essential industry-oriented competencies and skills. This subject builds up greater confidence to face in the world of work.

OBJECTIVES:

- Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment preferably in an industrial environment.
- Implement the planned activity as a team.
- Take appropriate decisions on collected information.
- Carryout cooperative learning through synchronous guided discussions within the class in key dates, asynchronous document sharing and discussions, as well as to prepare collaborative edition of the final project report.

Project Work and Internship:

The students of all the Diploma Courses have to do a Project Work as part of the Curriculum and in partial fulfilment for the award of Diploma by the State Board of Technical Education and Training, Tamil Nadu. In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise. **The Project work must be reviewed twice in the same semester. The project work is approved during the V semester by the properly constituted committee with guidelines.**

a) Internal assessment mark for Project Work & Internship:

Detail of assessment	**Period of assessment**	**Max. Marks**
Project Review I	6th week	10
Project Review II	14th week	10
Attendance	Entire semester	5
Total Marks		**25**

Proper record should be maintained for the two Project Reviews and preserved for one semester after the publication of Board Exams results. It should be produced to the flying squad and the inspection team at the time of inspection/verification.

b) Allocation of Marks for Project Work & Internship in Board Examinations:

Details of Mark allocation	Max Marks
Demonstration/Presentation	25
Report	25
Viva Voice	30
Internship report	20
Total Marks	**100***

*Examination will be conducted for 100 marks and will be converted to 75 marks.

c) Internship Report:

The internship training for a period of two weeks shall be undergone by every candidate at the end of IV / V semester during vacation. The certificate shall be produced along with the internship report for evaluation. The evaluation of internship training shall be done along with final year "Project Work & Internship" for 20 marks. The internship shall be undertaken in any industry / Government or Private certified agencies which are in social sector / Govt. Skill Centres / Institutions / Schemes. A neatly prepared PROJECT REPORT as per the format has to be submitted by individual student during the Project Work & Internship Board examination.