CURRICULUM FOR THREE YEAR
(SIX SEMESTER)
DIPLOMA COURSE IN

AIRCRAFT MAINTENANCE ENGINEERING

Effective from Session

Semester System

UNDER DEVELOPMENT

Prepared By

Curriculum Development Cell

INSTITUTE OF RESEARCH DEVELOPMENT
& TRAINING, U.P., KANPUR

APPROVED BY

BOARD OF TECHNICAL EDUCATION
U.P. LUCKNOW,
CORRECTED AS SYLLABUS COMMITTEE OF:
B.T.E. MEETING HELD ON 19.04.2017:

Corrected and Approved By B.T.E. on dated 19.04.2017

STUDY AND EVALUATION SCHEME FOR
THREE YEAR (SIX SEMESTER) DIPLOMA COURSE IN AIR CRAFT MAINTENANCE ENGINEERING
(To Be Effective From)

I Semester

Curriculum							Scheme of Examination								
Periods Per Week						S U B J E C T	Theory			Practical			Grand Total	
Lec.	Tutorial	Draw	Lab	Work Shop	Total		Examination Dur.	Examination Marks	Sess. Marks	Total Marks	Examination Dur.	Sess. Marks	Total Marks	
4	2	-	-	-	6	1.1 Mathematics-I	2.5	50	20	70	-	-	-	70
4	2	-	-	-	6	1.2 Physics-I	2.5	50	20	70	-	-	-	70
6	-	-	2	-	8	1.3 General Engineering And Ground Supports	2.5	50	20	70	3	60	30	90	160
-	-	-	8	-	8	1.4 Engineering Drawing	4.0	50	20	70	-	-	-	-	70
8	-	-	-	-	8	1.5 Air Law, C.A.R. & Human Factors & Limitation-I	2.5	50	20	70	-	-	-	-	70
4	-	-	8	-	12	1.6 Workshop Practice	2.5	50	20	70	6	100	50	150	220
26	4	-	18	-	48	<---------TOTAL---------->	--	300	120	420		160	80	240	660
Games/NCC/Social and Cultural Activity+Community Development+ Discipline(10+20+10)															40
Aggregate															700

II Semester

4	2	-	-	-	6	2.1 Mathematics-II	2.5	50	20	70	-	-	-	-	70
4	2	-	-	-	6	2.2 Physics-II	2.5	50	20	70	-	-	-	-	70
4	2	-	-	-	6	2.3 Mechanics	2.5	50	20	70	-	-	-	-	70
7	2	-	3	-	12	2.4 Basic Electricity And Electronics Engineering	2.5	50	20	70	3	60	30	90	160
5	-	-	3	-	8	2.5 AirCraft Materials & Material Science	2.5	50	20	70	-	-	-	-	70
10	-	-	-	-	10	2.6 Air Law, C.A.R. & Human Factors & Limitation-II	2.5	50	20	70	-	-	-	-	70
34	8	-	6	-	48	<---------TOTAL---------->	--	300	120	420		60	30	90	510
Games/NCC/Social and Cultural Activity+Community Development+ Discipline(10+20+10)															40
Aggregate															550

NOTE:- (1) Each period will be 50 minutes duration.
(2) Each session will be of 16 weeks.
(3) Effective teaching will be at least 14 weeks.
(4) Remaining periods will be utilised for revision etc.
(5) A good number of guest lectures by person from industries and institutions of higher education be arranged own topics such as Environmental Pollution, Safety Concerns in Industry and Entreprenure Develop Development for general awareness
(6) For Community Development Work See Annexure-I
(7) Objective questions in theory examinations will be of 60 questions of 1/2 marks each with reasoning and other 04 questions will be of 5 marks each.

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STUDY AND EVALUATION SCHEME FOR
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(To Be Effective From)

III Semester

Curriculum							Scheme of Examination								
Periods Per Week						S U B J E C T	Theory			Practical			Grand Total		
Lec.	Tutorial	Draw	Lab	Work Shop	Total		Examination Dur.	Sess. Marks	Total Marks	Examination Dur.	Sess. Marks	Total Marks			
5	1	-	6	-	12	3.1 General Airframe	2.5	50	20	70	3	60	30	90	160
8	2	-	6	-	16	3.2 Air Craft Systems	2.5	50	20	70	6	100	50	150	220
4	1	-	5	-	10	3.3 Air Craft Electricity	2.5	50	20	70	3	60	30	90	160
7	3	-	-	-	10	3.4 Propellors	2.5	50	20	70	-	--	--	--	70
14	7	-	17	-	48	<---------TOTAL---------->	--	200	80	280	--	220	110	330	610
						Games/NCC/Social and Cultural Activity+Community Development+ Discipline							(10+20+10)		40
													Aggregate		650

IV Semester

8	3	-	-	-	11	4.1 Theory of Flight	2.5	50	20	70	--	--	--	--	70
6	-	-	6	-	12	4.2 Air Craft Reciprocating Engines	2.5	50	20	70	3	60	30	90	160
6	2	-	3	-	11	4.3 Air Craft Instruments	2.5	50	20	70	3	60	30	90	160
5	1	-	3	-	9	4.4 Air Craft Compass	2.5	50	20	70	3	60	30	90	160
3	-	-	2		5	4.5 Energy Conservation	2.5	50	20	70	3	20	10	30	100
28	6	-	14	-	48	<---------TOTAL---------->	--	250	100	350	--	200	100	300	650
						Games/NCC/Social and Cultural Activity+Community Development+ Discipline							(10+20+10)		40
													Aggregate		690

NOTE:-
(1) Each period will be 50 minutes duration.
(2) Each session will be of 16 weeks.
(3) Effective teaching will be at least 14 weeks.
(4) Remaining periods will be utilised for revision etc.
(5) For Community Development Work See Annexure-I
(6) After IV Sem exam, the students well go for 4 weeks industrial training structured and supervised by institute staff. They well prepare a report of their work and observations in industry which will be evaluated by external examinner for project for 60 marks (30 for Viva-Voce, 10 for Documentry work and 20 for sessional). See Annexure-II
(7) A good number of guest lectures by person from industries and institutions of higher education be arranged own topics such as Environmental Pollution, Safety Concerns in Industry and Entreprenure Develop Development for general awareness
(8) Objective questions in theory examinations will be of 60 questions of 1/2 marks each with reasoning and other 04 questions will be of 5 marks each.

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STUDY AND EVALUATION SCHEME FOR
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(To Be Effective From)

V Semester

Curriculum							Scheme of Examination								
Periods Per Week						S U B J E C T	Theory			Practical			Grand Total		
Lec.	Tutorial	Draw	Lab	Work Shop	Total		Examination Dur.	Sess. Marks	Total Marks	Examination Dur.	Sess. Marks	Total Marks			
8	-	-	8	-	16	5.1 Air Craft Reciprocating Engines & Accessories	2.5	50	20	70	3	60	30	90	160
6	-	-	6	-	12	5.2 Avionics	2.5	50	20	70	3	60	30	90	160
3	-	-	7	-	10	5.3 Basic Computer	-	--	--	--	3	60	30	90	90
2	-	-	8	-	10	5.4 Air Fram(BONANZA A-36/A-	2.5	50	20	70	6	100	50	150	220
19	-	-	29	-	48	<---------TOTAL---------->	--	150	60	210	--	280	140	420	630
						Games/NCC/Social and Cultural Activity+Community Development+ Discipline(10+20+10)									40
													Aggregate		670

VI Semester

4	-	-	-	-	4	6.1 Environmental Education* Disaster Management	2.5	50	--	--	-	--	--	--	--
10	-	-	10	-	20	6.2 Jet Engines	2.5	50	20	70	3	60	30	90	160
4	-	-	14	-	18	6.3 Aero Engine (Continental IO-550B/E-185)Series	2.5	50	20	70	6	100	50	150	220
-	-	-	-	6	6	6.4 Project	-	--	--	--	-	100	50	150	150
-	-	-	-	-	-	6.5 Industrial Training	-	--	--	--	-	40	20	60	60
18	-	-	24	6	48	<---------TOTAL---------->	--	100	40	140	--	300	150	450	590
						Games/NCC/Social and Cultural Activity+Community Development+ Discipline(10+20+10)									40
													Aggregate		630
													30% Carry Over of I & II		375
													70% Carry Over of III & IV		938
													70% Carry Over of V & VI		1300
															2613

NOTE:- (1) Each period will of be 50 minutes duration.
(2) Each session will be of 16 weeks.
(3) Effective teaching will be at least 14 weeks.
(4) Remaining periods will be utilised for revision etc.
(5) For Community Development Work See Annexure-I
(6) A good number of guest lectures by person from industries and institutions of higher education be arranged own topics such as Environmental Pollution, Safety Concerns in Industry and Entreprenure Develop Development for general awareness
(7) (*) It is compulsory to appear & to pass in examination, But marks will not be included for division and percentage of obtained marks.
(8) Objective questions in theory examinations will be of 60 questions of 1/2 marks each with reasoning and other 04 questions will be of 5 marks each.

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C O N T E N T S

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MAIN FEATURES OF THE CURRICULUM

TITLE OF THE COURSE	:	Diploma in Air Craft Maintenance Engineering
DURATION	:	Three Years(Six Semester)
PATTERN OF THE COURSE	:	Semester System
INTAKE	:	20
TYPE OF COURSE	:	Full Time Institutional
ENTRY QUALIFICATION	:	10 + 2 with (Physics, Chemistry and Mathematics) or Equivalent and 50% agregate in Physics, Chemistry and Math
MODE OF ADMISSION	:	Through Joint Entrance Examination

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LIST OF EXPERTS

The List of experts who participated in the workshop for semester system of curriculum in Aircraft Maintenance Engineering Diploma course held at Aeronautical Training Institute, U. P., Lucknow Airport, Lucknow on 21.04.2015

1.	Dr. G. M. Rahanuma	Principal Lecturer Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
2.	Sri B. K. Verma	Cheief Lecturer, Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
3.	Sri J. K. Saroj	Lecturer, Mechanical Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
4.	Sri M. S. Mehata	Lecturer, Avionics Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
5.	Km. Sneha Gupta	Lecturer, Aeronotics Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
6.	Sri Brajesh	Lecturer, Mechanical Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
7.	Sri Mohd Ahamad Siddiqui	Lecturer, Electrical Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
8.	Sri Arivnd Kumar	Instructor Workshop Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
9.	Km. Vandana Bhatt	Instructor (Aero) Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
10	Sri Santosh Kumar Singh	Instructor (Avionocies) Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
11.	Sri Dinesh Sharma	Lecturer (Electrical) I.R.D.T.,U.P., Kanpur

LIST OF EXPERTS

The List of experts who participated in the workshop for semester system of curriculum in Aircraft Maintenance Engineering(Avionics) Diploma course held at Aeronautical Training Institute, U. P., Lucknow Airport, Lucknow on 15.12.2016

1.	Dr. G. M. Rahanuma	Principal Lecturer Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
2.	Sri B. K. Verma	Cheief Lecturer, Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.

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3.	Sri Harjeet Singh	A.M.E. Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
4.	Sri Rajesh Kumar	A.M.E. Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
5.	Sri Basant Kr. Dwivedi	A.M.E.(Avionics) Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
6.	Sri Kanhaiya Lal Gupta	A.M.E.(Avionics) Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
7.	Sri J. K. Saroj	Lecturer, Mechanical Civil Aviation Department, U.P., Lucknow Airport, Lucknow.
8.	Sri M. S. Mehata	Lecturer, Avionics Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
9.	Km. Sneha Gupta	Lecturer, Aeronotics Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
10.	Sri Brajesh	Lecturer, Mechanical Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
11.	Sri Mohd Ahamad Siddiqui	Lecturer, Electrical Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
12.	Sri D. K. Singh	Lecturer, Aeronotics Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
13.	Sri Santosh Kumar Singh	Lecturer (Avionocies) Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
14.	Sri Ashish Gupta	Deputy Director I.R.D.T.,U.P., Kanpur

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LIST OF EXPERTS

A Curriculum Workshop for Development of Curriculum on the Subject " Energy Conservation" was held on 22nd January, 2018 at NITTTR, Chandigarh. The following participated in the workshop:-

S. No.	Name, Designation and Official address
From Field/Industries/Institutions of Higher Learning	
1.	Shri Jotinder Singh, Engineer-in-Chief(Retd.) Punjab State Power Corpn. Ltd.(PSPCL), Punjab
2.	Shri Punit Sharma, Asstt.General Manager, Electrical & Energy Management, Godrej Appliances Ltd. Mohali, Punjab
3.	Ms. Anu Singla, Associate Professor, Chitkara University, Rajpura, Punjab
4.	Shri Girish Kumar, UP New and Renewable Energy Development Authroity (UPNEDA), Lucknow, U.P.
5.	Sh. Lal Ji Patel, TBO/ CDC Officer, IRDT Kanpur, U.P.
6.	Shri Ravinder Kumar, Research Assistant, IRDT, Kanpur, U.P.
From NITTTR, Chandigarh	
7.	Dr. AB Gupta, Professor & Head, Curriculum Development Centre, **Coordinator**

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REVISION NEED & CURRICULUM PROFILE

Revision of a curriculum is, at times, necessary to make it useful to changing need of time, to weed out the matter irrelevant in the present context and to add to it some thing more wanted. Keeping all these point in mind the existing syllabus has been thoroughly scanned and appropriate changes made whereever necessary. For example the subjects such as in I year Mathematics, Physics, Mechanics, Workshop practice and in II year Theory of Flight, Aircraft Systems, Aircraft Electricity and also in Final Year subjects like Jet Engine, Avionics have been suitably revised and has been redesginsed to incorporate various ideas important to practicing maintenance personnels. Besides all this the ideas fundamental to aircraft frame, engines, flight and control instruments have been kept intact in systematic order. It is supposed that with all these changes, that has been made, the new syllabus will enable the trainees to perform their duties efficiently and effectively.

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I Semester

1.1 MATHEMATICS-I

L	T	P
4	2	-

Rationale :

Mathematics is the back bone of engineering education. It is indispensable for understanding quantitatively the concepts of engineering and technology.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Algebra	15	8	-
2.	Trignometry	15	8	-
3.	Differential Calculus	26	10	-
	Total	56	28	-

DETAILED CONTENTS

1. ALGEBRA:

(i) Theory of Eqution and symmetric functions of roots.

(ii) Bionomial, Logarithmic and Exponmential Series, General exponential and logarithmic series (Rivision).

(iii) Complex numbers and their applications to engineering problems.

(iv) Vectors and their graphic representation Mathematical operations of vectors.

(v) Matrices and Determinants (Elementary Idea).

2. TRIGNOMETRY :

(i) Inverse Circular Functions.

(ii) De Movier's Theorem and its application.

3. DIFFERENTIAL CALCULUS :

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(i) Method of finding derivatives of differential coefficient of a function.

(ii) Differentiation of function of function.

(iii) Logarithmic differentiation.

(iv) Successive differentiation.

(v) Partial differentiation.

(vi) Application of findings Tangents and Normal.

(vii) Maxima and Minima.

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1.2 PHYSICS-I

L	T	P
2	1	-

Rationale :

Knowledge and teaching of physics is a foundation course of engineering students, its purpose is to develop proper understanding of physical phenomena and the scientific concepts.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	14	7	-
2.	Topics No. 2	14	7	-
3.	Topics No. 3	14	7	-
4.	Topics No. 4	14	7	-
	Total	56	28	-

DETAILED CONTENTS

1.A. THERMOMETRY :

(i) Concept of heat and temperature. Units of heat. Basic principles of measurement of temperature.

(ii) Different types of thermometers, their merits and demerits with special reference to constant volume Hydrogen Gas Thermometer, Platinum Resistance Thermometer, Thermocouple Thermometers.

(iii) Relation between Fahrenheit, Celcius, Kelvin and Rankine's, Scales of temperature.

B. CALORIMETRY :

(i) Concept of thermal capacity and specific heat, Effect of temperature on specific heat, Specific heat of solid/liquid by Bunsen's ice calorimeter.

(ii) Latents heat of fusion and vaporisation, thermal energy and heat of combustions.

(iii) Specific heat of gases, Specific heat at constant pressure and constant volume (Cp & Cv) and relationship between them. Ratio of two specific heats, specific heat of gas at low temperature, difference between vapour and gas. .

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2. NATURE OF HEAT :

(i) Concept of mechanical equivalent of heat and its determination by Joule's method.

(ii) Concept of ideal and real gases. Laws governing the behaviour of gases viz. Boyle's Law, Charle's Law. Compression and expansion processes of gases - such as adiavatic, sothermal processes. Work done during these processes, Internal energy of gas.

(iii) Concept of heat transfer by conduction, convection and radiation, Coefficient of thermal conductivity and its determination by Searle's and Lee's methods. Simple numericals related to above

3. THERMODYNAICS :

First and second law of thermodynamics, Concept of heat engine, heat pump and refrigerator, Carnot cycle, Auto cycle and Diesel cycle and their thermal efficienies and related numericals.

4. OPTICS :

Nature of light, Speeds of light, Loss of refraction and reflection at a plane surface by Spherical Mirror and Lenses and Critical angle, Total internal reflection. Principle of Fibre optics, Optical fibre and their applications.

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1.3 GENERAL ENGINEERING AND GROUND SUPPORT

L	T	P
6	-	2

Rationale :

The paper intends to provide aquaintance with the components common to various machines and equipments and processes generally used in aircraft.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	9	-	-
2.	Topics No. 2	9	-	-
3.	Topics No. 3	9	-	-
4.	Topics No. 4	12	-	-
5.	Topics No. 5	12	-	-
6.	Topics No. 6	12	-	-
7.	Topics No. 7	12		
8.	Topics No. 8	9		
	Total	84	-	28

DETAILED CONTENTS

1. INTRODUCTION TO HAZARDOUS LIQUID/GASES:

Safety precautions when working with hazardous/non-hazardous gases, Oils and chemicals. Remedial action in the event of fire/accident.

2. AIRCRAFT FASTENING DEVICES:

Types, identification and symbols of- Bolts, Nuts Washers, Screws, Threads, Rivet, Pins, Keys nd Key Ways.

3. PURPOSE, USE AND LUBRICATION OF BEARINGS :

Plane, split step, ball and roller bearing, Journal bearing, thrust bearing, collar bearing and special types of bearing and their application such as oil lite bearing, elastomer bearing and air bearing.

4. TRASMISSION :

Different types of gear, gear trains and their use for transmission of motion, spur gear, single and double helical gear, bevel gears, worm gear, rack and penion. Concept of pitch, pitch circle and module, planetary gear system. Belt,

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pully chain and sprockets, lever devices, push pull rod system.

5. CABLES :

Introduction of aircraft cables, Material uses and types of cables. Cable fittings, swaging and splicing. Procedure of aircraft cables, Proof testing of aircraft cable, fair lead and turnbuckles.

6. FLUID LINES AND FITTINGS :

Rigid fluid lines, material, identification, sizes, febrication of metal tubes.

Flexible hose, Materials of flexible hoses - low, medium and high pressure hose, identification, flexible hose inspection, testing size designation and hose fittings

7. FIRE PROTECTION :

Classification of fire, Fire extinguishers identification, inspection and operating procedure. Safety and fire precaution to be observed during fuelling and defuelling of aircraft. Fire extinguishing agents

8. NONDESTRUCTIVE TESTING :

Crack detection by various method such as visual inspection, hot oil and chalk method. Dye penetrant method. Meganetic particle inspection, X-ray, Ultrasonic and Eddy current inspection, Florescent particle inspection test. NDT of composite
materials.

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LIST OF PRACTICALS

Material Testing

1. Riveting practice e.g butt joint, lap joint.
2. Inspection of cable system.
3. Familiarization with tube and flexible hose inspection and testing.
4. Familiarization with spliting and swaging operation.
5. Bending and flaring of tube.
6. Familiarization with various kind of union used in fuel, oil and hydraulic system.
7. Familiarization with dye penetrant method.
8. Familiarization with meganetic particle inspections.
9. Familiarization with Eddy current inspections.
10. Familiarization with cable tension adjustment.

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1.4 ENGINEERING DRAWING

L	T	P
-	-	8

Rationale :

Whether it is production, design or maintenance engineer, Knowledge of engineering drawing is a must to him. From production to assembly and dismantling for maintenance knowledge of engineering drawing is essential.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	-	-	-
2.	Topics No. 2	-	-	-
3.	Topics No. 3	-	-	-
4.	Topics No. 4	-	-	-
5.	Topics No. 5	-	-	-
6.	Topics No. 6	-	-	-
7.	Topics No. 7	-	-	-
8.	Topics No. 8	-	-	-
	Total	-	-	112

DETAILED CONTENTS

1. INTRODUCTION :

1.1 General Introduction to Engineering Drawing and its meaning.

1.2 Introduction of various drawing materials, instruments and equipment.

1.3 Use of Draughtman Instruments, Mini drafter and Set of instruments, French curves, their correct use and care.

1.4 Sizes of Drawings sheets and their lay out.

2A. LETTERING TECHNIQUES :

Printing of vertical and inclined, Normal single stroke capital letters and numbers.

B. INTRODUCTION TO SCALES :

Necessity and use, R.F. types used in general engineering drawing, Plane, Diagonal and Chord sxales.

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3. CONVENTIONAL REPRESENTATIONS :

3.1 Methods of showing centre lines, hidden lines, reference lines section lines and dimensional lines and dimensioning.

3.2 Standard material symbols.

3.3 Conventional method of representing threads, nuts, joints and welded parts. Exercises to illustrats the above.

4. Dimensioning Techniques.

5. PRINCIPLE OF PROJECTIONS :

Principle of projections and essential views, orthographic projection and exercises.

5.1 Plan, Elevation, Side views in first angle and third angle projections, simple exercises.

6. ISOMETRIC PROJECTION :

6.1 Isometric Scales.

6.2 Isometric Views.

7. DEVELOPMENT OF SURFACES :

7.1 Parallel line and radial line methods developments, Development of simple and truncated surfaces (Cubes, Prisms, Pyramids, Cylinders & Cones).

8. DRAWING OF TYPICAL AIRCRAFT PARTS :

Study of machine drawing and blue prints.

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1.5 AIR LAW, C.A.R AND HUMAN FACTORS AND LIMITATION-I

L	T	P
8	-	-

Rationale :

The objective and quality and related responsibility in the work of aircraft maintenance at any level requires some legislation. The paper deals with such things imperative for the knowledge of aircraft maintenance engineer and these are changable to time to time as DGCA, New Delhi requirements

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	18	-	-
2.	Topics No. 2	18	-	-
3.	Topics No. 3	18	-	-
4.	Topics No. 4	18	-	-
5.	Topics No. 5	18	-	-
6.	Topics No. 6	10	-	-
7.	Topics No. 7	12	-	-
	Total	112	-	-

DETAILED CONTENTS

1. I. A. R. :

Knowledge of Aricraft manuals, Aircraft Rules. Air worthiness advisory circular, Aeronautical informationcirculars.

2. COCKPIT CHICK LIST, MEL, CDL AND DEFEX :

Minimum equipment list, preparation and use of concept and emergency check list. Defect recording, reporting, investigation, rectification adn analysis. Maintenance control by retiability method.

3. AIRCRAFT MAINTENANCE PROGRAMMES AND THEIR APPROVAL:

Reliability programme, AMP, On condition maintenance, TBO-revision programme, Maintenance of fuel and oil consumption records, Fixing routine maintenance periods and component TBO,s initial and revision.

4. APPROVAL OF ORGANISATIONS

Approval of organisation in CAR 145, CAR-M, Approval of organisation in Cat.E and Cat.G.

5. AIRWORTHINESS AND CONTINUED AIRWORTHINESS :

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Registration of aircraft, certificate of airworthiness, Rebuilding of aircraft, Special flight perprits, Airworthiness of ageing aircraft, Inspection of wooden aircraft, Airworthiness requirement for gliders, Microlight aircraft and hot air balloons. Flight manuals, pooling of aircraft, construction certification and operation of experimental/amature built aircraft, Age of aircraft, Import/Export of aircraft, Space, Item of equipments, Load and trim sheet.

6. FUELING, REFUELLING AND CALIBRATION OF FUELS :

Requirments for fueling, refueling, calibration of fuel, storage, handling quality control and unusable fuel.

7. HUMAN PERFORMANCE :

7.1 General : The Need to take human factors into account incident attributable to human factors/human error; Murphy's law.

7.2 Human Performance and Limitations : Vision, Hearing, Information Processing, Attention and perception, Memory, Claustrophobia and physical access.

7.3 Social Psychology : Responsibility- Individual and group, Motivation and de-motivation, Peer pressure, Culature issues, Team working, Management, supervision adn leadership.

7.4 Factors Affecting Performance : Fitness, Health, Stress - Domestic and work relatied, Time pressure and deadlines, Workload - Overload and underload, Sleep and fatigue, Shift work, Alcohal, medication, srug abuse.

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1.6 WORKSHOP PRACTICES

L	T	P
4	-	8

Preamble :

There are basically 4 shops to workshop practice i.e. Carpentary shop, Fitting shop, Machine shop and Welding shop. The purpose is to familarization of various machines used in aircraft repair and maintenance.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	6	-	-
2.	Topics No. 2	6	-	-
3.	Topics No. 3	6	-	-
4.	Topics No. 4	6	-	-
5.	Topics No. 5	6	-	-
6.	Topics No. 6	13	-	-
7.	Topics No. 7	13	-	-
	Total	56	-	112

DETAILED CONTENTS

1. Safety rules and Precautions in workshop- Instructions in the remedial action to be taken in the event of accidients/ human or machines

2. GENERAL WORKSHOP TOOLS :

A. Marking and Measuring tools - Steel scale, Surface gauge, Protector, Try square, Scriber, Different types of Punches, Divider, Callipers, surface Plate, Gauges, Vernier Callipers, Micrometer, Combinition set, Marking gauges, Bevel square.

B. Cutting Tools - Different types of File, Hacksaw, Chisels Tap and Die, Different types of Drill, Reamer, Different types of saw, Different types of Plainer, Different types of Power tools- lathe, Grinding Machine, Power Hacksaw, Milling Machine, Drilling Machine

C. Holding and Supporting Tools - Different types of vice, Bench hook, Bar clamp, Tongs, Pliers, Jigs adn fixtures.

D. Striking Tools - Different types of Hammer.

E. Miscellaneous Tools - Screw Driver, Pincer, Different types of wrench, Keys, File Card, Spanner & drift.

3. Handling and uses of different type of precision measuring tools.

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4. Limits fits and allowances. Concept of interchangeability.

5. Working knowledge of Tools used on the follwong machine tools - Power Hacksaw, Drilling Machine, Lathe (Centre, Capston and Turret). Grinding Machines

6. Welding

A. Safety precautions observed before and during welding.

B. Different types of welding - Gas welding, Electric arc welding, Seam welding, Spot welding, TIG & MIG, Types of fluxes and its advantages.

(a) Gas welding - Types of gas welding, identificaiton of cylinders pressure regulator (single and double), welding torch and equipment, type of flame and blow pipe.

(b) Electric Arc Welding - Types of arc welding - metallic arc, gas shield arc welding (TIG & MIG), plasma arc welding.

(c) Pressure Welding - Seam, Butt and spot welding.

(e) Types of welded joints and defect analysis

7. Brazing - Al brazing, Cu brazing, Silver brazing and Stainless steel brazing.

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LIST OF PRACTICAL

GENERAL

1. Safety preautions to be observed in workshop

2. Familiarisation with various tools and equipments in use in the workshop.

3. Workshop, Work materials and Tool materials.

EXERCISE :

FITTING SHOP :

1. Hacksawing procedure, Precautions and Techniques in Hacksawing, Different number of Teeth in Blade, Utility.

2. (a) Making a straight cut with Hacksaw.

   (b) Cutting a Solid block.

   (c) Cutting a Channel.

   (d) Cutting a corner

   (e) Cutting a Conduit.

3. Cutting a square piec of 2" sides with Hacksaw.

4. Practice in the use of different files, precautions in the use of different filling rechique and methods.

5. Exercise 3 to be filed approximate size to side 2".

6. Filling the above exercise top surface to flat.

7. Filling the sides of above job to make right angle.

8. Making of "T" fitting.

9. Making Male and Female as per diagram given.

10. Making circular hole by drilling and finishing with file.

11. Making a square hole in a sheet.

12. Making a Diagononal fitting.

13. Practice in riveting and making a riveted joints.

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MACHINE SHOP :

1. Familiarisation with the Machines in the Machine shop with -

   (a) Lathe

   (b) Drilling Machine.

   (c) Sharppening of Tool Bits.

   EXERCISE :

1. Practice of Plain Turning, Facing of a M. S. Rod.
2. Step turning of Rod.
3. Thread Cutting Exernal
4. Taper turning.
5. Internal Turning Procedure.
6. Cutting Threads Internally by tape.
7. Knurling Practice.

   AECR CARPENTRY :

1. Familiarisation with Tools and Equipments and Safety procedure in Carpentry.
2. Measuring and Making tools.
3. Cutting Tools, Saw, Planes, Chisels etc.,
4. Drilling and Boring Tools : Carpenters Brace Augarbit, Rosebit, Rosebit and Bradwal.

   EXERCISE :

1. Procedure of use Saws and setting of the teeth.
2. Practice in Sharpening of Saws Teeth.
3. Practice in use of different types of chisels and shrpening
4. Practice in Grinding and Sharpening of various types of Chisels.
5. Practice of plaining.
6. Procedure of marking different types of cut.

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7. Making a Half Lap joints and 'T' joints and Sawing practices as per drawing.

WELDING SHOP :

Familiarisation with Tools, equipments used in the welding shop and precautions.

1. Oxygen and Acetyline Cylinders.

2. Acetyline regulator for Low Pressure.

3. Gas Cutting Equipment and Welding tips.

4. Pressure Regulators, Hose and Hose fitting, Welding Torch, Goggles, Spark, Filler Rod Wire Brush, welding table with fire, Brick to.

EXERCISE :

1. Practice of lighting the Gases.

2. Oxidising, Neutral and Reducing Flames.

3. Practice in making Head welding.

4. Practice a Line Brazing.

5. Practicing a Seam Soldering

6. Practicing a Butt Welding.

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II Semester

2.1 MATHEMATICS-II

L	T	P
4	2	-

Rationale :

Mathematics is the back bone of engineering education. It is indispensable for understanding quantitatively the concepts of engineering and technology.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Integral Calculus	28	14	-
2.	Co-Ordinate Geometry	28	14	-
	Total	56	28	-

DETAILED CONTENTS

1. INTEGRAL CALCULUS:

(i) Methods of indefinite integration.
(ii) Integration by Substitution.
(iii) Integration by parts.
(iv) Application of integration in calculation of Surface, Area and Volumes of cylinder, Cone and Sphere.

2. CO-ORDINATE GEOMETRY :

(i) Cartesian and Polar co-ordinates and their relationship through the system of representation of point in space and in a plane. Inter-relationship between Polar and Cartisian co-ordinates. Polar and Cartesian equation of standard curves.
(ii) Straight lines, Planes and Sphere in space, distance between two points of space. Findings equations of a straight line and shortest distance between two lines.
(iii) Standard form of curves of parabola, hyperbola, ellipse and tangents and normals.
(iv) Study of general equations of Second Degree for representing of various curve such as a pair of straight line, circle, parabola and ellipse.

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2.2 PHYSICS-II

L	T	P
2	1	-

Rationale :

Knowledge and teaching of physics is a foundation course of engineering students, its purpose is to develop proper understanding of physical phenomena and the scientific concepts.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	14	7	-
2.	Topics No. 2	14	7	-
3.	Topics No. 3	14	7	-
4.	Topics No. 4	14	7	-
	Total	56	28	-

DETAILED CONTENTS

1. WAVE MOTION AND SOUND :

Mechanical waves, Sinusoidal wave, Interfrence phenomena and Standing waves. Speed of sound, Production of sounds, Intensity of sound waves, Pitch and quality. Doplar's effects and Ultrosonic waves.

2. KINEMATICS :

(i) Angular valocity, Angular accelaration, Angular monmentum.

(ii) Relation between Angular and linear valocity.

(iii) Centrifugal force.

(iv) Motion in a vertical circle.

(v) K.E. of rotation.

(vi) Simple theory of vibrations and harmonic resonancres

(vii) Numericals based on above topics.

3. PROJECTILE :

Parabolic motions, Projectile thrown horizontally and at an angle, Problems on time of flight, horigontale range and

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maximum horizontal range.

4. MOTION OF SETELLITES - ESCAPE VALOCITY :

(i) Orbital speed of setellite.

(ii) Period of revolution of setellite.

(iii) Artificial setellite.

(iv) Weightlessness in setellite.

(v) Binding energy of setellite.

(vi) Max height attained and valocity of setellite.

(vii) Geo-stationery satelites

(viii) Jet propulsion theory.

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2.3 MECHANICS

L	T	P
4	2	-

Rationale :

This subject deals with fundamental concepts of mechanics which are useful for the AME students for further understanding the second and final year subject/topic like engine, braking system and in general.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	6	3	-
2.	Topics No. 2	6	3	-
3.	Topics No. 3	6	3	-
4.	Topics No. 4	6	3	-
5.	Topics No. 5	6	3	-
6.	Topics No. 6	6	3	-
7.	Topics No. 7	6	3	-
8.	Topics No. 8	6	3	-
9.	Topics No. 9	6	3	-
10.	Topics No. 10	2	1	-
	Total	56	28	-

DETAILED CONTENTS

1. VECTORS AND FORCE ANALYSIS :

Concept of Scalers and Vectors quantities, Graphical representation of vactors, Composition and Resolution of force vactors, Law of Parallelogram of forces and Law of Triangle of forces. Lami's theorem, Conditions for equilibrium of a particle under the action of number of forces, Concept of moment of a force, Resultant of forces and their equilibrant. Condition of equilibrium of a rigid body acted upon by number of forces. Related numericals, Concept of free body diagram.

2. FRICTION :

Static and dynamic friction, Limiting friction. Laws of friction, Angle of friction. Cofficient of friction. Numerical problems.

Application of friction in Aircraft/Aviation and its effect in terms of wear, tear and life.

3. WORK, POWER AND ENERGY :

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Torque and force, Work done by a force and torque. Kinetic and potential energies. H.P. of an engine and its efficiency. Motion in a straight line subjected to a force.

4. SIMPLE MACHINES :

Introduction, types of pulleys.Mechanical advantage and velocity ratios, Simple wheel and axle, Weston's differential pulley block and their use. Screw Jacks. Numerical problems.

5. MOMENT OF INERTIA :

Moment of inertia of plane areas, Radius of gyration, General theorems on moment of inertia

(i) Theorem of parralel axis.

(ii) Theorem of perpendicular axis.

6. MECHANISMS:

Definition of link, Frame and mechanism, Difference between machine and mechanism, Kinematic pairs, Lower and higher pairs. Introduction to four bar mechanisms, Slider crank mechanism, Introduction to cams and its use.

7. STRENGTH OF MATERIALS :

Stress, Strain and Elasticity, Tensile and compressive stress, Hookes law, different types of elasticity, Poission ratio, Relation between moduli. Determination of Young's modulous, for a material, numericals.

8. BEAMS AND TRUSSES :

Definitions of the terms. Concept of tie and struts, Types of supports. Calculation of reaction and supports of beams trusses and cantilevers. Concept of shear force and bending moment at a section of a beam under various kinds of load. Shear force and bending moment diagram.

9. FLUID MECHANICS:

Introduction to fluid mechanics, viscocity, Surface Tension, Importance of their knowledge in engineering field, Various kinds of fluid flows (Open and closed channels) Laminar and turbulent flows, Bernaullis equation and its application in general and in aeronautics. Introduction to Reynonds numbers.

10. Application of mechanics in Aeronautics (Brief Idea).

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2.4 BASIC ELECTRICITY & ELECTRONICS

L	T	P
7	2	3

Rationale

An A.M.E. diploma holder is involved in various jobs ranging from preventive maintenance of aircraft to fault location in circuits, commission of new component , selection of suitable component for improvement.In order to carry out these and similar jobs effectively on any equipment circuitry or machinery, specialised knowledge of concerned field is essential.

However, for acquiring knowldge in any specialised field of electrical engineering, a group of certain common fundamental concepts, principles and laws involved and mastering of some manual skills are the pre-requisites to be covered in the subject of basic electiricity.

Sl.N.	Units	Coverage Time L	T	P
1.	Basic terminology and their concept	5	1	-
2.	D.C. circuits	12	4	-
3.	Introduction To Semiconductor Devices	15	4	-
4.	Capacitors	12	4	-
5.	Electromagnetism	12	3	-
6.	Electromagnetic induction	15	4	-
7.	A.C. circuits	15	4	-
8.	Polyphase circuits	12	4	-
		98	28	42

DETAILED CONTENTS

1. Basic Terminology and their concepts

1.1 Current, EMF, potential difference (Voltage), resistance, resistivity, their units, conductors & insulators.

1.2 Effect of temperature on the resistance of conductors, semiconductors (C, Si, Ge) and insulators physical explanation, temperature coeffient of resistacne.

1.3 Electrical power, energy and their units (SI).

1.4 Relationship between electrical, mechanical and thermal SI units of work, power and energy.

2. D.C. Circuits

2.1 Kirchoff's laws.

2.2 Simple numerical problems based on Kirchoff's laws.
2.3 Introduction to Thevenin and Superposition theorem.

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2.4 Operation of photo cells, Construction, Material and operation of thermo-couples.

3. Introduction To Semiconductor Devices

Introduction of semiconductor and their application in avaiation. Types of semiconductor. Band theory of solids.

4. Capacitors

4.1 Concept of capacitor, capacity of parallel plate capacitor, and effect of physical parameters.

4.1 Energy stored in a capacitor, dielectric and its influence on capaitance of a capacitor, dielectric constant dielectric breakdown and dielectric strength. Dielectric loss.

4.3 Series and parallel combination of capacitors.

4.4 Variable capacitors.

4.5 Charging and discharging of capacitors.

4.6 Simple broblems on capacitors.

5. Electromagnetism

5.1 Theory of magnetism, Magnetic material, Magnetism and demagnetism, Electro magnetic waves.

5.2 Concept of magnetic flux, flux density, magnetic field intensity ,permeability and their units.

5.3 Maganetic circuits, concept of reluctance and mmf and simple problems.

5.4 Analogy between electric and magnetic circuits.

5.5 B-H curve and magnetic hysteresis (No mathematiccal derivation).

5.6 Elementry ideas about hysteresis loss.

6. Electromagnetic Induction

6.1 Faraday's laws of electromagnetic induction. Lenz's law, simple problem. Dynamically induced emf.

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6.2 Self induced emf, inductance, its role in electrical circuits. Simple problems.

6.3 Mutually induced emf, mutual inductance,its role in electrical circuits. Simple problems.

6.4 Energy stored in magnetic circuit.

6.5 Rise and decay of current in inductors.

6.6 Force on a current carrying conductor placed in a magnetic field and its applications.

6.7 Elementry idea about eddy current loss.

7. A.C.Circuits

7.1 Recapitulation of terminology, instantaeous value, maximum (peak) value, cyle, frequency,alternate current and voltage. Difference between AC and DC, Static electricity and conduction.

7.2 Equation of an alternating voltage and current and wave shape varying sinusoidally.

7.3 Average and RMS value of alternating voltage and current. Importance of RMS value. Simple problems.

7.4 Concept of phase, phase difference and phasor representation of alternating voltage and current.

7.5. A.C. through pure resistance, inductance,capacitance, phasor diagram and power absorbed.

7.6 R-L series circuit, idea of impedance and calculations.

7.7 Apparent power, reactive power and active power,power factor, its importance and simple problems.

7.8 R-C series circuit , simple problems.

7.9 R-L-C series circuit , simple problems.

7.10 Solution of simple parallel A-C ciruits by

(a) Phasor diagram method,

(b) Admittance method.

7.11 Solution of AC circuits series/ parallel by j method. (simple problems).

7.12 Resonance (Series and parallel) and practical

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application, simple problems.

8. Polyphase System

8.1 Introduction to polyphase system. Advantage of three phase system over single phase system.

8.2 Star and Delta connections. Relationship between phase and line value of currents and voltage.Power in polyphase circuits. Simple problems of balanced circuits only.

BASIC ELECTRICITY & ELECTRONICS LAB

i) To show the variation of resistance of a lamp with temperature by plotting a V-I curve for 100W filament lamps.

ii) To study the colour coded resistance and to verify the same by multimeter.

iii) To measure the total or equilivant resistance of colour coded resistors connected in series and parallel and to verify the same by multimeter.

iv) To verify the Ohm's Law.

v) To measure the total or equilivant capacitance of capictors connected in series and parallel and to verify the same by multimeter.

vi) To find the relationship between voltage and current for R-L series circuit for variable resistances & variable inductance.

vii) To measure the power factor in a single phase AC circuit by using voltmeter, ammeter & wattmeter.

viii) To study the B-H curve for a ferro-magnetic core.

IX) To study the phenomenon of electro magnetic induction.

x) Verification of voltage and current relations in Star and delta connected systems.

xi) Testing of diodes and transistors.

xii) Soldering Practices.

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2.5 AIRCRAFT MATERIALS AND MATERIAL SCIENCE

L	T	P
5	-	3

Preamble:

The aim of Aircraft Maintenance Engineering is to familarise with the material of various parts of Aircraft and to make best use of material available in single form or in combination. For this purpose knowledge is Material Science is essential.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	8	-	-
2.	Topics No. 2	6	-	-
3.	Topics No. 3	8	-	-
4.	Topics No. 4	6	-	-
5.	Topics No. 5	6	-	-
6.	Topics No. 6	6	-	-
7.	Topics No. 7	8	-	-
8.	Topics No. 8	8	-	-
9.	Topics No. 9	8	-	-
10.	Topics No. 10	6	-	-
	Total	70	-	42

DETAILED CONTENTS

1. INTRODUCTION TO AIRCRAFT MATERIALS (Non Metals) :

A. Air craft woods and their uses, their structure, strength of wood, Types of glues

B. Introduction to Plywood, its construction and use.

C. Types of aircraft Fabric, their specifications and testing.

D. Reinforcing tapes, threads and their specification and requirement.

E. Introduction to popes and thinner, classification and types, Tauetening and non tauetenin dopes.

2. Rubber- Natural synthetic rubber, Types of synthetic rubber, Buna-s Buna-N, Neopren Butyl and thickol and their uses and storage and service life.

3. Introduction to plastic - Classification, inspection, thermo plastic and thermo setting plastic.

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4. Aircraft adhesives and seallent used and storage

5. INTRODUCTION TO FERROUS MATERIALS :

A. Physical terms like- hardness, brittlenste, malleability Ductility, elasticity, density, fusibility, conductivity, contraction and expansion.

B. Heat teratment Terms - Critical range, Annealing, Narmalizing, Heat treatment, Hardening Quenching, Tempering carburizing, case harding

C. Physical Test Terms - Strain, stress, tensile strength, elastic limit, proportional limit, proof stress, yield strength, yield point elongation, reduction of area, modulus of elasticity.

D. Hardness testing- Rockwell, Brinnel and universal testing machine.

6. STEEL AND ITS ALLOY :

A. Plain carbon steel, effect of indiviual elements. SAE numbering system, Air craft steel and corrosion resistent steel.

B. Heat treatment of steel- Critical range, structure of steel, theory of heat treatment.

C. Introduction to various methods of heat treatment. Hardening, Tempering, Annealing, Normalising, Carburising, Case hardening and their Different processes. Heat treatment of carbon steels, Critical points in iron-carbon diagram. Refining process and their temperature. Temperature colour guide.

7. INTRODUCTION TO NON FERROUS METALS :

A. Introduction to Ni and its alloy, Cu and its alloy- Properties and types. Identification of those materials in various heat treated states and forms.

B. Introduction to Air Craft Aluminium alloys, Nomenclature, classification, heat treatment of Al alloy.

C. Mg and its alloys, Ti and its alloys, inconel monel and their uses

8. SHAPING OF METALS :

Forging, Drawing, Casting, Rolling, Bending, Extruding, Shearing, Forming and Piercing.

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9. COMPOSITE MATERIAL :

A. Composite, advantages & uses of compositite material.

B. Reinforcing fibres, type & uses.

C. Terms : warp, weft, unidirectional, bidirectional, mats, fabric weaves, satin weaves, hybrids, intraply hybrid, interply hybrid.

D. Matrix material, thermosets, thermoplastic, epoxy resin, working with resin & catelysists, adhesive pre-inpregnated materials, fillers, metal matrix composites.

E. Core material, honey-comb, foams-styrofoam, urethane, PVC, strux.

F. Different types of manufacturing techniques, manufacturing methods, compression, moulding, vaccuum bagging, filament winding, wet lay-up, lightining protection & painting of composite part.

G. Safaty precautions in the use of composite material.

H. Curing method of composite material in brief-autoclave, heating blankets.

I. Machinery of cured composite.

J. Detection of defects/deterioration in composite

10. CORROSION AND ITS PREVENTION :

Corrosion and their type, Detection of corrossion, prevention of corrossion, method of preventing corrossion, special coating, chemical films, special paints like Abrassive Resistant Paint, Heat and corrossive resistive paints and electroplating.

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2.6 AIR LAW, C.A.R AND HUMAN FACTORS AND LIMITATION-II

L	T	P
10	-	-

Rationale :

The objective and quality and related responsibility in the work of aircraft maintenance at any level requires some legislation. The paper deals with such things imperative for the knowledge of aircraft maintenance engineer and these are changable to time to time as DGCA, New Delhi requirements

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	20	-	-
2.	Topics No. 2	20	-	-
3.	Topics No. 3	20	-	-
4.	Topics No. 4	20	-	-
5.	Topics No. 5	20	-	-
6.	Topics No. 6	40	-	-
	Total	140	-	-

DETAILED CONTENTS

1. AIRCRAFT INSTRUMENTS, EQUIPMENTS AND ACCESSORIES :

Overhaul and periodical inspection of aircraft instrument, maintenance of test equipment, Airworthiness precedure for aircraft system/ accessories shop, FDR, CVR, GPWS, ACAS.

2. LICENSING OF AIRCRAFT MAINTENACE ENGINEERS (CAR-66):

Issue of AME licences, its classification and experiments requirements, procedure of examination for issue/extension of BASIC and AME licences. Classification and certification responsibilities fo AME licence for Helicopters, Endorsement, renewal and certification privileges of AME licence, Grant fo open AME licence. Issue of BAMEC and authorisation to AME/Approved person. Grant of apporval to persons engaged in overhaul, Major repairs of component/aircraft engine. Approval of FEE, CFE, GET. Student flight engineer/Flight Engineers licence. Validation of foreign AME licence, Mandatory modification and inspection.

3. OPERATIONAL REQUIREMENTS OF AIRCRAFT :

Operation of commercial Air Transport Aeroplanes. General aviation Aeorplanes, Commerical air transport and general aviation Helicopters. Powered hang gliders, Exit low seating. Airworthiness, mainteance and operational

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requirements for extended range operation with twin engine aeroplane for commerical air transport operation. Requirements for operation manual; Implementation of RVSM, Performance based navigation. Requirements for evaluation, certification and maintenance of aircraft flight simulators and synthetic flight training device. Airworthiness requirements for CAT II and CAT III A operation.

4. Airborne communication, navigation, radar and flight testing of aircraft.

5. MISCELLANEUS REQUIREMENTS :

1. Weight and balance control, storage of aircraft parts,

Loncessions, Aircraft log books, provision of medical supplies in aircraft. Document to be carried on boald by Indian registered aircraft and procedure of tissue of taxy Permit.
2. CAR 21.

6. HUMAN PERFORMANCE :

6.1 Physical Environment : Noise and fumes, Illumination, Climate and temperature, Motion and cibration, Working environment.

6.2 Tasks : Physical work, Repetitive tasks, Visual inspection, Comples system.

6.3 Communication : Within and between teams, Work logging and recording, Keeping upto date, currency, Dissemination of information.

6.4 Human Error : Error models and theories, Types of error in maintenance tasks, Implications of errors (i.e accidents), Avording and managing erroes.

6.5 Hazards in the Workplace : Recognising and avoiding hazards, Dealing with emergencies.

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III Semester

3.1 GENERAL AIRFRAME

L	T	P
5	1	6

Rationale :

This paper equips the maintenance engineer with the pre and post requisites of flight to facilitate him in his work to meet the desired objectives.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage L	T	P	Time
1.	Topics No. 1 & 2	12	3	-	
2.	Topics No. 3 & 4	12	3	-	
3.	Topics No. 5 & 6	12	2	-	
4.	Topics No. 7 & 8	12	2	-	
5.	Topics No. 9 & 10	12	2	-	
6.	Topics No. 11 & 12	10	2	-	
	Total	70	14	84	

DETAILED CONTENTS

1. General airframe of fixed wing including windows, doors and emergency exit.

2. Stresses taken up by aircraft such as tensile, compression, shear, torsion and bending.

3. General constructions : Composite constructions, Metal construction, Steel tubular structure (Truss type), Monocoque and Semi-monocoque.

4. Introduction of fail-safe and safe-life concept, damage tolerance, Ageing aircraft and SSID, Minor defect.

5. Construction of Wing and types of wings.

6. Aircraft Flying Control System- Primary control system, Secondary and Auxillary control system, Spoilers, types of spoilers and its purpose, Artifical Feel Unit. Gust lock system. Stall and stall protection devices.

7. Aircraft Fuel tanks - its classificaiton, testing and repair procedure of A.C. fuel tanks..

8. Aircraft Painting and Finish- Different types of paints, primers, varnish, enamels and Enamels and resisting paints, water resistings paints.

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9. Aircraft Assembly and Rigging- Symmetry check, Balancing of control surface, duplicate inspection. Aircraft rigging and control system rigging.

10. Detailed knowledge of the various inspections such as heavey landing, lightening strike, abnormal flight leads etc., Familiarity of the structural manuals, various types of repairs given by the manufacturer therein, incorporation of alternate/equivalent materials, raising up of modifications repair schemes to the aircraft during overhaul.

11. Aircraft weight, balance and its purpose , precautions for weightment, Preparation of weight schedule, calculation of centre of gravity.

12. Aircraft Structure - Minor structural reparirs of metal and composite aircraft. Classification of damage, damage layout, riveting layout, composite repair.

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LIST OF PRACTICALS

1. Fimiliarization with different types of aircraft structure.

2. Familiarizatio with different types of wings.

3. Familiarization with Aircraft control system.

4. Inspection of cables and tension check.

5. Rigging of control and symmetry check.

6. Familiarization with aircraft fuel system and fuel tank.

7. Familiarization with aircraft fabric covering and doping practive

8. Familiarization with various kinds of ground equipment(Chocks, Jacks, Tail suppport, Tresties, Rear fuselage and tresties).

9. Insertion and patch repairs.

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3.2 AIR CRAFT SYSTEMS

L	T	P
8	2	6

Rationale :

Various pneumatic hydraulic and mechanical systems used for smooth operation of aircraft to need proper maintenance. So their knowledge is essential.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. A	18	4	-
2.	Topics No. B	18	4	-
3.	Topics No. C	17	4	-
4.	Topics No. D	15	4	-
5.	Topics No. E	15	4	-
6.	Topics No. F	15	4	-
7.	Topics No. G	15	4	-
	Total	112	28	84

DETAILED CONTENTS

A. HYDRAULIC SYSTEM :

1. Introduction :

a. Fundamental of hydraulic system
b. Hydraulic trminology.
c. Advantages and disadvantages of hydraulic system.

2. Hydraulic fluids

a. Properties
b. Types
   A. Vegetable base
   B. Mineral Base
   C. Phosphate estar base.

3. SEALS :

a. Purpose
b. Types
c. Identification

4. Hydraulic system components :

a. Reservoir
   A. Purpose
   B. Types- (i) Inline Reservoir (ii) Integral Reservoir

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b. Filters,
c. Hydraulic Pumps :- (a) Purpose (b) Types- Constent Delivery Pump, Variable delivery pump.

4. Pressure Control Devices

A. Pressure Switches
B. Pressure Tegulators
C. Relief Valve
D. Thermal Relief Valve
E. Pressure Reducing valve

5. Accumulator - Purpose, Types

6. Selector valves - Purpose, Types

7. Automatic Operating Control Valves

a. Orifice or restrictor valves
b. Check Valves
c. Orific Check Valves.
d. Metering Check Valve
e. Hydraulic Fuse
f. Sequence Valve
g. Shuttle valve
h. Priorty Valve
i. Flow Equalizers

8. Hydraulic Actulars

a. Flexible hoses construction inspections and pressure testing
b. Rigid tubing construction, inspections, pressure testing
c. Trouble shootings of hydraulic system.

B. PNEUMATIC SYSTEM :

1. Introduction :

a. Fundamental of Pneumatic System
b. Terminology
c. Advantage and disadvantages.

B High pressure, Medium pressure and Low pressure system.

C. Pneumatic system components-

a. Pumps and compressor
b. Construction and working of reciprocating, centrifugal and vacuum pumps, Blowers and compressor, Fans and Exhaust, Difference between reciporcating and rotary compressors,

Types of Compressor :

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Working, Single stage and multi stage compressors. Power required to drive a compressor.

a. Relief valves,
b. Control valves,
c. Filters,
d. Oil and Water seperator,
e. Pressure reading valves,
f. Check valves,

g. Restrictor valves.

2. Sources of compressed air :

APU, Reservoirs, ground supply.

3. LANDING GEAR SYSTEM :

a. Introduction.
b. Landing gear configuration- Tricyle, Conventional geared A/c
C. Classification of LG- Non absorbing, Shock absorbring, Fixed gears, retractable gear.

4. Landing gear components :

Traction, strut, torque lind, truck, Drag link, Side brace link, Over contes link, Shimmy dampes.

5. Steering System :

Moch, Power steering system, Anti skid system.

6. Detraction System :

Mechanical, Electrical, Hydraulic, Emergency landing gears extension

SAFETY DEVICES :

Landing gears position indicators system centralising system. Break assembilies - Single disk, Dual disk, Multiple disk, Expandes tube brakes.

Types - Independent brake system, Power brake control system.

Purpose

Inspection and maintenance of brake system.

A/C landing wheels- Split wheels, removable wheels

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A/c Types and tubes - Tire nomenclature,

A/c tire construction - Tube type and tubeless tire and tubes.

Inspection of tyres and tubes

Types of tire damage

D. PRESSURISATION :

Introduction, Heating system, Cabin cooling system- Vapor cycle and air cycle. Cabin pressurization system - Sources of pressurization, Pressurization system control components operation, Pressurization - Outflow valve, safety valve, positive pressure relief valve, negative pressure relief valve.

E. OXYGEN SYSTEM:

Purpose, Types of oxygen system- SOX and LOX, Chemical oxygen generator.

Component :- Demant and dilutes demand regulator. Pressure demand regulators, Oxygen bottles, Regulators, Oxygen masks. Chemical oxygen system- servicing and maintenance of oxygen system, Safety precautions.

Fire Protections :- Fire detection system- Requirement, Types of fire dection system - Spot detector, Overhead detector (Thermal, Thermocoupl, Fenewal, Kidde, Lindberg, Systron donnes). Fire extebguishing, Smoke and toxic gas detection system light, Maintenance and servicing.

F. FUEL SYSTEM:

System layout, Fuel Components -fuels tanks, Fuel pump, Fuel strainer, Fuel detector and shut off, fuel venting, draining, crossfeed and transfer, Indications and warrings.

Types of Fuel System - Gravity feed fuel system, Pressure feed fuel system

Trouble shooting

G. WATER WASTE SYSTEM :

Water system layout, Distribution, servicing adn draining, toilet system and corrosion aspects.

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LIST OF PRACTICALS

1. Pressure testing of hydraulic hoses.

2. flaring and bending procedure of fluid plumbing.

3. Testing of outflow and safety valve of pressurisation system.

4. Charging of air-conditioning system,

5. Servicing of shock strut.

6. Landing gear protection check

7. Charging and purging of oxygen system.

8. Removal an installation of accumulator.

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3.3 AIRCRAFT ELECTRICITY

L	T	P
4	1	5

Rationale :

Use of electrical systems in the design of air craft is well known to every one. Maintenance of these systems is a matter of utmost importance. The purpose is to develop proper understanding of various aspects of phenomenon in the aircraft.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	5	1	-
2.	Topics No. 2	5	1	-
3.	Topics No. 3	5	1	-
4.	Topics No. 4	5	1	-
5.	Topics No. 5	5	1	-
6.	Topics No. 6	5	1	-
7.	Topics No. 7	5	1	-
8.	Topics No. 8	5	1	-
9.	Topics No. 9	5	1	-
10.	Topics No. 10	5	2	-
11.	Topics No. 11	6	3	-
	Total	56	14	70

DETAILED CONTENTS

1. Electrical Measuring Instruments :

1.1 General discription and types of measuring instruments.
1.2 Requirement of indicating instrument.
1.3 Different type of instruments - Moving coil tupe, Moving Iron type dynamometer type, construction and working.
1.4 A meter, voltmeter, wattmeter, frequency meter.

2. Electrical, Cables and wires and terminals : Nomenclature : Current Capacity; Lacing, Clamping and Routing of wire bundles, Various terminals and constructions; Different types of connectors; Switches.

3. Protective devices : Fuses; Relays; Circuit breaker; Over voltage; Under voltage; Reverse current breaker; Current limiter.

4. Static electricity in aircraft : Corona threshold, P-static-cause and prevention, Bonding; Static discharge wick and null discharges; Shielding.

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5. D. C. generators :

- Basic Theory of generators
- Construction and purpose of component in DC generator
- Operation and factors effecting output and direction of current flow in DC generator
- Armature reaction and its remedies
- Series wound, shunt wound and compound wound DC generator
- Paralleling of generator.

6. A. C. generators/ Alternator:

- Basic theory of AC generator
- Operation and construction of AC generator
- Single phase, Two phase and Three phase alternator
- Operation and construction of revolving armature and revolving field type AC generator
- Inverter

7. Motors :

D.C. Moters :

Basic Theory, Operation and Factors affecting out power, Torque,
Speed, Direction of rotation of D C Motors, Series, Wound, Shunt
Wound and compared wound motors.

A. C. Moters :

Basic theory, Operation of constraction, characteristics of AC
Synchronous and induction motors both single and pdy phase, Method of speed control and direction of rotation, Types of A C motors such as capacitor, shaded, split phase, repulsion, Etc. stenter motors.

8. Transformers :

- Transformers construction, principle and operation
- Transformer losses and methods for overcoming then
- Transformer action under load and no load condition
- Power transformer, efficiency, polarity making
- Primary and secondary current, voltage, turn ratio
- Auto transformers, current and potential transformers

9. Voltage Regulator :

- Vibrating type voltage regulator
- Carbon pile type voltage regulator
- Three unit control pannel

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10. DC Sources of Electricity :

- Construction and basic chemical action of primary cell, secondary cell and alkaline cells
- Cells connected in series and parallel
- Internal resistance and its effect on battery
- Operation construction of lead acid battery and Ni-Cd battery
- Charging method of battery
- General precaution while handling with lead acid and Ni-Cd batteries (Aircraft batteries)
- Operation of Photo Cell

11. Rectifiers and Filters :

- Operation of rectifiers and filters
- Types of rectifiers
- Types of filters

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LIST OF PRACTICALS

1. To Study Thermo-couple function.

2. Practice with various techniques of Wiring.

3. Familizaration with the parts of DC Generator and procedure for their inspection and maintenance.

4. Familizaization with the parts of AC Generator (Alternator) and procedure for their inspection and maintance.

5 Familizaization with the parts of DC motor and Procedure for their inspection and maintenance.

6 Familizaization with the parts of AC motor and Procedure for their inspection and maintenance.

7. Familiarization with the operation and testing of transformer.

8. Familiarization with lead acid battery and recognise their parts.

9. Familiarization with Ni-Cd battery and recognise their parts.

10. Familiarization with the method of charging of battery.

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3.4 PROPELLERS

L	T	P
7	3	-

Rationale :

Knowledge of air craft propeller construction, material and various designs is a matter of special interest to air craft engineers.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	12	8	-
2.	Topics No. 2	12	8	-
3.	Topics No. 3	12	8	-
4.	Topics No. 4	12	8	-
5.	Topics No. 5	12	8	-
6.	Topics No. 6,7	12	8	-
7.	Topics No. 8,9,10	13	9	-
8.	Topics No. 11,12	13	9	-
	Total	98	42	-

DETAILED CONTENTS

1. Theory of Propellers Terms used and definations. Propellers slip, Effective and Geometric pitch forces active on propellers, Propellers clearances.

2. Materials used for construction of propellers.

3. Types, Fixed pitch, Adjustable pitch, Varriable pitch, Constant speed, Feathering of propellers. Propellers classifications (Tractor and Pusher). Two position and ground adjustable propeller.

4. Parts of propellers, Static and Dynamic balance of propeller. Propellers tracking.

5. Reverse pitch propeller and its utility. Alpha and Beta range of reverse pitch propeller.

6. Hydromatic propeller.

7. Inspection and general maintenance of propellers.
8. Installation of a propeller to an engine and tests to performed.
9. Propellers Ice protection (Fluid and electrical deicing equipment.
10. Synchornization and synchrophasing.
11. Autofeather, NTS and TSS system.

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12. Propeller governor

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IV Semester

4.1 THEORY OF FLIGHT

L	T	P
8	3	-

Rationale :

This paper equips the maintenance engineer with the insight of pre and post requisites of flight. It will facilitate him in his work to meet the desired objectives of flights.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	20	10	-
2.	Topics No. 2	12	4	-
3.	Topics No. 3	12	4	-
4.	Topics No. 4	12	4	-
5.	Topics No. 5	12	4	-
6.	Topics No. 6	10	4	-
7.	Topics No. 7	12	4	-
8.	Topics No. 8	12	4	-
9.	Topics No. 9	10	4	-
	Total	112	42	

DETAILED CONTENTS

1. STUDY OF ATMOSPHERE (I.S.A.) :

Introduction to Atmosphere- Physical properties of air, atmosphere, air density, pressure, temperature and their behaviour with change in altitude and their effect on the performance of the aircraft. International standard atmosphere(I.S.A.) and their application.

2. AERODYNAMICS :

A. General principle of Aerodynamics and application in Aircraft.

B. Different parts of Aircraft and their utility. Effect of engine power and aircraft weight on performance of aircraft.

C. Lift and means of producing lift.

D. Air Resistance, Stream Lines, Stream Lining Flow, Laminar Flow, Turbulent Flow, Skin Friction and Boundary Layer.

E. Bernaulli's Theorem and its application, Application of

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Neuton's Law of Motion

F. Drag and their classification.

G. Lift/drag Ratio considerations.

H. Knowledge of forces acting on the aircraft during all phases of flight.

3. Stability and control- Axies of aircraft, Stability, types of stability (Longitudinal, Lateral, directional) and its control (Roll, Pitch and Yaw)

4. Flying Control - Primary, Secondary and Auxiliary flying control.

5. Knowledge of the characteristics of subsonic, transonic and supersonic airflow and their applicaiton.

6. Characteristics of the aerofoils used for subsonic and transonic flights. Angle of attack and angle of incidence.

7. Puropse and uses of various types of high lift and darg devices such as vortex generator, boundary layer fences, slots, winglets, end plates, leanding edge flaps, spoilers, lift dumpers and speed brakes, canard.

8. High speed aerodynamics, concept of supersonic pattern, difference between subsonic and supersonic flow and formation of shock waves.

9. Concept of fly by wire and its application. A brief knowledge of rotor craft, Helicopter aerodynamics.

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4.2 AIRCRAFT RECIPROCATING ENGINES

L	T	P
6	-	6

Rationale :

Engine is the source of propullsive force for the of aircraft and its knowledge, principle of working is must for aircraft maintenance engineer.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	12	-	-
2.	Topics No. 2	15	-	-
3.	Topics No. 3	15	-	-
4.	Topics No. 4	15	-	-
5.	Topics No. 5	15	-	-
6.	Topics No. 6	12	-	-
	Total	84	-	84

DETAILED CONTENTS

1. PRINCIPLE OF HEAT ENGINE :

I. Conversion of heat energy to mechanical energy and the relationship between volume, pressure and temperature.

II. Thermodynamic laws related to internal combustion engines.

III. General knowledge of the Otto cycle Disel cycle and relation between P,V and T cycle.

IV. Gas Turbine Engine Theory and reaction principles.

V. Requirements for effective combustion.

2. Internal Combustion Engines Theory and Performance -

I. Concept of Internal Combustion Engine.

II. Engine Operating Fundamental

A. Reciprocating engine and its types

III. Difference between Petrol Engine adn Diesel Engine.

IV Difference between two stroke and four stroke operating cycle.

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V. Description of inlet and exhaust valves operating cycle with valve timing diagram. Definition of valve lead, lag and overlap and reason for incorporation in the valve operating cycle.

VI. Terms related to Reciprocating Engine - Stroke, TDC, BDC, Swept volume, Clearnace volume, Firing order, Piston displacement. Compression ratio, Magifold pressure, Detonation, Preignition, Kickback, Backfire and Afterfire.

3. ENGINE PERFORMANCE :

I. IHP, BHP and FHP, Mean effective pressure power calculation and its measurement.

II. Factors affecting reciprocating engine performance.

4. EFFICIENCIES :

I. Definition and calculation of Mechanical, thermala nd volumetric efficiencies.

II. Propulsive, Thermal and Overall efficiency.

III. Thermal efficiency curve.

5. ENGINE DESIGN AND CONSTRUCTION (RECIPROCATING ENGINE):

A. Construction, Function and Classification of the Following.
I. Crankcase
II. Cylinder
III. Piston
IV. Connecting Rod
V. Crank Shaft
VI. Valve
VII. Piston Rings and Pins
VIII. Valve Operating Mechanism
IX. Canashaft
X. Cam Ring
XI. Bearings
XII. Accessories and Reduction Gear System

6. Engine Fire detection and protection system

A. Fire Detection

I. Thermal Switch
II. Thermocouple
III. Fenwal
IV. Kidde
V. Systron Dorner
VI. Lindberg

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B. Engine Fire Protection System

I. Five Extingushing Methods.
II. Extingrishing Agent.

LIST OF PRACTICALS

1. Identification of various engine parts.
2. Removal and installation procedure of propeller.
3. Propeller tracking procedure.
4. Run out out check of cwankshaft.
5. Cold cylinder check.
6. Compression testing of engine cylinder by direct and differential method.
7. Identification of various engine parts of Gas Turbine Engine.

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4.3 AIR CRAFT INSTRUMENTS

L	T	P
6	2	3

Rationale :

Knowledge of aircraft instruments for maintenance engineer is no way less important then that of aircraft engine. They are controlling and guiding organs of the aircraft.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1 & 2	12	4	-
2.	Topics No. 3 & 4	15	5	-
3.	Topics No. 5 & 6	15	5	-
4.	Topics No. 7 & 8	15	5	-
5.	Topics No. 9 & 10	15	5	-
6.	Topics No. 11 & 12	12	4	-
	Total	75	28	42

DETAILED CONTENTS

1. General introduction to Aircraft instrument, Various types of aircraft instruments and their classification.

2. Altimeter, Principle, Constructional details, Types of setting, Position error leak test and periodical inspection.

3. Airspeed indicator- Principle and construction. Pitot and Static Tube Construction and Principle, Position Error, Construction and periodical inspection, lead test.

4. VSI - Principle and constructional features, check and periodical inspection.

5. Pressure gauge : Principle of operation, types of gauges (Manifold Pressure Gauge, Mechanical Type, Bourdon Tube), Periodical inspection.

6. Temperature Gauge- Principle of themocuple and different types of thermometer used in Aviation. Maintenance and Periodical inspection.

7. R. P. M. Indicator- Mechanical construction details types of indicator maintenance and periodical inspection.

8. Gyro Instruments- Different types of gyros; Constructional details of each and their principle of operation. Maintenance and periodical inspection.

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9. Electrically operated instruments.

10. Fuel flow gauge and content gauges.

12. Detailed knowledge of the procedures of replacement and insite operational tests of various aircraft instruments and equipments.

LIST OF PRACTICALS

1. Leak testing of pitot and static system.

2. Identification of various parts of instruments.

3. Calibration and testing of fuel quantity gauges.

4. Periodical maintenance of gyro instruments.

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4.4 AIR CRAFT COMPASS

L	T	P
5	1	3

Rationale :

Air craft compass is an important instrument of air craft. Its proper working and sensitivity is of utmost importance in flight as well as in landing, so the subject can not be ignore for maintenance engineer.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	10	2	-
2.	Topics No. 2	12	3	-
3.	Topics No. 3	12	3	-
4.	Topics No. 4	12	2	-
5.	Topics No. 5	12	2	-
6.	Topics No. 6	12	2	-
	Total	70	14	42

DETAILED CONTENTS

1. Knowledge of general properties of permanent magnets, polarity and strength of bar magnets,magnetism, magnetic materials and the earth as a magnet; the magnetic meridian and its relationship to the geographic metidian.

2. Knowledge of the general principles of construction of Aircraft Direct Reading Compasses(DR), Maintenance and periodical inspection.

3. Familiarization with the procedure of installation of the compass in the aircraft.

4. Familiarization with swinging, its procedures, precaution taken during swinging, selection of swinging sites.

5. Knowledge of the compensation of compassess in the aircraft, deviations, the calculations and adjustments necessary for corrections for co-effecient A, B and C. Preparation of deviation cards and graphs.

6. Knowledge of the use of landing compass for checking the compasses in Aircraft.

LIST OF PRACTICAL

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1. Swinging and compensation of compass by synthetic aids.
2. Actual swinging and compensation fo compass installed in an Aircraft.
3. Preparation of Deviation card and preparing Low Book entry.

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4.5 ENERGY CONSERVATION

L	T	P
3	-	2

RATIONALE

The requirement of energy has increased manifolds in last two decades due to rapid urbanization and growth in industrial/service sector. It has become challenging task to meet ever increasing energy demands with limited conventional fuels and natural resources. Due to fast depletion of fossil fuels and a tremendous gap between supply and demand of energy, it is essential to adopt energy conservation techniques in almost every field like industries, commercial and residential sectors etc. Energy conservation has attained priority as it is regarded as additional energy resource. Energy saved is energy produced. This course covers the concepts of energy management and its conservation. It gives the insight to energy conservation opportunities in general industry and details out energy audit methodology and energy audit instruments.

DETAILED CONTENTS

1. **Basics of Energy**

   1.1 Classification of energy- primary and secondary energy, commercial and non-commercial energy, non-renewable and renewable energy with special reference to solar energy, Capacity factor of solar and wind power generators.
   1.2 Global fuel reserve
   1.3 Energy scenario in India and state of U.P. Sector-wise energy consumption (domestic, industrial, agricultural and other sectors)
   1.4 Impact of energy usage on climate

2. **Energy Conservation and EC Act 2001**

   2.1 Introduction to energy management, energy conservation, energy efficiency and its need
   2.2 Salient features of Energy Conservation Act 2001 & The Energy Conservation (Amendment) Act, 2010 and its importance. Prominent organizations at centre and state level responsible for its implementation.
   2.3 Standards and Labeling
      2.3.1 Concept of star rating and its importance
      2.3.2 Types of product available for star rating

3. **Electrical Supply System and Motors**

   3.1 Types of electrical supply system
   3.2 Single line diagram
   3.3 Losses in electrical power distribution system
   3.4 Understanding Electricity Bill
      3.4.1 Transformers Tariff structure
      3.4.2 Components of power (kW, kVA and kVAR) and power factor, improvement of power factor
      3.4.3 Concept of sanctioned load, maximum demand, contract demand and monthly minimum charges (MMC)

   3.5 Transformers
      3.5.1 Introduction

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3.5.2 Losses in transformer
3.5.3 Transformer Loading
3.5.4 Tips for energy savings in transformers

3.6 Electric Motors
3.6.1 Types of motors
3.6.2 Losses in induction motors
3.6.3 Features and characteristics of energy efficient motors
3.6.4 Estimation of motor loading
3.6.5 Variation in efficiency and power factor with loading
3.6.6 Tips for energy savings in motors

4. Energy Efficiency in Electrical Utilities

4.1 Pumps
4.1.1 Introduction to pump and its applications
4.1.2 Efficient pumping system operation
4.1.3 Energy efficiency in agriculture pumps
4.1.4 Tips for energy saving in pumps

4.2 Compressed Air System
4.2.1 Types of air compressor and its applications
4.2.2 Leakage test
4.2.3 Energy saving opportunities in compressors.

4.3 Energy Conservation in HVAC and Refrigeration System
4.3.1 Introduction
4.3.2 Concept of Energy Efficiency Ratio (EER)
4.3.3 Energy saving opportunities in Heating, Ventilation and Air Conditioning (HVAC) and Refrigeration Systems.

5 Lighting and DG Systems

5.1 Lighting Systems
5.1.1 Basic definitions- Lux, lumen and efficacy
5.1.2 Types of different lamps and their features
5.1.3 Energy efficient practices in lighting

5.2 DG Systems
5.2.1 Introduction
5.2.2 Energy efficiency opportunities in DG systems
5.2.3 Loading estimation

6 **Energy Efficiency in Thermal Utilities**

6.1 Thermal Basics
6.1.1 Types of fuels
6.1.2 Thermal energy
6.1.3 Energy content in fuels
6.1.4 Energy Units and its conversions in terms of Metric Tonne of Oil Equivalent (MTOE)

6.2 Energy Conservation in boilers and furnaces
6.2.1 Introduction and types of boilers
6.2.2 Energy performance assessment of boilers
6.2.3 Concept of stoichiometric air and excess air for combustion
6.2.4 Energy conservation in boilers and furnaces

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6.2.5 Do's and Don'ts for efficient use of boilers and furnaces

6.3 Cooling Towers
- 6.3.1 Basic concept of cooling towers
- 6.3.2 Tips for energy savings in cooling towers

6.4 Efficient Steam Utilization

7 Energy Conservation Building Code (ECBC)

7.1 ECBC and its salient features
7.2 Tips for energy savings in buildings
- 7.2.1 New Buildings
- 7.2.2 Existing Buildings

8 Waste Heat Recovery and Co-Generation

8.1 Concept, classification and benefits of waste heat recovery
8.2 Concept and types of co-generation system

9 General Energy Saving Tips

Energy saving tips in:

9.1 Lighting
9.2 Room Air Conditioner
9.3 Refrigerator
9.4 Water Heater
9.5 Computer
9.6 Fan, Heater, Blower and Washing Machine
9.7 Colour Television
9.8 Water Pump
9.9 Cooking
9.10 Transport

10 Energy Audit

10.1 Types and methodology
10.2 Energy audit instruments
10.3 Energy auditing reporting format

PRACTICAL EXERCISES

1. To conduct load survey and power consumption calculations of small building.
2. To check efficacy of different lamps by measuring power consumption and lumens using lux meter.
3. To measure energy efficiency ratio (EER) of an air conditioner.
4. To measure effect of valve throttling and variable frequency drive (VFD) on energy consumption by centrifugal pump.
5. To measure and calculate energy saving by arresting air leakages in compressor.
6. To measure the effect of blower speed on energy consumed by it.

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V Semester

5.1 AIRCRAFT RECIPROCATING ENGINE AND ACCESSORIES

L	T	P
8	-	8

Rationale :

Engine is the source of propullsive force for the of aircraft and its knowledge, principle of working is must for aircraft maintenance engineer.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	25	-	-
2.	Topics No. 2	25	-	-
3.	Topics No. 3	25	-	-
4.	Topics No. 4	21	-	-
5.	Topics No. 5	8	-	-
6.	Topics No. 6	8	-	-
	Total	112	-	112

DETAILED CONTENTS

1. ENGINE FUEL AND OIL SYSTEM :

Principles of operation and construction of typical float type carburetor and Direct fuel injection system and . Difference between down draft and updraft configuration. Description and operation of throttle valves, main/idle jets, Power enrichment systems, float chamber, Discharge nozzles, accelerator pumps and mixture control system. Cause and effect of impact, throttle and fuel ice on engine performance. Conditions for use of carburetor/induction icing and its prevention. Principle, operation and construction of pressure injection carburetor and fuel injection carburetor. Function and operation of fuel/air metering forces, impact tubes, venturi.

Description of installation, removal, inspection and servicing of typical carburetor system and system components. Adjustments and functional checks required of the fuel metering control system. Determination of rectification requirements of system faults. Description of the installation, removal, inspection and servicing of typical fuel injection system and system components. Adjustments and functional checks required for the fuel constrol system. Trouble shooting and rectification requirements of fuel system faults.

Characteristics of lubricants used in piston engine of system. Contamination of oil and its identification.

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Properties of lubricating oil-Purity, viscosity, viscosity index, grading, flash point, fire point, pour point, detergent and non detergent.

Description of operation principles and constructional features of wet and dry sump lubrication systems. Suitability of each for typical engine configuration. Description of the constructional features and operation of : pressure pumps, scavenger pumps, oil coolers, oil cooler regulators, oil tank/hoppers, relief valves, check valves, oil filters and oil dilution systems.

2. IGNITION AND STARTING SYSTEM :

Principles of operation of magneto ignition. Definition of flux eddies, E-gap and flux reversal. Function of contact breaker, condenser, distributor and screening of magneto ignition system. Difference between primary and secondary systems. Construction of polar inductor and rotating magnet magnetos. Difference between high and low tension ignition system and advantage and disadvantages of each system. Difference between battery and magneto ignition system. Description, operation and consstruction of nooster coil, induction vibrator and impulse coupling auxiliary ignition system. Description of the procedures for magneto interval timing and magneto to engine timing. Calculation of magneto cam speed for a given magneto cam configuration. Effect of magneto points gapping. Differnce between advance/retard ignition timing. Operation of magneto switches. Construction and function of a compensated cam.

Construction of spark plug. Description on temperature, classification and reach. Inspection, servicing, clearing, assembly and testing of spark plug andleads. Effect of spark plug gap on performance. Diagonising of engine condition by spark plug apperance. Various types of ignition harness, their constructional features testing and repair procedures and screening methods.

Principles of the impulse coupling, ignition boosters and starter relays. Interpretation of ignition and starting system, circuit diagrams and determination of sustem operation and system faults. Determination of rectification requirements of system faults both in ignition and starting system.

Identification ofthe effects of faults in components on an engine starting system. Troubling shooting and rectification requirements of system faults.

3. SUPERCHARGED SYSTEMS :

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Description, construction and operation of typical intake and alternate air system and engine exhaust system. Purpose and principle of supercharging and the effects on volumetric efficiency, charge density and temperature, brake hourse power, manifold absolute pressure, detonation, revolution per minute and fuel consumption. Description of construction and operating principle of geared supercharger and turbo supercharger system. Construction and function of impeller, diffuser, engine gear drive, turbine and intercooler. Definition of rated altitude, criticl altitude, overboost, overshoot, boot strapping, upper deck pressure and manifold pressure. Difference between internal supercharge, external turbo supercharger, multistage and multispeed supercharger. Difference between ground boosted and altitude engines.

Operation and layout of a system consisting of absolute pressure controller, ratio controller, manifold pressure relief valve and waste gate assembly. Operation and layout of a system consisting of density controller, differential pressure controller and waste gate assembly. Operation and layout of a system consisting of variable absolute pressure controller and waste gate assembly. Operation and function of a system consisting of ground adjustable waste gate valve, mainfold pressure relief valve. Description of the operation and procedures. Resolving problem which involve with power, surging, low deck pressure, high deck pressure, low critical altitude and low oil pressure. Description of control system and adjustment procedures.

4. ENGINE INDICATING SYSTEMS OF PISTON ENGINES :

Principles of operation, installation procedures, and the conditions sensed by the following instruments : Mainfold pressure guage, oil pressure gauge, electrical and mechanical tachometers, fuel flow indicator, electrical resistance thermometers, thermocouple thermometer indicators, ratiometer electrical resistance thermometers, fule contents and pressure gauge. Identification of the causes of faults in typical aircraft system.

5. Induction, exhaust and cooling system of piston engines.

6. Power plant installation, storage and removal- Engine, monitoring and ground operation, safety precaution etc..Procedure for starting and ground runup, interpretation of engine power output and preservation and depreservation of engine.

LIST OF PRACTICALS

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1. Top overhaul of a piston engine.
2. Procedure of pressrvation (Long term and Short term).
3. Pre-oiling method for a piston engine.
4. Removal and installation procedure of Magneto.
5. Removal and installation procedure for piston engine.
6. Rigging procedure for engine controls.
7. Magneto to engine timing check.
8. Bomb testing of spark plug.

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5.2 AVIONICS

L	T	P
6	-	6

Rationale :

The electrical devices used in aviation make good study for air craft maintenance eigineer.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
	Auto Pilot			
1.	Topics No. 1	8	-	-
2.	Topics No. 2	8	-	-
3.	Topics No. 3	8	-	-
4.	Topics No. 4	10	-	-
	Basic Avionics			
1.	Topics No. 1	6	-	-
2.	Topics No. 2	6	-	-
3.	Topics No. 3	6	-	-
4.	Topics No. 4	6	-	-
5.	Topics No. 5	6	-	-
6.	Topics No. 6	6	-	-
7.	Topics No. 7	8	-	-
8.	Topics No. 8	10	-	-
	Total	84	-	84

DETAILED CONTENTS

AUTO PILOT :

1. Elementory working principle of simple auto pilot system and its type

2. component of auto pilot system, description and operation.

3. Servo mechanism - Open and Close loop control system, Feedback and follow up

4. Synchro System - Construction, operation and its types (Torque, Control, Resoher and differential).

BASIC AVIONICS :

1. Semi Conductor Theory - Conventional and Electron flow, voltage and current sources. P and N type materials-Effect

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of impurities on conduction, majority and minority carriers; PN junction in semi-conductor, development of potential across a PN junction in unblased, forward blased and reverse biased conditions. Special purpose diodes (Zener), Schottky, varactor, etc.

2. Bipolar Transisters as amplifiers. Concept of power amplifiers.

3. Concept of FET, JFET, MOSFET.

4. Concept of operational amplifiers.

5. Oscillators and Multivibrators.

6. C.R.T. and its application.

7. Bands of frequency spectrum, different modulations and demodulatios techniques and brief idea details of propogation.

8. Aircraft Communication, Navigation and Radar equipment, A brief details about their operation/Use in aircraft.

LIST OF PRACTICALS

1. Recognition and testing of diodes with AVO meter.

2. Recognition and reading the value of resistances with colour codes.

3. Recogntion the types of capacitors and reading their values.

4. Testing of transistors.

5. Using of bonding tester on A/c.

6. Use of CRO.

7. Use of AVO meter.

8. Familiarization with basic autopilot conponents and its operations

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5.3 BASIC COMPUTERS

L	T	P
3	-	7

Rationale :

Computer are being used for management informatives. An introduction to the computer system is required to understand and make use of computer in an effective way. This subject is purely designed to make student of ATI to understand computer in the Real Aircraft Maintenance World.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	6	-	-
2.	Topics No. 2	5	-	-
3.	Topics No. 3	5	-	-
4.	Topics No. 4	6	-	-
5.	Topics No. 5	6	-	-
6.	Topics No. 6	6	-	-
7.	Topics No. 7	4	-	-
8.	Topics No. 8	4	-	-
	Total	42	-	98

DETAILED CONTENTS

1. Introduction to Computer:

Block Diagram of Computer, Types Of Computer Central Processing unit (Control unit, A.L.U.) & memory Unit. Types of Input and Output devices and memories. Visual Display Unit, Keyboard, Floppy disk drive, Hard disk drive, CD-ROM Drive, Magnetic & Number system(Conversion) Binary, Octal, Hexa decimal number system, Bit, Byte and Word. AND, OR, NOT, NOR, Exclusive or Equlity Gates.

2. DOS/WINDOWS:

Internal & External Commands of DOS, Features Of Windows.

3. MS WORD PROCESSING:

File : Open, Close, Save and Find File, Print and Page Setup
Edit : Cut, Copy, Find, Replace
Insert: Page Insert, Page No., Symbole
Font : Paragraph, Tabs, Boder & Shading, Change Case
Tools : Spelling, Mail Merge
Table : Insert Table, Delete Cells, Merge Cell, Sort Text

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4. MS EXCEL :

Practice on above software for calculation and graph using all commands and all function.

5. Foxpro

What is Data base, data types, create structure of Record, sorting & Indexing, Report & label creation.

6. Introduction to Internet:

What is Network, How to send & receive messages, and see differents web sites.

7. SYSTEM ANALYSIS AND DATA PROCESSING :

- System Concepts
- File Design
- Data Base Design
- System & Data Flow Charting

8. USE OF COMPUTER IN AIRCRAFTS :

ILS, VOR, DME, GPS, OMEGA, TRASPONDER AND AUTO PILOT.

LIST OF PRACTICALS

1. Creating, Editing, Modifying database file, Label, Report, Format & Query.
2. Use All commonds of DOS.
3. Use all the features and utilities of MS Word.
4. Use all the features and utilities of MS Excel
5. Selection of command using Windows.
6. Practices on E-Mail & Websites.
7. Inventory & Preventive Maintenance Package, Written specially for Aircraft Maiatenance Organisation
   - System Analysis and Design, Programming and Working.

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5.4 AIRFRAME (BONANZA A-36/A-35)

L	T	P
2	-	8

Rationale :

Airframe specifics maintenance need their proper knowledge. The paper projects considerable light on salient points of BONANZA A-36/A-35.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	2	-	-
2.	Topics No. 2	2	-	-
3.	Topics No. 3	2	-	-
4.	Topics No. 4	2	-	-
5.	Topics No. 5	2	-	-
6.	Topics No. 6	2	-	-
7.	Topics No. 7	2	-	-
8.	Topics No. 8	2	-	-
9.	Topics No. 9	2	-	-
10.	Topics No. 10	2	-	-
11.	Topics No. 11	2	-	-
12.	Topics No. 12	2	-	-
13.	Topics No. 13	2	-	-
14.	Topics No. 14	2	-	-
	Total	28	-	112

DETAILED CONTENTS

THEORY

1. Basic type of construction features materials used. Advantages and Disadvantages of this types structure.

2. Type of control surface used in this aircraft and their control movements.

3. Rigging of controls.

4. Air conditioning system and operating principles, servicing and functional test

5. Discription and operation of retractable landing gear, brake and wheel, Emergency retraction system.

6. Detailed knowledge of fuel system.

7. Type of instrument fitted to aircraft, their basic operating principle. Specific Aircraft system and stand by system.

8. Introduction to aircraft electrical system, power generating and voltage control system and associated components &

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starting system. and environmental control system, Stand by electrical system.

9. Knowledge of aircraft wiring diagrams.

10. Aircraft performance assessment procedure.

11. Auto pilot system : Brief description and operation

12. General knowledge for current airworthiness publication for the aircraft. Knowledge of MPD, COSL, MODS, SB's, SL's pertaining to specific Aircraft.

13. Handling & servicing of aircraft publications.

14. Corrosion, Preventation and storage of Aircraft.

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LIST OF PRACTICALS

1. Association in carrying out of periodical schedules upto 100 hrs/90 days inspection schedules.

2. Servicing, cleaning and lubrication of aircraft.

3. Inspection and serviceability check of aircraft instruments.

4. Inspection and maintenance of vaccum pump and associated components.

5. Landing gear extension/retraction and emergency extension.

6. Oleo filling and charging.

7. Brake bleeding operation and filling of brake master cylinder

8. Inspection of wing attachment bolts and replacemnet procedure.

9. Auto pilot system and their functional texts.

10. Rigging of control surface.

11. Aircraft weighing and preparation of weight schedule procedure.

12. Rigging of control surface.

13. Knowledge of minor repairs and permissible repair scheme for aircraft.

14. Filling of Log Books.

15. Inspection of Air conditioning system.

16. Fuel calibration, Pilot static leak test and C of A renewal inspection.

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VI Semester

6.1 ENVIRONMENTAL EDUCATION & DISASTER MANAGEMENT

L	T	P
4	-	-

RATIONALE:

A diplima student must have the knowledge of different types of pollution caused due to industrialisation and construction activities, so as he may help in balancing of eco-system and control pollution by providing controlling measures. They should be also aware of the environmental laws for effectively controlling the pollution of environment. The topics are to be taught in light of legislation Para-3.

TOPIC WISE DISTRIBUTION OF PERIODS:

SL. NO.	TOPIC	L	T	P
1.	Introduction	6		
2.	Pollution	4		
2.1	Water Pollution	8		
2.2	Air Pollution	8		
2.3	Noise Pollution	4		
2.4	Radio Active Pollution	6		
2.5	Solid Waste Management	6		
3.	Legislations	4		
4.	Environmental Impact Assessment	4		
5.	Disaster Management	6		
	TOTAL	56	-	-

DETAILED CONTENTS

1. INTRODUCTION :

- Basics of ecology, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system, different development i.e. irrigration, urbanization, road development and other engineering activities and their effects on ecology and eco system, Mining and deforestation and their effects.

- Lowering of water level , Urbanization.

- Biodegradation and Biodegradibility, composting, bio remediation, Microbes .Use of biopesticidies and biofungicides.

- Global warning concerns, Ozone layer depletion, Green house effect, Acid rain,etc.

2. POLLUTION :

Sources of pollution, natural and man made, their effects on living environments and related legislation.

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2.1 WATER POLLUTION :

- Factors contributing water pollution and their effect.

- Domestic waste water and industrial waste water. Heavy metals, microbes and leaching metal.

- Physical, Chemical and Biological Characteristics of waste water.

- Indian Standards for qulity of drinking water.

- Indian Standards for quality of treated waste water.

- Treatment methods of effluent (domestic waste water and industrial/ mining waste water), its reuse/safe disposal.

2.2 AIR POLLUTION :

Definition of Air pollution, types of air pollutants i.e. SPM, NOX, SOX, GO, CO2, NH3, F, CL, causes and its effects on the environment.

- Monitoring and control of air pollutants, Control measures techniques. Introductory Idea of control equipment in industries i.e.

  A. Settling chambers
  B. Cyclones
  C. Scrubbers (Dry and Wet)
  D. Multi Clones
  E. Electro Static Precipitations
  F. Bog Fillers.

- Ambient air qulaity measurement and their standards.

- Process and domestic emission control

- Vehicular Pollution and Its control with special emphasis of Euro-I, Euro-II, Euro-III and Euro IV.

2.3 NOISE POLLUTION :

Sources of noise pollution, its effect and control.

2.4 RADIOACTIVE POLLUTION :

Sources and its effect on human, animal, plant and material, means to control and preventive measures.

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2.5 SOLID WASTE MANAGEMENT :

Municipal solid waste, Biomedical waste, Industrial and Hazardous waste, Plastic waste and its management.

3. LEGISLATION :

Preliminary knowledge of the following Acts and rules made thereunder-

- The Water (Prevention and Control of Pollution) Act - 1974.

- The Air (Prevention and Control of Pollution) Act - 1981.

- The Environmental Protection (Prevention and Control of Pollution) Act -1986. Rules notified under EP Act - 1986 Viz.

  # The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000

  # The Hazardous Wastes (Management and Handling) Amendment Rules, 2003.

  # Bio-Medical Waste (Management and Handling) (Amendment) Rules, 2003.

  # The Noise Pollution (Regulation and Control) (Amendment) Rules, 2002.

  # Municipal Solid Wastes (Management and Handling) Rules, 2000.

  # The Recycled Plastics Manufacture and Usage (Amendment) rules, 2003.

4. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) :

- Basic concepts, objective and methodology of EIA.

- Objectives and requirement of Environmental Management System (ISO-14000) (An Introduction).

5. DISASTER MANAGEMENT :

Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, Case study of Tsunami Disaster, National policy- Its objective and main features, National Environment Policy, Need for central intervention, State Disaster Authority- Duties and powers, Case studies of

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various Disaster in the country, Meaning and benifit of vulnerability reduction, Factor promoting vulnerability reduction and mitigation, Emergency support function plan.

Main feature and function of National Disaster Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human Resource Development and Function, Information dissemination and communication.

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6.2 JET ENGINE

L	T	P
10	-	10

Rationale :

Jet engine is also a kind of air craft engine. Knowledge of various kinds of engine used in air craft and inspection procedure is vary essential for maintenance parsonnals.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1	12	-	-
2.	Topics No. 2	12	-	-
3.	Topics No. 3	12	-	-
4.	Topics No. 4	12	-	-
5.	Topics No. 5	12	-	-
6.	Topics No. 6	12	-	-
7.	Topics No. 7	12	-	-
8.	Topics No. 8	12	-	-
9.	Topics No. 9	12	-	-
10	Topics No. 10	12	-	-
11.	Topics No. 11	20	-	-
	Total	140	-	140

DETAILED CONTENTS

1. Introduction to jet engine, Brayton cycle, Comparative study between piston engine and turbine engine.

2. Jet propulsion theory, Types of jet propulsion - Rocket Jet, Pulse Jet, Ram jet engine, Gas turbine engine and its types - Turbo jet, Turbo prop, turbo fan, Turbo haft.

3. Air system of turbine engine - Venting, Cooling of turbine blades and nozzle guide vanes, Cooling of turbine disc and shaft, Cooling of accessories, Sealing control of bearing loads, Air system elements.

   Fixed Areas - Holes, slots and ducts, Rotating seals, Labyrinth seals, Brush and Leaf seals, Carbon seals, Ring seals, Hydraulic seals, Static seals. Troubleshooting.

4. Fuel System- Introduction, Controls - Types of controls, Hydromechanical, Hydropneumatic, Hybrid and Electronics (EEC & FADEC). Fuel system components. Troubleshooting

5. Starting and Ignition System :

   Starting System :-

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A. Electric starters, Starter generator, Pneumatic (Air turbine) starter.

B. Starter pressure, Regulating and shut off valve.

C. Trouble shooting of starting system

Ignition System :-

A. Main ignition system.

B. Intermittent duty low tension ignition system with DC voltage input.

C. High tension intermittent duty AC input system.

D. Solid state and High tension ignition system.

E. Igniter Plug - Its construction and types.

F. Troubleshooting of ignition system.

6. Lubircating System :-

A. Principle of engine lubricating system.

B. Requirement of turbine engine lubricants.

C. Oil sampling.

D. Wet sump lubrication system and dry sump lubrication system and its components.

7. Thrust Augmentation :-

A. Types, purpose and operation of water injection adn after burning.

B. Thrust augmentation system.

8. Thrust Reversal System :-

A. Types, purpose and operation of thrust reversals.

9. Material and Methods of Construction :-

A. Properties of materials required for the construction of gas turbine engine.

B. Introduction of various construction procedure of components of gas turbine engine

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10. Inspection and Maintenance of Gas Turbine Engine :-

A. Compressor inspection and maintenance.

B. Hot Section Inspection - Inspection of combustion chamber. Inspection of Nozzle guide vanes. Inspection of temperature indication system. Inspection of exhaust system.

11. Ground Run Procedure :-

A. Turbojet Aircraft

B. Turboprop Aircraft

C. Turbofan Aircraft

Engine controls and its rigging.

LIST OF PRACTICALS

1. Compressor washing procedures.

2. Internal inspection of an engine by endoscope/boroscope.

3. Hot section inspection, spliting of engine, inspection of combustion chamber, nozzle guide vane and turbine, inspection of turbine tip clearance, inspection of hot section using modern non-destructive testing techniques.

4. Inspection of accessories gear system.

5. Functional test of fuel system including fuel nozzle.

6. Functional check of temperature indication system.

7. Rigging procedure of engine and propaller control.

8. Engine removal and installation.

9. Engine ground testing procedure.

10. Engine preservation (Long term and short term).
11. Functional test of ignition ignitor.

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6.3 AERO ENGINE (CONTINENTAL IO-550 B/E-185) SERIES

L	T	P
4	-	14

Rationale :

Engine specifics maintenance need their proper knowledge. The paper projects considerable light on salient points of Continental IO-550B/E-185.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time L	T	P
1.	Topics No. 1 & 2	8	-	-
2.	Topics No. 3 & 4	8	-	-
3.	Topics No. 5 & 6	8	-	-
4.	Topics No. 7 & 8	8	-	-
5.	Topics No. 9 & 10	8	-	-
6.	Topics No. 11,12,13 & 14	16	-	-
	Total	56	-	196

DETAILED CONTENTS

1. Construction of various parts of the engine, working principle.
2. Function of fuel injection system
3. Ignition system and Magneto timing procedure.
4. Propeller description and operations.
5. Type of propeller system, Variable pitch propeller description and operation
6. Properller installation and track check procedure.
7. Cylinder compression check procedure, methods and permissible limits.
8. Procedure of crank shaft run out check and its limitations.
9. Starting system, Operating Principles of engine starting system.
10. Function of engine lubricating system.
11. Trouble shooting procedure for various engine systems.
12. General knowledge for current airworthiness publication for engine and its accessories.

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13. Handling & uses of aircraft & engine publications.

14. Corrosion prevention and preservation/storage of Engine.

LIST OF PRACTICALS

1. Association in carrying out of periodical inspection schedules upto 100 hrs.

2. Dismentlaing procedure of of incandscent section of engine for top overhaul.

3. Carrying out top over haul inspection and recording all the dismentaling.

4. Assemble procedure of cylinders on to engine.

5. Ground run procedure (1) precautions (2) System Check (peroformance & evaluation), Power Check.

6. Propeller Tracking Procedure.

7. Procedure of removal of Ignition system.

8. Inspection of ignition components for serviciability.

9. Carrying out check of ignition timming and perform the serviciability check.

10. Procedure of Filling of log book

11. Removal procedure and inspection of starter.

12. Inspection of induction system & exhaust system.

13. Trouble shooting procedure.

14. Idle speed and idle mixture adjustment procedure.

15. Engine preservation procedure.

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6.4 PROJECT

Student in groups/individually the given maintenance work of major/minor assembly, subassembly of aircraft. They will prepare a reprot of their work which should contain : Its objective, Identification of work elements, their sequencing, Time schedule, Work procedure facilities/resources wanted. Inspection of parts decision making whether recondition of replace - Manpower wanted, estimated expenditure. Testing after maintenance.

Two periods per week are alloted for this work. The project contains 150 marks, the breakup is as follows

Viva-Voce	-	80 Marks
Documentation	-	20 Marks
Sessional Marks	-	50 Marks

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STAFF STRUCTURE

1.	Cheif Instructor	1	Degree or equivalent in Aeronautical/Electrical or Mechanical Branch of Engineering with at least 15 Years experience in Aviation industry or an aviation institute of training in responsible position. OR Director General of Civil Aviation's curent A.M.E. Licence in cateogires 'A', 'C' and 'X' with either 'B' or 'D' to cover any Trubine Engine Aircraft/Helicopter and Minimum 10 years Aviation experence out of which the candidate will should senior A. M. E./Senior Instructor or equivalent in any organisation. Preferential - Preference will be given to those who have experience in any A. M. E. school.
2.	Dy. Cheif Instructor	1.	Degree or equivalent in Aeronautical/Electrical or Mechanical Branch of Engineering with at least 10 Years experience in Aviation industry or an aviation institute of training in responsible position. OR 1.Director General of Civil Aviation's current Aircraft Maintenance Enginering licence in categories 'A', 'C' & 'X' and 2.Should have either 'B' or 'D' Licence on any aircraft. OR A.M.E. Licence in categories 'A', 'C' and 'X' to cover at least one turbine Engine Helecopter or aeroplane and should have worked as A. M. E. for 5 years in any organisation. Preferential - Preferentila will be given to those who have teaching experience in an A. M. E. Training Centre.

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3.	Computer Programmer	1	
4.	Instructor	7	
A.	Science	1	M.Sc. in Physics/Maths will 48% (Plus) marks with at least Physics, Chemistry, Mathematics at Graduate level and two years teaching experience at Intermediate/Diploma Leval.
B.	Mechanical	2	Bachelor's Degree in Respective
C.	Electrical	1	Branch of Engineering
			Equivalent with 55% (Plus) marks and an experience of 2 years preferablly in the field of maintenance of Aircraft or as an Instructor in an Aviation Training Institute.
D.	Aeronautical/ Maintenance Engineer	3	Bachelor's Degree in Aeronautical Engineering of Equivalent with 55% (Plus) Marks.
			OR
			Directorate General of Civil Aviation's Aircraft Maintenance Engineering Licence in Category 'A' and
			Two years practical experience in the field of aviation after obtaining the licence
E.	Asstt. Instructor	3	Diploma in respective branch of
	Mech/Aero/Elect.	2	engineering or equivalent with 4
		1	years industrial/practical experience in the respective field preferablly in an aviation organisation.
F.	Trade Technician		N.C.T.V.T. Trade certificate in pective.
	Machinist	1	Trade with at least 5 years practical
	Fitter	1	Industrial Experience
	Electrician	1	
	Welder	1	
	Carpenter	1	

P. SO. :

At least two Guest Lecturers be arranged every month, from the persons in the respective field.

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SPACE REQUIREMENT

S.No.	ROOM REQUIREMENT	QTY.	AERA SQ. MTR.
	A. Administrative Block		
1.	Cheif Instructor/Principal Room	1	30
2.	Dy. Cheif Instructor Room	1	20
3.	Lecturer Room	1	70
4.	Office Room	1	60
	B. Teaching Staff		
1.	Class Room	4	30 Each
2.	Drawing Hall	1	60
3.	Conference A.V. Aids Room	1	120
4.	Library Cum Reading Room	1	120
	C. Workshop Block		
1.	Machine Shop	1	120
2.	Fitting Shop	1	50
3.	Welding Shop	1	50
4.	Carpentary Shop	1	40
5.	Engine Test Shop	1	40
6.	Airframe Shop	1	40
7.	Instrument Shop	1	40
8.	Hydraulic and Pnumatic Shop	1	40
9.	Small Hanger for Positioning	1	200
10.	Computer Lab (Air Cond.Glass Partition and Special type pvc flooring and false ceiling)		60
	D. Stores of Aircraft		
1.	Store Room	1	60

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LIST OF EQUIPMENT

Sl.No.	NAME OF EQUIPMENT	Qty.	COST
A.	MACHINE/FITTING SHOP		
1.	Bench Vices	6	
2.	Hacksaw with frame	6	
3.	Power Saw	1	
4.	Hammer ball peen	6	
5.	Hammers cross peen	6	
6.	Hammers straight peen	6	
7.	Hammers soft head	6	
8.	Files set	6	
9.	Steel Rule	6	
10.	Fitter Square	6	
11.	Punches (Set)	6	
12.	Calipers (Set containing internal external and hermaphrodite)	6	
13.	Scribing block	6	
14.	Vee block	5	Pairs
15.	Surface Plate (Cost Iron)	6	
16.	Surface Plate (Granite)	1	
17.	Hand Drill Machine	6	
18.	Power Drill Machine (Bench)	2	
19.	Drill Bits	10	Sets
20	Reamers	10	Sets
21.	Taps	4	Sets
22.	Die	4	Sets
23.	Micrometer English (External)	5	Sets
24.	Micrometer English (Internal)	5	Sets
25.	Micrometer Metric (External)	5	Sets
26.	Micrometer Metric (Internal)	5	Sets
27.	Vernier Calipers	10	
28.	Screw Thread Gauge	5	
29.	Bench Grinder	2	
30.	Screw Driver Sets	6	Sets
31.	Sheet Cutter	6	
32.	Pliers	6	
33.	Lathe Machine (3 Ft. Bed)	4	
34.	Lathe Machine (6 Ft. Bed)	1	
35.	Production Lathe	1	
36.	Capstain lathe	1	
37.	Hot & Cold chisels	6	Set Each
38.	Arbor press	1	
39.	Combination Set	4	
40.	Milling Machine	1	
41.	Shaping Machine	1	
42.	Hardness Tester		
	(A) Brinell Tester	1	
	(B) Pockwell Tester	1	
B.	CARPENTARY SHOP :		
1.	Carpenter's Saw	6	
2.	Jack Planes Wooden	6	
3.	Jack Planes Metal	6	
4.	Chisels firmer	6	

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Sl.No.	NAME OF EQUIPMENT	Qty.	COST
5.	Chisels Mortise	6	
6.	Anger Bit	6 Sets	
7.	Measuring & Marking Tools	6 Sets	
8.	Power Saw	2	
9.	Carpentar's Bench Vice	6	
10.	Carpentar's Lathe (3 Feet)	1	
C.	WELDING SHOP :		
1.	Gas Welding Set	2	
2.	Oxygen and Accetylene Cylinder (Spare)	1 Each	
3.	Electric Arc Welding Machine (Transformer Type)	2	
4.	Argon Arc Welding Machine	1	
5.	Goggle (Gas Welding)	6	
6.	Spark Lighter	2	
7.	Wire Brush	6	
8.	Eye shield for electric arc welding	6	
9.	Soldering Iron	6	
10.	Blow Lamp	2	
D.	ENGINE SHOP :		
1.	Mock up of fuel system	1	
2.	Mock up of ignition system	1	
3.	Mock up of oil system	1	
4.	Exploded view of engine	1	
5.	Condinental A-65 Engine	1	
6.	One continental 0-45 engine for imparting training and associated tools for carrying out job.	1	
7.	Turbine Engine	1	
8.	Spanner Set (Ring)	1	
9.	Spanner Set (Open)	1	
10.	Deep Socket (3/8 " square head)	4 Set	
11.	Socket (1/4" Square head)	4 Set	
12.	Extensions	4 Sets	
13.	T-Handle	4	
14.	Rachet Handle	6	
15.	Cylinder Mercer Gauge	3	
16.	Pin Hole Gauge	3 Sets	
17.	Telescoping	4"	
18.	Depth Gauge (Virnier)	5	
19.	Height (Virnier)	5	
20.	Depth Gauge (Micrometer Type)	5	
21.	Dial Test Indicator	4	
22.	Valve Lappers	6	
23.	Compressor	1	
24.	Valve spring Compression Tester Feel	2	
25.	Feeler Gauge (In Thous)	6	
26.	Float Level Test Ring	2	
27.	Eomb Tester	1	
28.	Meggar	1	
29.	Magneto Test Rig.	1	
30.	Torque Spanner (Dial Type)	1	
31.	Torque Spanner (Racchet Type)	1	
32.	Piston Engine Compression Tester	1	

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Sl.No.	NAME OF EQUIPMENT	Qty.	COST
33.	Compressor Pdg	1	
34.	De-greasing Plant	1	
35.	Pre-oiling Rig.	1	
36.	Prop Balancing Test Rig.	1	
37.	Persian Blue	1	
38.	Mallet	4	
E.	AIRFRAME SHOP		
1.	Mock up of pneumatic system	1	
2.	Mock up of tydraulic system	1	
3.	Flight Controls Balancing Rig	1	
4.	Working Model of Hydraulic Brake	1	
5.	Hose Pressure TestingRig.	1	
6.	One Complete Aircraft Ofr	1	
7.	Ufrtvsttishr and Associated Tools	1	
8.	Swaging Tool	4	
9.	Circlip Pliers (Internal)	2	Sets
10.	Circlip Pliers (External)	2	Sets
11.	Grease Gun	1	
12.	Portable Magnaflux Equip.	2	
13.	De-Magnetisation Rig.	1	
14.	Flourscent Inspection Equip	1	
15.	Cherry Rivet Gun	3	
16.	Clico Fasteners Pliers	2	Sets
17.	Tire Pressure Gauge	2	
18.	Pneumatic Revetting Gun	2	
19.	Snap and Dolly	6	Sets
20.	Ezy-Cut Extractor	2	
21.	Moly Tester	2	
22.	Cable Tensiometer	2	
23.	Fabric Strength Tester	2	
24.	Doping Mask	5	
25.	Fabric Stiching Needles	5	Sets
26.	Straight Edge	2	
27.	Sprit Level	2	
28.	Plumb Bob	2	
29.	Avery Seales (Consisting of 3 scales)	1	Sets
30.	Trammel	2	
31.	Allen Key Set	2	
32.	"C" Spammer	4	
33.	Adkistale Spanner	2	
34.	Griplier	2	
35.	Plep Charging Rig.	1	
36.	Cable Splicing Tools	4	Sets
37.	Universal Testing Machine	1	
F.	ELECTRICAL SHOP		
1.	Mock Up of all electrical generally on aircraft	1	
2.	Generator	1	
3.	Electrical Landing Light (Retractable)	1	
4.	Bat. Charging room for both lead acid and Nicad Battery	1	
5.	Heigh Rate discharge Tester	1	

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Sl.No.	NAME OF EQUIPMENT	Qty.	COST
6.	A. V. Aids, Color Monitor with		
	I. Slide Projector	1	
	II. Film Projector	1	
	III. Overhead Projector	1	
7.	Wheet Stone Bridge	2	
8.	Multimeter	2	
9.	Continuity Tester	2	
10.	Millivolt Drop Tester	2	
11.	Battery Charger	2	
12.	Hydrometer	2	
13.	Pippette	2	
G.	INSTRUMENT SHOP		
1.	Dead Weight Tester	1	
2.	Compressor (Small)	1	
3.	Glass Case (Airtight)	1	
4.	Monometer	1	
5.	Glass Jars	10	
6.	Pitot Static Syste Leak Test Rig.	1	
7.	Instrument Makers Screw Driver	2	Sets

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BASIC ELECTRICITY AND ELECTRONICS ENGINEERING LAB

Sl. No.	Equipment	Qty.	Price
1.	Ammeter -dynamometer type portable, moving coil, permanent magnet 150 mm uniform scale		
	a. Range 0 - 2.5 - 5 Amp.	2	1200
	b. Range 0 - 50 m A	1	500
	c. Range 0 - 500 mA	2	1000
2.	Ammeter - moving iron type Portable moving iron permanent magnet, 150 mm uniform scale		
	a. Range 0 - 5 Amp.	2	1000
	b. Range 0 - 10/20 Amp.	2	1000
	c. Range 0 - 500 mA/1000 mA	2	1000
3.	Voltmeter dynamometer type portable moving coil permanent magnet 150 mm uniform scale		
	a. Range 0 - 5/10 V	2	1000
	b. Range 0 - 15/30 V	1	1000
	c. Range 0 - 50 mv/100 mv	1	1000
	d. Range 0 - 125/500 V	1	1000
	e. Range 250/500 V		
4.	Digital multimeter 3.5 digit - display D.C. voltage 0 - 1000 V in 5 steps A.C. voltage 0 - 750 V in 5 steps Resistance 0 - 20 M ohm in 6 steps D.C. 0 - 10 A in 6 steps A.C. 0 - 10 A in 6 steps Power supply 9 V.	1	3000
5.	Analog multimeter (Portable) D.C. Voltage 0 0 1000 V AC Voltage 0 2/5/10/25/100/250/1100 V. Resistance 0 200 M ohm DC 0 - 50 micro Amp./1 mA/10 mA/100mA/1A/10A AC 0 - 100 mA/1A/25 A/10A	1	1000
6.	Wattmeter single phase (LPF= 0.2) portable dynamometer type, scale 150 mm current range 0 - 5/10 Amps voltage Range 0 - 250/500 V	2	5000
7.	Decade resistance box constantan coils, single dial 10x10, 10x100, 10x1000, 10x10,000 ohms	1	1000
8.	Continuously variable 0 - 1000 micro farad, 250 V	1	1000
9.	Energymeter single phase induction type, industrial grade 5 A or 10 A, 250 V, 50 Hz.	1	2000
10.	Energymeter(Substandard)	1	3000

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	single phase, induction type 5 A/10A, 250 V, 50 Hz.		
11.	Power factor meter dynamometer type, eddy current damping, 50 Hz, scale length 150 mm range upto 20 amp, voltage range 300 V 10 F. range 0.5 log, unity 0.5 load.	1	5000
12.	Frequency meter (Reed type) 230 V, range for having 21 reeds for 40-60 Hz range.	1	500
13.	Rheostat sliding rheostats wound with evenly oxidised iron free nickel copper on vitreous enamelled round steel tube 150 ohms 2 Amps. 110 ohms 2.5 Amps.	 1 1	 600 600
14.	Variable inductor single phase, 250 V, 2.5 KVAr continuously variable	1	2000
15.	Cathode ray oscilloscope 10 MHz dual beam oscilloscope vertical defeection band width DC-10 MHz (-3db) rise time 30 ms defeection coefficient 12 horizontal defeection band width 1 MHz (+6db)	1	10,000
16.	Battery charger 12 V silicon bridge rectifier AC input 230 V, DC output suitable for charging 6 V And 12 V batteries provided with MC voltmeter 0 - 20 V and ammeter 0 - 5 A	1	1000
17.	Capacitors 2.5 microfarod, electrolytic type	4	200
18.	Q Meter frequency 0 - 30 MHz Q 0 to 500	 1	 4000
19.	LCR meter (digital) 3.5 digit display capacitance 0 to 20,000 microfarad inductance 0 to 200 Henry resistance 0 to 20 M ohms	1	8000
20.	LCR/Q bridge capable of measuring resistance, inductance and capacitance of range 8 amps, 0.012 to 10 M ohms, 4 to 10,000 H, 0.5 pico farad to 10 F.	1	5000
21.	Kelvin double bridge 10 x 0.1 ohms circular slide wire devided into 200 equal parts		

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22.	Energy meter 3 phase induction type, 4 wire, industrial grade, 50 Hz, 10 A, 440 Volt	1	5000
24.	Energy meter (Sub standard) 3 phase, 4 wire, 440 V, 10A, 50 Hz induction type.		
25.	Transformer single phase core type, 230/110 V, 1 KVA, 50 Hz.	1	5000
26.	Universal shunt 0 - 75 A	1	2000
27.	Current transformer 10/25/50/5A as per IS 4201/1967 and 2705/1981	1	2000
28.	Potential transformer 10 VA, 415/110 V as per IS 4201/1967 and 2705/1981	1	2000
29.	Strain guage	1	1000
30.	Maxwells bridge	1	1000
31.	Weins bridge	1	1000
32.	Schering bridge	1	1000
33.	Single Phase AC Watt Hour Meter (Electronic Energy Meter) 240V,50 C/s 10 Amp.,	1	1200
34.	3 Phase Four Wire (3X240V between Line To Nuetral) AC static Watt Hour Meter (Electronic Energy Meter) 10A	1	2500
35.	Trivector Meter	1	5000

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BASIC COMPUTER
COMPUTER CENTRE

S.No.	DESCRIPTION	QTY.	APPROX. COST (in Rs.)
1	PENTIUM-IV 2.4 Ghz or latest RAM-256 MB or latest HDD-80 GB latest MONITOR COLOUR 17" AGP 16 MB 52X MM KIT(52x CD Drive, Speaker,sound card) FDD - 1.44 MB Key Board - 107 Keys Multimedia Mouse - Optical Fibre Mouse 32 Bit PCI ETHERNET CARD(10/100) Mbps Pre loaded Windows XP OR WINDOWS 2000 Pre loaded Norton Anti Virus with licence media and manual OR Computer of latest Specification	16 (15+1Server)	8,000,00=00
Software :			
i.	Noval Netware/NT Latest Version	01	55000
ii	WINDOWS - XP/WINDOWS 2000 /Windows NT	01	6000
iii.	MS OFFICE XP	01	17000
iv.	Dos latest version.	01	5,000
v.	FoxPro 2.5 or Latest Version	01	
3. Hardware			
i.	Internal Modem 56 kbps		
ii.	Hubs-16 port, all accessories related to Networking.		
iii.	Scanner- A4	01	10,000
4.	132 Column 600 CPS or faster 9 Pin dot matrix printer with 500 million character head life	01	15,000
5.	Laser Jet	01	20,000
6.	5 KVA on line UPS with minimum 30 miniute battery backup along with sealed maintenance free batteries. Provision for connecting external batteries with network connectivity.	01	1,75000
7.	Window Air Conditioner 1.5 tones capctity with ISI mark alongwith electronic voltage stablizer with over viltage and time delay circuit	04	30,000(EACH)
8.	Room preparation and furniture	LS	

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LIST OF LABORATORY EQUIPMENT(Energy Conservation)

Sr. No	Particulars	Qty	Estimated Cost (Rs)
1.	Multimeter	1	17,000
2.	Power Analyzer	1	20,000
3.	Luxmeter	1	5,000
4.	Black Box (for checking lamp efficacy including stand and luxmeter)	1	25,000
5.	Centrifugal pump, 1 kW	1	15,000
6.	Variable Frequency drive	2	50,000
7.	Water Flow meter	1	10,000
8.	Pressure Gauge	1	2,000
9.	Experimental Set up for Valve Throttling vs VFD	1	50,000
10.	Compressor, 20 cfm, single-stage	1	50,000
11.	Air leakage meter	1	18,000
12.	Blower (2 HP)	1	8,000

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XII. LEARNING RESOURCE MATERIALS

1.	LCD Projector with Screen	1	--	20000
2.	Handicam	1	--	30000
3.	Cutting, Binding & Stitching equipment.	1	--	30000
4.	Desk Top Computer with Internet Core i5/i7- 760, Processor, Genuine Windiw 7, Professional 18 inch HD, Flat Panel Monitor Optical Mouse, Key Board & all related media or latest version	1	--	40000
5.	Home Theater Support Disc type CD. CDR/CDRW DVDR/DVDRW, VCD Supported with USB Port Support-DIVX/JPEG/MP3	1	--	25000
6.	Commerical P A System 16 W-220W output, AC & 24V DC Operated, 5 Mic. & 2 Auxilary input, Speaker output 4 Ohm, 8 Ohm, 17 V & 100 V	1	--	20000
7.	Interactive Board	1	--	50000

ote :

1. This center will be only one at the institute level irrespective of all branches.

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ANNEXURE I

COMMUNITY DEVELOPMENT WORK

For Community Development work to the students will visit identified villages for a week, convenieltly, during the session. The students shall render following services and information to the villagers.

1. To launch and sustain funtional literacy programmes.

2. To make folks aware of Sanitation, Hygeine, Environmental Pollution, Family Welfare, etc. To control and reduce pollution effecting the social fabric of rural life i.e.

   - Construction of Soak Pits and Sanitary Latrines, Tree Plantation, Social Forestry, Installation of Smokeless Chulhas.

3. To help the rural youth in preparing project reports to receive loans for developing cottage industries.

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ANNEXURE - II

FIELD EXPOSURE

After second exam. in the summer vacation students will have a four week Industrial Training. They will work and focus their attention there on following points to incorporate them in their reports.

1. Name & Address of the unit

2. Date of

   i. Joining.

   ii. Leaving.

3. Nature of Industry

   i. Product.

   ii. Services.

   iii. Working Hrs.

4. Sections of the unit visited and activities there in.

5. Details of machines/Tools & instruments used in working in the section of the unit visited.

6. Work procedure in the section visited.

7. Specifications of the product of the section and materials used.

8. Work of repair and maintenance cell.

9. Details of the shops (welding, Foundary, Machines shop Electrical Maintenance Shop,etc) related to repair and maintenance work.

10. Name of checking and Inspecting Instruments and their details. Quality controls measures taken.

11. Details of hadraulics/pneumatic/ thermal units or appliances used if any.

12. Discripton of any breakdown and its restoring.

13. Use of computer - if any.

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14. Visit of units store, Manner of keeping store items, Their receiving & distribution.

15. Safety measures on work place & working conditions in general - comfortable, convenient & hygeinic.

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ANNEXURE - III

TRAINEES ASSESSMENT

This Institution invites the comments on the training of its students (work & behaviour) from their immediate supervisors on the following points.

1. Name of the trainee

2. Date of

   i. Joining.

   ii. Leaving.

3.

   i. Regularity & Punctuality

   ii. Sense of responsibility

   iii. Readiness to work/learn

   iv. Obedience

   v. Skill aquired

4. Name of the sections of the unit he attended during his stay.
   His activities/worth of being there.

5. Any thing specific

Sinnature of the Assessor

Date :- Designation

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STUDENT ACTIVITIES ON ENERGY CONSERVATION/ENERGY EFFICIENCY

1. Presentations of Case Studies
2. Debate competitions
3. Poster competitions
4. Industrial visits
5. Visual Aids

COURSE OUTCOMES

After studying this course, a student will be able to co-relate and apply fundamental key concepts of energy conservation and energy management in industry, commercial and residential areas. A student will be able to:

- Define principles and objectives of energy management and energy audit.
- Understand Energy Conservation Act 2001 and its features.
- Understand various forms & elements of energy.
- Identify electrical and thermal utilities. Understand their basic principle of operation and assess performance of various equipments.
- Identify areas of energy conservation and adopt conservation methods in various systems.
- Evaluate the techno economic feasibility of the energy conservation technique adopted.

INSTRUCTIONAL STRATEGY

Teachers are expected to lay considerable stress on understanding the basic concepts in energy conservation, principles and their applications. For this purpose, teachers are expected to give simple problems in the class room so as to develop necessary knowledge for comprehending the basic concepts and principles. As far as possible, the teaching of the subject must be supplemented by demonstrations and practical work in the laboratory. Visits to industries must be carried out. Expert from industry must be invited to deliver talks on energy conservation to students and faculty.

REFERENCE BOOKS

1. Guide book on General Aspects of Energy Management and Energy Audit by Bureau of Energy Efficiency, Government of India. Edition 2015
2. Guide book on Energy Efficiency in Electrical Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
3. Guide book on Energy Efficiency in Thermal Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
4. Handbook on Energy Audit & Environmental Management by Y P Abbi&Shashank Jain published by TERI. Latest Edition
5. **Important Links:**
   (i) Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India. www.beeindia.gov.in.
   (ii) Ministry of New and Renewable Energy (MNRE), Government of India. www.mnre.gov.in.
   (iii) Uttar Pradesh New and Renewable Energy Agency (UPNEDA), Government of Uttar Pradesh. www.upneda.org.in.
   (iv) Central Pollution Control Board (CPCB), Ministry of Environment, Forest and Climate Change, Government of India. www.cpcb.nic.in.
   (v) Energy Efficiency Sevices Limited (EESL). www.eeslindia.org.
   (vi) Electrical India, Magazine on power and electrical products industry. www.electricalindia.in.

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ANNEXURE-IV QUESTIONNAIRE

INSTITUTE OF RESEARCH,DEVELOPMENT AND TRAINING U.P.KANPUR -208024

SUBJECT: Questionnaire for ascertaining the functional requirements of Three Year Diploma holders in Aircraft Maintenance Engineering and inputs to improve the existing curriculum accordingly employment opportinities awaiting them.

PURPOSE: Revision of curriculum for Three Year Diploma in Aircraft Maintenance Engineering.

NOTE: 1.Please answer the questions to the points given in the questionnaire.
2.Any other point or suggestion not covered in this questionnaire may be written on a separate paper and enclosed with the questionnaire.

1.Name of the organisation:_____
_____

2.Name & Designation of the officer _____
filling the questionnaire _____

3.Name of the department/section/ _____
shop _____

4.Important functions of the _____
department/section/shop _____

5.Number of diploma holder employees
under your charge in the area of _____
Air Craft Maintenance Engineering
and number existing vaccancies.

6.Please give names of modern equipments/machines handled by a diploma holder in Air Craft Maintenance Engineering.

1. 2. 3.

4. 5. 6.

7.What proficiencies are expected from a diploma holder in Air Craft Maintenance Engineering.

1. 2. 3.

4. 5. 6.

8.Mention the approximate percentage of the following desired in Diploma teaching.

1. Theoretical knowledge ----------%

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2. Practical knowledge ----------%
3. Skill Development ----------%

9. Do you think " on the job training" / Industrial training should form a part of curriculum. (Yes/ No)
if yes then
(a) Duration of training ----------
(b) Mode of training 1. Spread over different semesters

2. After completion of course

3. Any other mode

10. What mode of recruitment is followed by your organisation.

1. Academic merit
2. Written test
3. Group discussion
4. Interview
5. On the job test.

11. Mention the capabilities/ Qualities looked for while recruiting diploma holder in Air Craft Maintenance Engineering.

(a) Technical knowledge ----------
(b) Practical skill ----------
(c) Etiquettes and behaviour ----------
(d) Aptitude ----------
(e) Health habit and social background ----------
(f) Institution where trained ----------

12. Which type of assignment do you suggest for an entrepreneur in Air Craft Maintenance Engineering.

13. In which types of organisations can a diploma holder in Air Craft Maintenance Engineering can work or serve.

1 2 3

4 5 6

14. Job prospects for the diploma holder in Air Craft Maintenance Engineeringthe next ten years in the state/country.

15. In your opinion what should be the subjects to be taught to a diploma student in Air Craft Maintenance Engineering.

Theory Practical

16. Kindly mention particulars regarding topics/areas which should be given more emphasisin the curriculum .

Theory Practical

17. Kindly state whether your organisation can contribute towards improvement of Yes/ No

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curriculum in above field.
If yes : Please give names of experts in
your organisation willing todo something
in this respect

18. Kindly give your valuable suggestions for being considered at the time of finilisation of curriculum.

19. What changes in technologies are to be incorporated in the development of curriculum in Air Craft Maintenance Engineering.

(Signature)

Kindly mail the above questionnaire duly filled to:-

Ashish Gupta
Deputy Director
Institute of Research,Development & Training,U.P.
Govt. Polytechnic Campus
Kanpur-208024

(Please note that all information in this survey is confidential for the use of curriculum revision only)

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