

CURRICULUM FOR THREE YEAR

DIPLOMA COURSE IN

=====
: AIRCRAFT MAINTENANCE ENGINEERING :
: Effective from Session 2008-09 :
: :
=====

=====
: Annual System :
=====

=====
UNDER DEVELOPMENT
=====

Prepared By

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: Curriculum Development Cell :
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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 30.06.08 :
=====

STUDY AND EVALUATION SCHEME FOR
THREE YEAR DIPLOMA COURSE IN AIR CRAFT MAINTENANCE ENGINEERING
(To Be Effective From 08-09)

I Year

Curriculum						Scheme of Examination									
Periods Per Week						S U B J E C T	Theory				Practical			Grand Total	
Le c.	Tut ori al	Dr aw	Lab	Work Shop	Tot al		Examination Dur.	Sess. Marks	Total Marks	Examination Dur.	Sess. Marks	Total Marks			
													Marks		Marks
2	1	-	-	-	3	1.1 Mathematics	2.5	50	20	70	-	-	-	70	
2	1	-	-	-	3	1.2 Physics	2.5	50	20	70	-	-	-	70	
2	1	-	-	-	3	1.3 Mechanics	2.5	50	20	70	-	-	-	70	
3	1	-	2	-	6	1.4 Basic Electricity And Electronics Engineering	2.5	50	20	70	3	60	30	160	
3	-	-	2	-	5	1.5 General Engineering And Ground Supports	2.5	50	20	70	3	60	30	160	
-	-	-	4	-	4	1.6 Engineering Drawing	4.0	50	20	70	-	-	-	70	
3	-	-	4/2	-	5	1.7 AirCRAFT Materials & Material Science	2.5	50	20	70	-	-	-	70	
4	-	-	-	-	4	1.8 Air Law, C.A.R. & Human Performance	2.5	50	20	70	-	-	-	70	
3	-	-	12	-	15	1.9 Workshop Practice	2.5	50	20	70	6	100	50	220	
22	4	-	22	-	48	<-----TOTAL----->	-	450	180	630	-	220	110	330	960
												Games/NCC/Social and Cultural Activity+Community Development+ Discipline(10+20+10)		40	
												Aggregate		1000	

- NOTE:-
- (1) Each period will be 50 minutes duration.
 - (2) Each session will be of 32 weeks.
 - (3) Effective teaching will be at least 25 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 Entrepreneurship 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.

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

II Year

Curriculum						S U B J E C T	Scheme of Examination								
Periods Per Week							Theory				Practical				Grand Total
Le c.	Tut ori al	Dr aw	Lab	Work Shop	Tot al		Examination Dur.	Sess. Marks	Total Marks	Examination Dur.	Sess. Marks	Total Marks	Grand Total		
														Marks	Marks
3	1	-	-	-	4	2.1 Theory of Flight	2.5	50	20	70	--	--	--	70	
3	1	-	4	-	8	2.2 General Airframe	2.5	50	20	70	3	60	30	90	
3	-	-	4	-	7	2.3 Air Craft Reciprocating Engines	2.5	50	20	70	3	60	30	90	
3	1	-	4/2	-	6	2.4 Air Craft Instruments	2.5	50	20	70	3	60	30	90	
3	1	-	4/2	-	6	2.5 Air Craft Systems	2.5	50	20	70	6	100	50	150	
3	1	-	4/2	-	6	2.6 Air Craft Compass	2.5	50	20	70	3	60	30	90	
3	1	-	4	-	8	2.7 Air Craft Electricity	2.5	50	20	70	3	60	30	90	
2	1	-	-	-	3	2.8 Propellers	2.5	50	20	70	-	--	--	70	
23	7	-	18	-	48	<-----TOTAL----->	--	400	160	560	--	400	200	600	
Games/NCC/Social and Cultural Activity+Community Development+ Discipline(10+20+10)													40		
Aggregate													1200		

- NOTE:-
- (1) Each period will be 50 minutes duration.
 - (2) Each session will be of 32 weeks.
 - (3) Effective teaching will be at least 25 weeks.
 - (4) Remaining periods will be utilised for revision etc.
 - (5) For Community Development Work See Annexure-I
 - (6) After yearly exam, the students will go for 4 weeks industrial training structured and supervised by institute staff. They will prepare a report of their work and observations in industry which will be evaluated by external examiner 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 Entrepreneur 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.

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

FINAL Year

Curriculum						Scheme of Examination									
Periods Per Week						S U B J E C T	Theory			Practical			Grand Total		
Le c.	Tut ori al	Dr aw	Lab	Work Shop	Tot al		Examination Dur.	Sess. Marks	Total Marks	Examination Dur.	Sess. Marks	Total Marks			
4	-	-	4	-	8	3.1 Air Craft Reciprocating Engines & Accessories	2.5	50	20	70	3	60	30	90	160
4	-	-	4	-	8	3.2 Jet Engines	2.5	50	20	70	3	60	30	90	160
4	-	-	4	-	8	3.3 Avionics	2.5	50	20	70	3	60	30	90	160
1	-	-	3	-	4	3.4 Basic Computer	-	--	--	--	3	60	30	90	90
1	-	-	7	-	9	3.5 Air Frame (BONANZA A-36)	2.5	50	20	70	6	100	50	150	220
1	-	-	7	-	9	3.6 Aero Engine (Continental IO-550B) Series	2.5	50	20	70	6	100	50	150	220
2	-	-	-	-	2	3.7 Environmental Education* Disaster Management	2.5	50	--	--	-	--	--	--	--
-	-	-	-	2	2	3.8 Project	-	--	--	--	-	100	50	150	150
-	-	-	-	-	-	3.9 Industrial Training	-	--	--	--	-	40	20	60	60
17	-	-	29	2	48	<-----TOTAL----->	--	250	100	350	--	580	290	870	1220
												Games/NCC/Social and Cultural Activity+Community Development+ Discipline(10+20+10)	40		
												Aggregate	1260		
												30% Carry Over of Ist Yr.	300		
												70% Carry Over of IInd Yr.	840		
													2400		

- NOTE:-
- (1) Each period will of be 50 minutes duration.
 - (2) Each session will be of 32 weeks.
 - (3) Effective teaching will be at least 25 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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MAIN FEATURES OF THE CURRICULUM

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

LIST OF EXPERTS

The List of experts who participated in the workshop for revision of curriculum in Aircraft Maintenance Engineering Diploma course held at Aeronautical Training Institute, U. P., Lucknow Airport, Lucknow on 26th November, 1993 at 11.00 A. M.

1. Sri D. P. Ghosh, Controller of Airworthiness
Civil Aviation Department,
Government of India,
Lucknow Airport, Lucknow
2. Sri D. P. Agnihotri Cheif Instructor Communication,
Civil Aviation Training College,
National Airport Authority,
Bamrauli, Allahabad - 211 012
3. Sri V. P. Missey Sr. Airworthiness Officer,
DGCA, Lucknow Airport, Lucknow
4. Sri R. S. K. Sinha Assistant Professor
Board of Technical Education, U.P.,
Lucknow.
5. Sri G. Seetiah Sr. Engineer
Directorate of State Civil Aviation
U. P., Lucknow Airport, Lucknow.
6. Sri Ravi Drishna Sr. Airworthiness Officer
DGCA, Lucknow Airport, Lucknow
7. Sri P. RajKumar Menon Aircraft Maintenance Engineer
Directorate of State Civil Aviation
U. P., Lucknow Airport, Lucknow.
8. Sri S. U. Khan Cheif Lecturer
Aeronautical Training Institute,
U.P., Lucknow Airport, Lucknow.
9. Sri D. P. S. Sirohi Lecturer (Mechanical)
Aeronautical Training Institute,
U.P., Lucknow Airport, Lucknow.
10. Sri K. S. Gandhi Lecturer (Mechanical)
Aeronautical Training Institute,
U.P., Lucknow Airport, Lucknow.
11. Sri D. K. Srivastava Lecturer (Electrical)
Aeronautical Training Institute,
U.P., Lucknow Airport, Lucknow.
12. Sri H. S. Sharma Lecturer (Science)
Aeronautical Training Institute,
U.P., Lucknow Airport, Lucknow.
13. Sri S. K. Bhasin Computer Co-ordinator

Directorate of State Civil Aviation
U.P., Lucknow Airport, Lucknow

14. Sri R. C. Trivedi Assistant Professor
Institute of Research, Development
and Training, U. P., Kanpur
15. Sri B. Lal Assistant Professor
Institute of Research, Development
and Training, U. P., Kanpur
16. Sri Y. K. Darbari Senior Manager, Quality Control
(Sent his Suggestions) H. A. L., Lucknow

LIST OF EXPERTS

The List of experts who participated in the workshop for revision of curriculum in Aircraft Maintenance Engineering Diploma course held at Aeronautical Training Institute, U. P., Lucknow Airport, Lucknow on 6 Feb., 1998 at 11.00 A. M.

1. Sri D.K.Vishwakarma Director, Aeronautical Training
Institute, U.P., Lucknow Airport,
Lucknow
2. Sri V. P. Massey Sr. Airworthiness Officer,
DGCA, Lucknow Airport, Lucknow
3. Sri Arvind Mohan Air Worthiness Officer
Airport, Lucknow
4. Sri G. Seetiah Addl. Chief Engineer
Directorate of State Civil Aviation
U. P., Lucknow Airport, Lucknow.
5. Sri K. S. Gandhi Lecturer (Mechanical)
Aeronautical Training Institute,
U.P., Lucknow Airport, Lucknow.
6. Sri S.N.Tandon Lecturer (Mechanical)
Aeronautical Training Institute,
U.P., Lucknow Airport, Lucknow.
7. Sri D. K. Srivastava Lecturer (Electrical)
Aeronautical Training Institute,
U.P., Lucknow Airport, Lucknow.
8. Sri M.P.Singh Asstt. Professor
I.R.D.T., U.P., Kanpur

The List of experts who participated in the workshop for revision of curriculum in Aircraft Maintenance Engineering Diploma course held at Aeronautical Training Institute, U. P., Lucknow Airport, Lucknow on 4.3.2008 & 11.4.2008.

1. Sri Devendra Swarup Director, Aeronautical Training Institute,U.P.,Lucknow Airport, Lucknow
2. Sri D.K.Vishwakarma Cheif Engineer, Directorate of State Civil AviationU. P., Lucknow Airport, Lucknow.
3. Sri P. P. Pathak Controller,Air Worthiness DGCA, Lucknow Airport, Lucknow
4. Sri N. K. Jakhanawala Cheif Lecturer Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
5. Sri L. M. Sharma Quality Control Manager Directorate of State Civil Aviation U. P., Lucknow Airport, Lucknow.
6. Dr. R. P. Pyasi Professor, Electrical Engineering K. N. I. T., Sultanpur
7. Dr. U. K. Singh Professor, Mechanical Engineering K. N. I. T., Sultanpur
8. Sri Shobit Das Aircraft Maintenance Engineer Directorate of State Civil Aviation U. P., Lucknow Airport, Lucknow.
9. Dr. Adarsh Kumar Lecturer, Science Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
10. Sri M. K. Gupta Lecturer, Mechanical Engineering Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
11. Sri S. K. Dubey Lecturer, Aeronautical Engineering Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
12. Sri Amit Porwal Lecturer, Mechanical Engineering Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
3. Sri B. K. Verma Lecturer, Electrical Engineering Aeronautical Training Institute, U.P., Lucknow Airport, Lucknow.
14. Sri R. B .Singh (Sent Comments) Engineer, Directorate of State Civil Aviation U. P., Lucknow Airport, Lucknow.
14. Smt. Sushma Gaur Director, I.R.D.T.,U.P., Kanpur
15. Sri M. P. S. Bhadauria Assistant Professor I.R.D.T.,U.P., Kanpur

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 wherever 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.

A. Change in the name of the subjects are given below-

OLD PAPER NAME	NEW PAPER NAME
1.4 Basic Electrical Engineering	Basic Electricity & Electronics
1.5 General Engineering	General Engineering & Ground Supports
1.7 Aircraft Materials and Metallurgy	Air Craft Materials & Material Science
1.8 Legislation & C.A.R.	Air Law, C.A.R. and Human Performance
2.3 Aero Engine & Accessories-I	Aircraft Reciporating Engines-I
3.1 Aero Engine & Accessories-II	Aircraft Reciporating Engines & Accessories-II

B. The duration of theory examination time 3 hours has been reduced to 2.5 hours as per special recommendation given by experts participated in the workshop.

1.1 MATHEMATICS

L	T	P
2	1	-

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	10	5	-
2.	Trigonometry	10	5	-
3.	Differential Calculus	10	5	-
4.	Integral Calculus	10	5	-
5.	Co-Ordinate Geometry	10	5	-
Total		50	25	-

DETAILED CONTENTS

1. ALGEBRA:
 - (i) Linear equation and their solutions, Indices and Power, negative & Fractional numbers.
 - (ii) Binary and other applicable numbering system (Basic Concept Only). Binomial, Logarithmic and Exponential Series (Revision).
 - (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. TRIGONOMETRY :
 - (i) Inverse Circular Functions.
 - (ii) De Moivre's Theorem and its application.

3. DIFFERENTIAL CALCULUS :

- (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. Points of Maxima and Minima Normals.

4. 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.

5. CO-ORDINATE GEOMETRY :

- (i) Cartesian and Polar co-ordinates in their relationship through the system of representation of point in space and in a plane. Inter-relationship between Polar and Cartesian 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.

1.2 PHYSICS

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	8	4	-
2.	Topics No. 2	8	4	-
3.	Topics No. 3	6	3	-
4.	Topics No. 4	8	4	-
5.	Topics No. 5	8	4	-
6.	Topics No. 6	4	2	-
7.	Topics No. 7	8	4	-
Total		50	25	-

DETAILED CONTENTS

1. HEAT & TEMPERATURE :
 - (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.
 - (iv) Concept of thermal capacity and specific heat, Effect of temperature on specific heat, Specific heat of solid/liquid by Bunsen's ice calorimeter.
 - (v) Latents heat of fusion and vaporisation, thermal energy and heat of combustions.
 - (vi) Specific heat of gases, Specific heat at constant pressure and constant volume (C_p & C_v) and relationship between them. Ratio of two specific heats, specific heat of gas at low temperature, difference between vapour and gas. .

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

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

(ix) 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

2. THERMODYNAMICS :

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

3. OPTICS :

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

4. WAVE MOTION AND SOUND :

Mechanical waves, Sinusoidal wave, Interference phenomena and Standing waves. Speed of sound, Production of sounds, Intensity of sound waves, Pitch and quality. Doppler's effects and Ultrasonic waves.

5. KINEMATICS :

(i) Angular velocity, Angular acceleration, Angular momentum.

(ii) Relation between Angular and linear velocity.

(iii) Centrifugal force.

(iv) Motion in a vertical circle.

(v) K.E. of rotation.

(vi) Simple theory of vibrations and harmonic resonances

(vii) Numericals based on above topics.

6. PROJECTILE :

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

maximum horizontal range.

7. 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.

1.3 MECHANICS

L T P
2 1 -

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	4	2	-
6.	Topics No. 6	4	2	-
7.	Topics No. 7	6	3	-
8.	Topics No. 8	6	3	-
9.	Topics No. 9	4	2	-
10.	Topics No. 10	2	1	-
Total		50	25	-

DETAILED CONTENTS

1. VECTORS AND FORCE ANALYSIS :

Concept of Scalars and Vectors quantities, Graphical representation of vectors, Composition and Resolution of force vectors, 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. Coefficient of friction. Numerical problems.

3. WORK, POWER AND ENERGY :

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 parallel 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, Hooke's law, different types of elasticity, Poisson's ratio, Relation between moduli. Determination of Young's modulus, for a material, numericals.

8. FLUID MECHANICS:

Introduction to fluid mechanics, viscosity, Surface Tension, Importance of their knowledge in engineering field, Various kinds of fluid flows (Open and closed channels) Laminar and turbulent flows, Bernoulli's equation and its application in general and in aeronautics.

9. 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 - Graphically and analytically. Calculation of magnitude and nature of forces in various members of a truss. Concept of shear force and bending moment at a section of a beam under various kinds of load. Shear force and bending moment diagram.

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

1.4 BASIC ELECTRICITY & ELECTRONICS

L T P
3 1 2

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 knowledge 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 electricity.

Sl.N.	Units	Coverage Time		
		L	T	P
1.	Basic terminology and their concept	3	1	-
2.	D.C. circuits	9	3	-
3.	Introduction To Semiconductor Devices	12	3	-
4.	Capacitors	9	3	-
5.	Electromagnetism	9	3	-
6.	Electromagnetic induction	12	4	-
7.	A.C. circuits	12	4	-
8.	Polyphase circuits	9	4	-
		75	25	50

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 coefficient of resistance.
 - 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.
- 2.4 Operation of photo cells, Construction, Material and operation of thermo-couples.
- 3. Introduction To Semiconductor Devices

Introduction, semiconductor and their applications, Different semiconductor materials used in manufacturing various semiconductor (Si & Ge), Material used for electronic components like resistor, capacitor, diode, transistors, thyristors and inductors.
- 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 capacitance 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 problems 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 Magnetic 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 mathematical derivation).
 - 5.6 Elementary ideas about hysteresis loss.
- 6. Electromagnetic Induction
 - 6.1 Faraday's laws of electromagnetic induction. Lenz's law, simple problem. Dynamically induced emf.
 - 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 Elementary idea about eddy current loss.
- 7. A.C. Circuits
 - 7.1 Recapitulation of terminology, instantaneous value, maximum (peak) value, cycle, 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 circuits 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 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 60W and 100W filament lamps.
- ii) To verify the Kirchoff's laws.
- iii) To observe the B-H curve for a ferro-magnetic core on CRO.
- iv) To find the relationship between voltage and current for R-L series circuit for variable resistances & variable inductance.
- v) To determine the variation in the values of inductance of a coil for different positions of the movable iron core.
- vi) To measure the power factor in a single phase AC circuit by using voltameter, ammeter & wattmeter.
- vii) To charge and discharge a capacitor and to show the graph on C.R.O.
- viii) Verification of voltage and current relations in Star and delta connected systems.
- IX) To study the phenomenon of electro magnetic induction.
- x) To measure the total on equivalent resistance to verify the same by calculation method.
- xi) To study the colour coded resistance and to verify the same by multimeter.
- xii) To study and sketch diodes, transistors, thyristors, IC and PCB.

1.5 GENERAL ENGINEERING AND GROUND SUPPORT

L T P
3 - 2

Rationale :

The paper intends to provide acquaintance 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	6	-	-
2.	Topics No. 2.1	9	-	-
3.	Topics No. 2.2	9	-	-
4.	Topics No. 2.3	6	-	-
5.	Topics No. 2.4	6	-	-
6.	Topics No. 2.5	6	-	-
7.	Topics No. 3	6	-	-
8.	Topics No. 4	6	-	-
9.	Topics No. 5	6	-	-
10.	Topics No. 6	6	-	-
11.	Topics No. 7	9	-	-
Total		75	-	50

DETAILED CONTENTS

1. SAFETY PRECAUTIONS :

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

2. MACHINE COMPONENTS :

Introduction to components, their specification and use with special emphasis on those used in air craft, such as Brinell hardness, Rockwell hardness, UTM, fastening equipment.

2.1 Types of revets used in aircraft and their material.

2.2 Pins, Cotters and Cottor joints,

2.3 Keys, Key ways and Splines on shafts,

2.4 Bearings :

Plane, Brushed, Split step, Ball, Rollar bearings, Journal bearing; Thrust bearing, Collar bearing and special types of bearings and their application.

- 2.5 Different types of gears, Gear trains and their use for transmission of motion. Supr gears, Single and double helical gears, Bevel gears, Mitrewheel, Worms, Rack and penion. Concept of pitch, Pitch cricle and module.

3. Fittings and Cables :

- 3.1 Knowledge of various kinds of fittings and cables used in aircrafts. Swaging procedure of aircraft cables and maintenance. Splicing,
- 3.2 Turnbuckles and use.
4. Knowledge of Colour codings, Symbols of other markings used to identify fluid systems, pipe lines, rubber parts and other aircraft, systems of aircraft.
5. General knowledge of procedure of jacking, Leveling and mooring of aircraft.
6. Knowledge of safty and fire precautions to be observed during maintenance and fuelling and defuelling of air craft.
7. Non Destructive Testing : Crack detection by various methods such as visual inspection Hot Oil and Chalk method, Dry penetrant method, Mognaflex inspection including modern techniques like X-ray, Ultrasonic and Eddy currents.

LIST OF PRACTICALS

Material Testing

1. To determine Brinell hardness No. of a sample on Brinell hardness tester.
2. To determine Rockwell hardness No. of a sample on Rockwell hardness tester.
3. To test for crack detection on given sample using magnetic crack detector.
4. To detect crack of a sample by dye penetrant method.
5. To determine the ultimate tensile stress, its modulus of elasticity, stress at yield point. Elongation and percentage contraction in cross sectional area of a specimen by U.T.M.

1.6 ENGINEERING DRAWING

L	T	P
-	-	4

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	-	-	-
9.	Topics No. 9	-	-	-
10.	Topics No. 10	-	-	-
11.	Topics No. 11	-	-	-
Total		-	-	100

DETAILED CONTENTS

1. INTRODUCTION :
 - 1.1 General Introduction to Engineering Drawing.
 - 1.2 Introduction of various drawing materials, instruments and equipment.
 - 1.3 Use of Draughtman Instruments, T-square, 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 scales.

3. CONVENTIONAL REPRESENTATIONS :
 - 3.1 Methods of showing centre lines, hidden lines, reference lines section lines and dimensional lines and dimensioning.
 - 3.2 Conventional signs of materials.
 - 3.3 Conventional method of representing threads, nuts, joints and welded parts. Exercises to illustrate 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. Conventional signs used for different aircraft.
9. Drawing of couplings.
10. DRAWING OF TYPICAL AIRCRAFT PARTS :
 - 10.1 Drawing of various engine parts like piston, Crank shaft and valve mechanism etc.,
 - 10.2 Study of machine drawing and blue prints.

1.7 AIRCRAFT MATERIALS AND MATERIAL SCIENCE

L T P
3 - 4/2

Preamble:

The aim of Aircraft Maintenance Engineering is to familiarise 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 in Material Science is essential.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time		
		L	T	P
1.	Topics No. 1	15	-	-
2.	Topics No. 2	6	-	-
3.	Topics No. 3	9	-	-
4.	Topics No. 4	6	-	-
5.	Topics No. 5	6	-	-
6.	Topics No. 6	6	-	-
7.	Topics No. 7	9	-	-
8.	Topics No. 8	9	-	-
9.	Topics No. 9	9	-	-
Total		75	-	50

DETAILED CONTENTS

1. INTRODUCTION TO AIRCRAFT MATERIALS (Non Metals) :
 1. Types of Wood-soft, Cross section, Grains defects.
 2. Specification requirements and use of spruce, Walnut, Mahogany, Birch and Ash.
 3. Plywood, its construction and use.
 4. Types of glues for aircraft use. Precautions to be observed storage life.
 5. Fabric types, specifications, requirements.
 6. Reinforcing tapes, edgings, threads and their specification requirement.
 7. Different types of dopes and thinner acetate and nitrocellulose, tautening and nontautening and their storage life, specification requirements of dopes.
 2. Plastics resin plastics, thermo-plastics, Thermosetting plastics, Acrylic and Cellulose their use.

3. Rubber and synthetic rubber natural, Synthetic Buna's Buna-N, Neopren Butyl and thickol and their uses and shelf life and service life.

4. Aircraft adhesives and sealant

5. METAL AND ALLOYS :

(A) Ferrous & Non Ferrous Metals :

Introduction to manufacturing, properties and uses of Pigiron, Wrought iron and Cast iron. Difference between iron and steels. Types of steels. SAE and British systems of their classification

Low, medium and high carbon steels, their properties and uses. Introduction to various methods of heat treatment - Hardening, Tempering, Annealing, Normalising, Carburising, Refining processes and temperatures. Temperature colour guides. Case hardening - Different processes. Heat treatment of carbon steels, Critical points in iron-carbon diagram.

Identification of ferrous metals on practical tests

(B) Non Ferrous Metals :

Alloy Steels : Kinds, composition, properties. Effect of constituents on their properties

Definition of light alloys and heavy alloys and their application in air crafts. Magnesium Alloys, Titanium alloys, Inconel alloys and their uses.

Identification of non ferrous metals on practical tests.

Heat treatment processes for light alloys - Age hardening.

(C) Wrought aluminium alloys indicating their properties - Specifications Duralumin-alclad and its use - identification of those materials in various heat treated states and forms.

6. COMPOSITE MATERIAL :

1. Composite, advantages & uses of composite material.

2. Reinforcing fibres, type & uses.

3. Terms : warp, weft, unidirectional, bidirectional, mats, fabric weaves, satin weaves, hybrids, inply hybrid, interply hybrid.

4. Matrix material, system, thermosets, thermoplastic, epoxy resin, system, working with resin & catalysis, adhesive pre-impregnated materials, fillers, metal matrix composites.

5. Core material, boney-comb, foams styrofoam, urethane, PVC, strux.
6. Factores considered for maufacturing cost of composite, manufacturing methods, compression moulding, vaccum bagging, filament winding, way lay-up, lightening protection & painting of composite part.
7. Safaty precautions in the use of composite material.
8. Curing method of curing cimposite material in brief autoclave, heating blankets, machining cured composites.
9. Detection of defects/detoriation in composite and non-metlic materials.
7. Air-craft Hardwares :
 1. Detailed knowledge of identification, terminology, correct use and inspection of Aircraft, nuts, bolts, Studs, Screws, Washers, Locking devices, types of threading of nuts and bolts, Knowledge of their Indian, British and American standards.
 2. Spring materials : Characteristics and appliaction
 8. CORROSION AND ITS PREVENTION :

Factors in the choice of materials in various parts of aircraft. Detection of corrossion, special coating, chemical films, special paints like Abrassive Resistant Paint, Heat and corrossive resistive paints and electroplating.
 9. HIGH TEMPERATURE MATERIALS :

Sensors materials like Heat sensing, Signal sensing.

1.8 AIR LAW, C.A.R AND HUMAN PERFORMANCE

L T P
4 - -

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	9	-	-
2.	Topics No. 2	9	-	-
3.	Topics No. 3	9	-	-
4.	Topics No. 4	9	-	-
5.	Topics No. 5	7	-	-
6.	Topics No. 6	9	-	-
7.	Topics No. 7	6	-	-
8.	Topics No. 8	9	-	-
9.	Topics No. 9	9	-	-
10.	Topics No. 10 TO 20	9	-	-
11.	Topics No. 21	15	-	-
Total		100	-	-

DETAILED CONTENTS

1. I. A. R. :
Knowledge of Aircraft Rules as far as they relate to airworthiness and safety of aircraft.
2. C.A.R, A/C, ADVISORY CIRCULARS :
Knowledge of "Civil Airworthiness Requirements", "Aeronautical Information Circulars (Relating to airworthiness)", "Advisory Circulars " and AME notice issued by DGCA. Familiaration with C.A.R. 145, C.A.R. 21.
3. PRIVILEGES OF AME's :
Knowledge of Privileges and responsibility of the various categories of AME Licence and approved persons. Requirements and procedure for issue/extension/endorsement/renewal of various category of AME license/approvals/c/c/authorisation.
4. AIRWORTHINESS AND CONFIRMED AIRWORTHINESS:
Knowledge of various mandatory documents like Certificate of Registration, Certificate of Airworthiness, Flight Manual, Export Certificate of Airworthiness. Types of certificates

like requirements for Aging Aircraft, Requirements procedures and conditions for issuance of special flight permits.

5. Requirements for storage, quality control, checks, distribution. Aircraft instruments, equipments and accessories, general requirements for maintenance and certifications of aircraft including Gliders, Microlight, Aircraft, Hot Airballoons. Duplicate inspection of controls.

6. LOG BOOKS :

Various log books required to be maintained for Aircraft. Method of maintaining the log book. Procedure for making entries in Log books, Journey log books, Technical log book etc.,

7. Requirement for flight testing of aircraft.

8. STORAGE OF AERONAUTICAL PARTS:

Bonded and Quarantine stores, storage of various aeronautical products including rubber goods, various fluids.

9. OPERATIONAL REQUIREMENTS OF AIRCRAFT :

Knowledge of various terms such as Certificate of Flight Release, Certificate of Maintenance, Approved Certificates.

10. Installation and maintenance requirement of Air burning, commercial/navigation and radio equipments systems
11. Registrations, markings, weight and balance control, load and trim sheets.
12. Minimum equipments, instruments required for various types of operation.
13. Modification, Concession, Airworthiness Directive, Service Bulletins.
14. Approval of organisation.
15. Registration markings.
16. Documents required to be carried on board.
17. Issue of Type approval.
18. Issue of C of A.
19. Defects recording, Monitoring, reporting and investigation.
20. Requirements of A/c fuels, refuelling of A/c and calibration of a/c fuel tanks

21. HUMAN PERFORMANCE :

1. General :

The need to take human factors into account. Incidents attributable to human factors/human error. Murphy's Law.

2. Human Performance and Limitations :

Vision, Hearing, Information processing, Attention and perception, Memory, Claustrophobia and physical access.

3. Social Psychology :

Responsibility : Individual and group, Motivation and demotivation, Peer pressure, Culture issues, Team working, Management, supervision and leadership.

4. Factors Affecting Performance :

Fitness/health; Stress : domestic and work related; Time pressure and deadlines; Workload : Overload and underload; Sleep and fatigue, shiftwork; Alcohol, medication, drug abuse.

5. Physical Environment :

Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment.

6. Tasks :

Physical work; Repetitive tasks; Visual inspection; Complex system.

7. Communication :

Within and between teams; Work logging and recording; Keeping up to date, currency; Dissemination of information.

8. Human Error :

Error models and theories; types of error in maintenance tasks; Implications of errors (i.e. accidents), Avoiding and managing errors.

9. Hazards in the workplace :

Recognising and avoiding hazards; Dealing with emergencies.

1.9 WORKSHOP PRACTICES

L T P
3 - 12

Preamble :

There are basically 4 shops to workshop practice i.e. Carpentry shop, Fitting shop, Machine shop and Welding shop. The purpose is to familiarization 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	9	-	-
2.	Topics No. 2	9	-	-
3.	Topics No. 3	9	-	-
4.	Topics No. 4	9	-	-
5.	Topics No. 5	9	-	-
6.	Topics No. 6	12	-	-
7.	Topics No. 7	18	-	-
Total		75	-	300

DETAILED CONTENTS

1. Safety rules and Precautions in workshop- Instructions in the remedial action to be taken in the event of accidents/human or machines
2. Handling and uses of different types of workshop tools and equipments. Tools used by Aircraft mechanic, Measuring tools and equipments. Inspections gauges and tools, gauges calibration, jigs and fixtures.
3. Handling and uses of different type of precision measuring tools and equipments
4. Limits fits and allowances. Concept of interchangeability.
5. Working knowledge of Tools used on the following machine tools - Power Hacksaw, Drilling Machine, Lathe :- Centre, Capstan and Turret. Grinding Machines
6. Welding, Brazing and Soldering,
 - (a) Different types of welding - Gas welding, Electric arc welding - Brief description of above and welding equipment. Welding of pipe lines and pressure vessels, life prediction of welds, idea of advance welding-quality aspects.
 - (b) Gas welding - Identification of cylinders - High pressure system, Low pressure system - their

properties.

- (c) Impurities in acetylene gas, their effects on metal, testing of acetylene gas for impurities.
- (d) Precaution and safety before welding.
- (e) Purifier.
- (f) Regulators - Single stage, Double Stage - Advantages.
- (g) Blow Pipes - Different types. Name of parts their advantages and working principle including cutting blow pipes.
- (h) Types of flames - Their effect on metal sketches.
- (i) Leftward, Rightward and Vertical welding - Their operating limits advantages.
- (j) Welding on aircraft - Seam welding, Rosett welding tack welding and spot welding..
- (k) Brazing - Welding, Aluminum and Magnesium alloys.
- (l) Test on Welding joints.
- (m) Welding faults - Torch normalising - Use of crayons.
- (n) Soldering, Hard soldering, Silver soldering, Brazing.
- (o) Different types of fluxes - their composition and uses.
- (p) Repair and weld of metals and non-metals, pipes, propellers, skin sheets, thermal consideration for welding

LIST OF PRACTICAL

GENERAL

1. Familiarisation with various tools and equipments in use in the workshop.
2. 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 piece of 2" sides with Hacksaw.
4. Practice in the use of different files, precautions in the use of different filing techniques and methods.
5. Exercise 3 to be filed approximate size to side 2".
6. Filing the above exercise top surface to flat.
7. Filing 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 Diagonal fitting.
13. Practice in riveting and making a riveted joints.

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 External
4. Taper turning.
5. Internal Turning Procedure.
6. Cutting Threads Internally.
7. Knurling Practice.

AEER 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.
2. Practice in Sharpening of Saws Teeth.
3. Practice in use of different types of chisels.
4. Practice in Grinding and Sharpening of various types of Chisels.
5. Practice of planing.
6. Procedure of marking different types of cut.
7. Making a Half Lap joints as per drawing.
8. Scarf Joint.
9. Making different shapes of wood Angles, Square etc.,
10. Making a overlap patch repair.
11. Making a Round Insertion Path repair.

12. Making a Scarf patch repair to plywood skin.

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.

2.1 THEORY OF FLIGHT

L	T	P
3	1	-

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	24	8	-
2.	Topics No. 2	6	2	-
3.	Topics No. 3	6	2	-
4.	Topics No. 4	6	2	-
5.	Topics No. 5	6	2	-
6.	Topics No. 6	6	2	-
7.	Topics No. 7	6	2	-
8.	Topics No. 8	5	2	-
9.	Topics No. 9	5	2	-
10.	Topics No. 10	5	1	-
Total		75	25	

DETAILED CONTENTS

1. AERODYNAMICS :
 1. General principle of Aerodynamics and application in Aircraft.
 2. Different parts of Aircraft and their utility. Effect of engine power and aircraft weight on performance of aircraft.
 3. Lift and means of producing lift.
 4. Air Resistance, Stream Lines, Stream Lining, Skin Friction and Boundary Layer.
 5. Bernoulli's Theorem-Ventury tube.
 6. Drag and their classification.
 7. Lift/drag Ratio considerations.
 8. Knowledge of forces acting on the aircraft during all phases of flight.

2. PHYSICS OF ATMOSPHERE (I.S.A.) :

The atmospheres, Air Density, Pressure Temperature change with Altitude and their effect on the performance of Aircraft. International Standard atmosphere (I.S.A.) and their application.

3. Types of stability and control.

4. Air frame primary flying controls.

5. Air frame secondary flying controls.

6. Knowledge of the characteristics of subsonic, transonic and supersonic airflow and the various used therein.

7. Knowledge of the characteristics of the aerofoils used for subsonic and transonic flights.

8. Knowledge of various types of high lift and drag devices, their operation, vortex generators boundary layer fences etc.,

9. Knowledge of the following :

Sweepback, High incidence tailplane aerodynamic loading, Superstall, Load Factors, Aquaplaning, Fly over concept.

10. A brief knowledge of rotor craft.

2.2 GENERAL AIRFRAME

L	T	P
3	1	4

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 Time		
		L	T	P
1.	Topics No. 1 & 2	6	2	-
2.	Topics No. 3 & 4	6	2	-
3.	Topics No. 5 & 6	9	3	-
4.	Topics No. 7 & 8	9	3	-
5.	Topics No. 9 & 10	9	3	-
6.	Topics No. 11 & 12	9	3	-
7.	Topics No. 13 & 14	9	3	-
8.	Topics No. 15 & 16	9	3	-
9.	Topics No. 17 & 18	9	3	-
Total		75	25	100

DETAILED CONTENTS

1. Classification of Aircraft and different parts, including Windows, Doors and Emergency exits.
2. Loads taken up by Aircraft.
3. General constructions : Composite constructions, Metal construction, Monocoque and Semi-monocoque, Stressed construction.
4. Knowledge of fail-safe and safe-life concept.
5. Construction of fuselage : Steel Tubular Structure, Light Metal construction, Fabric, Plywood and Metal coverage.
6. Construction of Wing and types of wings.
7. Aircraft components construction and utility.
8. Knowledge of such terms as damage tolerance aging aircraft and SSID.
9. Undercarriage types, Fixed and retractable Tyres, Tubes, Brake system and shock absorbers.

10. Primary control system, Secondary and Auxillary control system, Cable testing and rigging of controls.
11. Fuel tanks - different types, testing and repair.
12. Types of woods playwoods, defects, repair and replacements, gule and gluing procedures.
13. Types of fabrics surface tape and re-inforcing tape, lacing cord, sticking cord, Dope and dopping procedure.
14. Different types of paints, primers, varnish, enamels and resisting paints.
15. Knowledge of minor defects, their reporting, investigation and method of rectification and repair of minor defects rigging of aircraft. Periodical inspection necessary to check the serviceability of the aircraft. preparation of a brief report with the help of sketches if necessary in case of damage to the aircraft. Symmetry check, Balancing of control surface, duplicate inspection.
16. Detailed knowledge of the various inspections such as heavy landing, lightning strike, overweight landing, 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.
17. Knowledge of terms related to aircraft weighting preparation, precautions for weighting, Preparation of weight schedule, calculation of centre of gravity.
18. Minor structural reparirs of metal and composite aircraft.

LIST OF PRACTICALS

1. Aircraft tire, tube and wheel assembly.
2. Servicin of aircraft brake system.
3. Brake bleeding.
4. Servicing of oleo shock struts.
5. Bleeding shock struts.
6. Landing gear retraction check.
7. Fabric covering, sewing and patching.
8. Doplting.
9. Rigging of aircraft controls.
10. Symmetry check of aircraft.
11. Aircraft weighment.

2.3 AIRCRAFT RECIPORCATING ENGINES

L T P
3 - 4

Rationale :

Engine is the source of propulsive force for the 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	12	-	-
3.	Topics No. 3	12	-	-
4.	Topics No. 4	12	-	-
5.	Topics No. 5	15	-	-
6.	Topics No. 6	12	-	-
Total		75	-	100

DETAILED CONTENTS

1. THEORY & CONSTRUCTION :

Conversion of heat energy to mechanical energy and the relationship between volume, pressure and temperature. Thermodynamic laws related to internal combustion engines. General knowledge of the Otto cycle and relation between p,v and T. Requirements for effective combustion. Definitions of stroke, TDC, BDC, Swept volume and clearance volume.

2. Principles of Heat engine - internal combustion engines, Otto cycle and cycle efficiencies. Difference between two stroke and four stroke operating cycles. Description of inlet and exhaust valve operating cycle. Description of inlet and exhaust valve operating cycle. Definition of valve lead, lag and overlap and reason for incorporation in the valve operating cycle. Description of the layout and typical firing order of opposed, inline, vee and radial engines.

3. Definition and calculation of mechanical, thermal and volumetric efficiencies. Definition and measurement of Piston displacement, compression ration, manifold pressure. Calculation of piston displacement and compression ratio.

4. Construction, function and classification of cylinders, piston, piston rings, piston pins, connection rods, inlet and exhaust manifolds. Construction and functions of rocker

assemblies, push rods, cam followers, tappets, inlet and exhaust valves. Calculation of rotational speed and direction of rotation between crankshaft and cam configurations. Construction, function and classification of crankshafts, cam shafts, cam rings, roller, plain and ball bearings, engine casings and accessory/reduction gear boxes. Calculation of reduction gear ratios and drive direction.

5. Definition of horsepower/kilowatt, indicated horse power, brake horse power, friction horse power, indicated mean effective pressure, brake mean effective pressure and friction mean effective pressure, specific fuel consumption, brake specific fuel consumption, calculation of BHP and IHP and BSFC. Relation between fuel consumption and engine power. Effect of altitude humidity, temperature and icing on engine power. Definition of stoichiometric mixture, rich best power mixture, lean best power mixture and cruise power mixture. Symptoms and causes of detonation, pre-ignition, after firing, back firing. Effect of lean and rich mixture burn rates on engine performance.
6. Knowledge of the engine fire detection and protection system.

LIST OF PRACTICALS

1. Identification of various engine parts.
2. Installation and removal procedure of propeller and propeller tracking.
3. Removal and installation procedure of megneto and megneto timing.
4. Bomb testing of spark plug.
5. Compression testing of engine cylinder by direct and differential method.

2.4 AIR CRAFT INSTRUMENTS

L T P
3 1 4/2

Rationale :

Knowledge of aircraft instruments for maintenance engineer is no way less important than 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	9	3	-
2.	Topics No. 3 & 4	12	4	-
3.	Topics No. 5 & 6	12	4	-
4.	Topics No. 7 & 8	12	4	-
5.	Topics No. 9 & 10	9	3	-
6.	Topics No. 11 & 12	12	4	-
7.	Topics No. 13	9	3	-
Total		75	25	50

DETAILED CONTENTS

1. General introduction to Aircraft instrument, Various instruments and classification.
2. Altimeter, Principle, Constructional details, Types of setting, Position error leak test and periodical inspection.
3. Airspeed indicator, Pitot and Static Tube Construction and Principle, Position Error, Construction and periodical inspection, lead test.
4. Vertical speed indicator, Constructional features checks and Installation procedure, Periodical inspection.
5. Pressure gauge : Principle of operation, types of gauges, Periodical inspection.
6. Temperature Gauge; Principle of thermocouple and different types of thermometer used in Aviation. Cylinder Head Temperature Gauge, Maintenance and Periodical inspection.
7. R. P. M. Indicator; Mechanical construction details types of indicator maintenance and periodical inspection.
8. Gyro Instruments; Principle of Gyro Wheel and different

types of gyros; Constructional details of each i.e. Turn & Bank, Artificial Horizon and Directional gyro; Maintenance and periodical inspection, Suction gauge etc.,

9. Electrically operated instruments.
10. Fuel flow gauge and content gauges.
11. Main fold Pressure Gauge.
12. Detailed knowledge of the procedures of replacement and insite operational tests of all instruments (except the engine related instruments) and equipment (except where the use of special test instrument//equipment is required).
13. Introduction to Total Quality Management (TQM) as applicable to aviation industry with reference to ISO9000/IS14000 quality system standards.

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.

2.5 AIR CRAFT SYSTEMS

L T P
3 1 4/2

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	12	4	-
2.	Topics No. B	9	4	-
3.	Topics No. C	12	4	-
4.	Topics No. D	12	4	-
5.	Topics No. E	9	3	-
6.	Topics No. F	6	2	-
7.	Topics No. G	6	2	-
8.	Topics No. H	4	1	-
9.	Topics No. G	5	1	-
Total		75	25	50

DETAILED CONTENTS

- A. HYDRAULIC SYSTEM :
1. Fundamental of hydraulic system and terminology. Advantages and disadvantages of hydraulic system.
 2. Hydraulic fluids.
 3. Hydraulic rubber seals and packing waseers.
 4. Hydraulic system components : Reservoir, Hand pumps, Power driven pumps filters, Pressure regulator valve, Accumulator, Selector valves, Pressure relief valves, Actuating cylinders, Check valves, Orifice check valves, Restrictor valves, Hydraulic fuse, Line disconnect or Quick disconnect valve.
 5. Hydraulic plumbing and installations.
 6. Flexible hydraulic hoses.
 7. Inspection and pressure testing.
 8. Trouble shootings.
- B. PNEUMATIC SYSTEM :

1. Introduction.
 2. Advantage and disadvantages of pneumatic system.
 3. High pressure, Medium pressure and Low pressure system.
 4. Pneumatic system components; Pumps and compressor - Construction and working of reciprocating, centrifugal and vacuum pumps, Blowers and compressor, Fans and Exhaust, Difference between reciprocating and rotary compressors, their types and working, Single stage and multi stage compressors. Power required to drive a compressor,. Idea of volumetric efficiency and effect of temperature on it. Relief valves, Control valves, filters, Oil and Water separator, Air Bottle, Pressure reading valves, Check valves, Restrictor valves.
 5. Sources, engines/ APU - compressor, reservoirs, ground supply.
- C. LANDING GEAR SYSTEM :
1. Introduction.
 2. Landing gear arrangement, Steering and Centralising procedure.
 3. Shock struts and servicing of shock struts.
 4. Landing gear and retraction, Hydraulically, Electrically and Manually.
 5. Landing gear safety devices and gear position indicators, Mechanical horns, Light, Dynamic break relays.
 6. Shimmy dampers.
 7. Emergency extension systems.
 8. Brake systems.
 9. Aircraft tyre and Tubes.
 10. Maintenance, Servicing, Assemble, disassemble of tyres and tubes and Balancing of wheel assemble.
 11. Storing precautions for tyres and tubes.
 12. Anti skid system.
 13. Landing gear systems maintenance.
- D. PRESSURISATION :
1. Atmospheres - Description
 2. Need for pressurisation.

3. Method of pressurisation.
 4. Pressurisation controller.
 5. Out flow valves and safety valves.
 6. Instruments allied to pressurisation system
 7. Maintenance of pressurised cabin.
- E. AIR CONDITIONING :
1. Different modes of air conditioning.
 2. Heating system and types.
 3. Cooling system and types description and operation.
 4. Ventillation system.
 5. Control system for maintaining desired cabin atmosphere.
 6. Maintenance of aircraft air conditioning system.
- F. DEICING, ANTI-ICING AND RAIN PROTECTIONS:
1. Introduction.
 2. Ice prevention : Heating, surface using hot air heating by electrical system, Breaking of ice formation and alcohol spraying.
 3. Pneumatic de-icing system, Maintenance.
 4. Thermal Anti-icing system.
 5. Wind shield icing control system.
 6. Servicing and maintenance of di-icin system.
- G. AIRCRAFT OXYGEN SYSTEM :
1. Introduction
 2. Oxygen and components.
 3. Charging and purging of oxygen system, Oxygen system servicing.
 4. General precautions for oxygen system.
- H. FIRE PROTECTION :
1. Fire and smoke detection and warning systems.
 2. Fire extinguishing systems.

3. System tests.

I. FUEL SYSTEM & WATER/WASTE SYSTEMS :

System layout, fuels tanks, supply systems, dumping, ventining, draining, crossfeed and transfer, indications and warnings. Refeuling, defeuling and longitudinal balance of feul system. Water system layout, distribution, servicing and draining, toilet systems and corrossion aspects.

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. Pressure testing of heaters.
6. Maintenance of vent. blower.
7. Charging and purging of oxygen system.

2.6 AIR CRAFT COMPASS

L T P
3 1 4/2

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	12	4	-
2.	Topics No. 2	15	5	-
3.	Topics No. 3	12	4	-
4.	Topics No. 4	12	4	-
5.	Topics No. 5	12	4	-
6.	Topics No. 6	12	4	-
Total		75	25	50

DETAILED CONTENTS

1. Knowledge of general principles of magnetism, magnetic materials and permanent magnets, polarity and strength of bar magnets, the earth as magnet; the magnetic meridian and its relationship to the geographic metidian.
2. Knowledge of the general principles of construction for typical Aircraft direct reading compasses, including the magnet system damping liquid, verge ring and markings, lubber line, grid wires, shock absorbin suspension and correctors box, the inspection necessary for the detectio of common defects that may arise in use.
3. Knowledge of the procedure and points to be observed during installatic of the compass in aircraft.
4. Knowledge of the precautions to be observed in the choice of site for and preparation of a seinging base checking the base by mens of a landing compass.
5. Knowledge of the compensation of compassess in the aircraft, including the onservation of deviations, the calculations and adjustments necessary for corrections for co-effecient A, B and C, the procedure to be followed after, then corrections and made and the preparation of deviation cards and graphs.

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

LIST OF PRACTICAL

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.

2.7 AIRCRAFT ELECTRICITY

L	T	P
3	1	4

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	9	3	-
2.	Topics No. 2	6	3	-
3.	Topics No. 3	9	2	-
4.	Topics No. 4	6	3	-
5.	Topics No. 5	9	3	-
6.	Topics No. 6	6	2	-
7.	Topics No. 7	6	3	-
8.	Topics No. 8	6	1	-
9.	Topics No. 9	6	1	-
10.	Topics No. 10	9	3	-
11.	Topics No. 11	3	1	-
Total		75	25	100

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 dynemometer 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; Relavs; Circuit breaker; Over voltage; Under voltage; Reverse currient breaker; Current limiter.
4. Static electricity in aircraft : Coronna threshold, P-

static-cause and prevention, Bonding; Static discharge wick and null discharges; Shielding.

5. D. C. generators : Different parts; Theory different types and types of armature winding, armature reaction, magnetic neutral axis angle of lead types of generator and their uses. Interpoles, voltage regulators, vibrating type, Carbon pile, three unit control pannel, Paralleling of generators, Static generator and contraction, Repair and maintenance.
6. A. C. generators: Theory, construction, single phase, poly phase generator, static inverter, types voltage regulation, magnetic amplifier regulator, transistorized voltage regulator, parallel operation maintenance. Operation and construction of revolving armature and revolving field type of AC generators.
7. Motors : D. C. motors, Theory, Types, A. C. motor; Theory, Polyphase, Induction motor, Starters, Different types of A. C. motors, Induction motors (Single Phase) split phase motor, Repulsion motors, Series motors, Starter motors.
8. Transformers : Types of transformers, Principles of operation construction - Transformer ratio colling device uses and efficiency. Rectifiers, current transformer, potential xmer, auto xmer.
9. Aircraft typical electrical system : Aircraft wiring system, Various circuits of aircraft electrical system. Landing gear circuits, Generator circuit, Battery and starter circuits, Flap circuits, Landing light circuits, CHT circuit, O/T circuit, Fule content, Electrical gauges circuits.
10. Batteries
 1. General description and general precaution lead Nickel-Cadmium batteries (Aircraft batteries).
 2. Construction of lead acid batteries.
 3. Battery rating, Battery testing, Effect of temp.thermal runaway, cold weather operation.
 4. Charging of lead acid battery.
 5. Consturction of Nickel-Cadmium battery.
 6. Charging of Ni-Cd. Battery.
 7. Inspection and testing of Ni-Cd.Battery.
 8. Installation of lead acid amd Ni-Cd. Battery.
 9. Maintenance of installed batteries.
 10. Battery record, storage & transportation procedure.
11. Filters :

Application and uses of flow pass, high pass, bend pass and bend stop.

LIST OF PRACTICALS

1. Open lead acid battery and know the construction and assembly.
2. Transformer : Operation and Testing.
3. A. C. & D. C. Motors : Dismantle, Know the parts and service and reassemble.
4. Study Thermo-couple function.
5. Solenoid, Dismantling, inspecting and parts checking and its function.
6. Voltage regulator : Dismantle, inspecting the parts preparing wiring diagram and checking its function.
7. Strainers : Dismantling, cleaning, inspection, know the parts, function of parts and assembly.
8. Reading and connecting the different circuit diagrams.
9. Wiring practice in double wire and single wire system of basic circuits.
10. Charging of batteries.

2.8 PROPELLERS

L	T	P
2	1	-

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	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. 6	6	3	-
8.	Topics No. 6	8	4	-
Total		50	25	-

DETAILED CONTENTS

1. Theory of Propellers Terms used and definitions.
2. Materials used for construction of propellers.
3. Types, Fixed pitch, Adjustable pitch, Variable pitch, Constant speed, Feathering of propellers.
4. Parts of propellers, Static and Dynamic balance of propeller.
5. Reverse pitch propeller and its utility.
6. Hydromatic propeller.
7. Inspection and general maintenance of propellers.
8. Installation of a propeller to an engine and tests to performed.

3.1 AIRCRAFT RECIPROCATING ENGINE AND ACCESSORIES

L T P
4 - 4

Rationale :

Engine is the source of propulsive force for the 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	21	-	-
2.	Topics No. 2	21	-	-
3.	Topics No. 3	21	-	-
4.	Topics No. 4	21	-	-
5.	Topics No. 5	8	-	-
6.	Topics No. 6	8	-	-
Total		100	-	100

DETAILED CONTENTS

1. ENGINE FUEL AND OIL SYSTEM :

Principles of operation and construction of typical float chamber carburetor and fuel air ratio and its strength. 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, venture, flow dividers, throttle valve, attitude mixture controls, fuel nozzles and fuel injection pumps.

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 control system. Trouble shooting and rectification requirements of fuel system faults.

Description of the inspection and servicing of aircraft fuel system and components. Testing of fuels for

contamination and suitability. Trouble shooting and rectification requirements for fuel system faults.

Identification of the types of piston engine fuels and their application. Description of the following characteristics of piston engine fuels: volatility, resistance to gum deposit forming, anti-performance number, specific gravity anti knock additive, number, performance number, specific gravity anti knock additive, octane rating, Reid vapour pressure test and number detonation, pre-ignition and flame propagation. Common sources of contamination in fuels and describe the methods used to ensure purity of the fuel both in the aircraft and prior to refueling.

Characteristics of lubricants used in piston engine of system. Contamination of oil and its identification. 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. Description of cooling functions of the oil system.

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 construction of booster 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. Difference 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 reaction. Inspection, servicing, clearing, assembly and testing of spark plug and leads. Effect of spark plug gap on performance. Diagnosing of engine condition by spark plug appearance. 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 system operation and system faults. Determination of rectification requirements of system faults both in ignition and starting system.

Identification of the effects of faults in components on an engine starting system. Troubleshooting and rectification requirements of system faults.

3. SUPERCHARGED SYSTEMS :

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 horsepower, 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, critical altitude, overboost, overshoot, boost 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, manifold pressure relief valve. Description of the operation and procedures. Resolving problem which involve with two 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 : Manifold pressure gauge, oil pressure gauge, electrical and mechanical tachometers, fuel flow indicator, electrical resistance thermometers, thermocouple thermometer indicators, ratio meter electrical resistance thermometers, fuel 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 parameters for fire protection systems, preservation and de preservation of engine.

LIST OF PRACTICALS

1. Top overhaul of a piston engine.
2. Procedure of preservation (Long term and Short term).
3. Pre-oiling method for a piston engine.
4. Run out check of crank shaft.
5. Removal and installation procedure for piston engine.
6. Rigging procedure for engine controls.

3.2 JET ENGINE

L T P
4 - 4

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	4	-	-
2.	Topics No. 2 & 3	4	-	-
3.	Topics No. 4 & 5	12	-	-
4.	Topics No. 6 & 7	12	-	-
5.	Topics No. 8 & 9	8	-	-
6.	Topics No. 10 & 11	8	-	-
7.	Topics No. 12 & 13	8	-	-
8.	Topics No. 14 & 15	8	-	-
9.	Topics No. 16	24	-	-
10.	Topics No. 17 & 18	12	-	-
Total		100	-	100

DETAILED CONTENTS

1. Introduction to Jet Engines : Brayton cycle, comperative stydy between piston Engine & Tubrine engine.
2. Theory of Jet Propeller : Types of propeller units.
3. The Aviation gas turbine : Turbo prop, Turbo shaft, turbo jet, Turbo fan including by pass engine.
4. Construction features of various types of turbine engines air inlet, comprassor design and construction and various types. Advantages and disadvantages of each type of compressors, combustion chambers, conatructions and types, Advantages of each types, exhaust system, construction and type, accessory gear section-construction, reduction geer system.
5. Air system of turbine engine including cooling, seeling of bearing and bleed valve operation.
6. Gas turbine fuels, fuel system & controls.
7. Starting and ignition system.

8. Lubricants and lubricating system.
9. Thrust augmentation including water methanol/power boosting system and after burner or reheat engines.
10. Thrust reversal system.
11. Dressing and installation of gas turbine engines.
12. Material for gas turbine engines.
13. Operation, Maintenance and Overhaul.
14. Ground running and power assessment procedure.
15. Engine controls and rigging.
16. Specific engine P & W PIGA series engine.
Construction features, air system, fuel system, oil system, ignition system, starting system, exhaust system, propeller system, indication system, fire protection system, anti-icing/de-icing system, engine installation procedure engine control and rigging procedures power assessment, engine trimming.
17. Engine inspection procedure
 - A. Compressor inspection and maintenance.
 - B. Hot section inspection : inspection of combustion chamber, inspection of nozzle guide vanes, inspection of turbine, inspection of temperature indication system, inspection of exhaust system.
18. Effects of sound and air pollutions on human beings due to light and heavy aircrafts.

LIST OF PRACTICALS

1. Compressor washing procedures.
2. Condition monitoring of a Jet Engine.
3. Internal inspection of an engine by endoscope/boroscope.
4. Hot section inspection, splitting 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.
5. Inspection of accessories gear system.
6. Functional test of fuel system including fuel nozzle.
7. Functional check of temperature indication system.
8. Rigging procedure of engine and propeller control.
9. Engine removal and installation.
10. Engine ground testing procedure.
11. Engine preservation (Long term and short term).
12. Functional test of ignition ignitor.

3.3 AVIONICS

L T P
4 - 4

Rationale :

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

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time		
		L	T	P
Auto Polot				
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	8	-	-
2.	Topics No. 2	8	-	-
3.	Topics No. 3	8	-	-
4.	Topics No. 4	8	-	-
5.	Topics No. 5	8	-	-
6.	Topics No. 6	8	-	-
7.	Topics No. 6	8	-	-
8.	Topics No. 6	10	-	-
Total		100	-	100

DETAILED CONTENTS

AUTO POLOT :

1. Elementary working principle of simple auto pilot system.
2. Different types of auto pilots.
3. Components of auto pilot system, description and operation.
4. Intergration of flight direction system and Horizontal situation indicator with auto pilot operation.

BASIC AVIONICS :

1. Semi Conductor Theory - Conventional and Electron flow, voltage and current sources. P and N type materials-Effect of impurities on conduction, majority and minority carriers;

PN junction in semi-conductor, development of potential across a PN junction in unbiased, forward biased and reverse biased conditions. Special purpose diodes (Zener), Schottky, varactor, etc.

2. Bipolar Transistors as amplifiers. Concept of power amplifiers.
3. Concept of PNP, JFET, MOSFET.
4. Concept operational amplifiers.
5. Oscillators and Multivibrators.
6. C.R.T. and its application.
7. Bands of frequency spectrum, different modulations and demodulation techniques and brief idea details of propagation.
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. Recognition the types of capacitors and reading their values.
4. Testing of transistors.
5. Using of bounding tester on A/c.
6. Use of CRO.
7. Use of AVO meter.

3.4 BASIC COMPUTERS

L T P
1 - 3

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	4	-	-
2.	Topics No. 2	2	-	-
3.	Topics No. 3	3	-	-
4.	Topics No. 4	4	-	-
5.	Topics No. 5	4	-	-
6.	Topics No. 6	4	-	-
7.	Topics No. 7	2	-	-
8.	Topics No. 8	2	-	-
Total		25	-	75

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 Equility 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

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 different 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 commands 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.
5. Practices on E-Mail & Websites.
6. Inventory & Preventive Maintenance Package, Written specially for Aircraft Maintenance Organisation
 - System Analysis and Design, Programming and Working.

3.5 AIRFRAME (BONANZA A-36)

L T P
1 - 7

Rationale :

Airframe specifics maintenance need their proper knowledge. The paper projects considerable light on salient points of BONANZA A-39.

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	1	-	-
13.	Topics No. 13	1	-	-
14.	Topics No. 14	1	-	-
Total		25	-	175

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 & 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, Prevention and storage of Aircraft.

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 vacuum 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 replacement procedure.
9. Auto pilot system and their functional tests.
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 state leak test and C and A renewal inspection.

3.6 AERO ENGINE (CONTINENTAL IO-550 B) SERIES

L T P
1 - 7

Rationale :

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

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	Coverage Time		
		L	T	P
1.	Topics No. 1 & 2	4	-	-
2.	Topics No. 3 & 4	4	-	-
3.	Topics No. 5 & 6	4	-	-
4.	Topics No. 7 & 8	4	-	-
5.	Topics No. 9 & 10	4	-	-
6.	Topics No. 11,12,13 & 14	5	-	-
Total		25	-	175

DETAILED CONTENTS

1. Construction of various parts of the engine, working principle.
2. Function and type of fuel injection system and ignition system
3. Magneto timing procedure.
4. Engine controls rigging.
5. Type of propeller system, Variable pitch propeller description and operation
6. Propeller 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.

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. Dismantling of incandescant section of engine for top overhaul.
3. Carrying out top over haul inspection and recording all the dismantling.
4. Assemble of cylinders on to the engine.
5. Ground run procedure (1) precautions (2) System Check (performance & evaluation), Power Check.
6. Prop bracking.
7. Ignition system, removal from the engine.
8. Inspection of ignition components for serviceability.
9. Carrying out check of ignition timing and perform the serviceability check.
10. Filling of log book
11. Removal and inspection of starter.
12. Inspection of induction system & exhaust system.
13. Trouble shooting procedure.
14. Idle speed and idle mixture adjustment.
15. Engine preservation.

3.7 ENVIRONMENTAL EDUCATION & DISASTER MANAGEMENT

L T P
2 - -

RATIONALE:

A diploma 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	3		
2.1	Water Pollution	8		
2.2	Air Pollution	8		
2.3	Noise Pollution	3		
2.4	Radio Active Pollution	4		
2.5	Solid Waste Management	5		
3.	Legislations	3		
4.	Environmental Impact Assessment	4		
5.	Disaster Management	6		
TOTAL		50	-	-

DETAILED CONTENTS

1. INTRODUCTION :

- Basics of ecology, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system, different development i.e. irrigation, 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 Biodegradability, composting, bio remediation, Microbes .Use of biopesticides 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.

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 quality 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, CO, 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 quality 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 RADISACTIVE POLLUTION :

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

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 various Disaster in the country, Meaning and benefit 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.

3.8 PROJECT

Student in groups/individually the given maintenance work of major/minor assembly, subassembly of aircraft. They will prepare a report 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 or replace - Manpower wanted, estimated expenditure. Testing after maintenance.

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

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

STAFF STRUCTURE

1. Chief 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 current A.M.E. Licence in categories 'A', 'C' and 'X' with either 'B' or 'D' to cover any Turbine Engine Aircraft/Helicopter and Minimum 10 years Aviation experience 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. Chief 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 Engineering 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 Helicopter 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.

- | | | | |
|----|--|---|---|
| 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 Level. |
| | 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 preferably 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 preferably in an aviation organisation. |
| | F. Trade Technician | | N.C.T.V.T. Trade certificate in |
| | Machinist | 1 | pective. |
| | Fitter | 1 | Trade with at least 5 years |
| | Electrician | 1 | practical |
| | Welder | 1 | Industrial Experience |
| | Carpenter | 1 | |
| | P. SO. : | | |
| | | | At least two Guest Lecturers be arranged every month, from the persons in the respective field. |

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

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	

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.	Carpentari's Bench Vice	6	
10.	Carpentari's Lathe (3 Feet)		
	1		
C.	WELDING SHOP :		
1.	Gas Welding Set	2	
2.	Oxygen and Acce tylene 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	

Sl.No.	NAME OF EQUIPMENT	Qty.	COST
32.	Piston Engine Compression Tester	1	
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 Retvetting 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" Spanner	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	

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	

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	1	2000

induction type, industrial
grade 5 A or 10 A, 250 V, 50 Hz.

10.	Energymeter(Substandard) single phase, induction type 5 A/10A, 250 V, 50 Hz.	1	3000
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.	1	600
	110 ohms 2.5 Amps.	1	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 defection band width DC-10 MHz (-3db) rise time 30 ms defeccion coefficient 12 horizontal defeccion 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 microfarad, 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	1	8000

	resistance 0 to 20 M ohms		
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		
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

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	16 (15+1Server)	8,000,00=00

OR

Computer of latest Specification
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 minute 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 voltage and time delay circuit	04	30,000(EACH)
8.	Room preparation and furniture		LS

XII. LEARNING RESOURCE MATERIALS

(Not to be procured, if available for other courses)

LEARNING RESOURCE MATERIALS

1.	Overhead Projector with screen	1	--	20000
2.	35 m.m. Slide cum Film Projector	1	--	50000
3.	Audio Cassette Recorder	1	--	15000
4.	V.C.R. with Monitor & Accessories	1	--	35000
5.	Photography Camera for Production of slide and film strips, 35 mm still camera dark room equipment.	1		100000
6.	Mathematical Typewriter	1	--	50000
7.	Cutting, Binding & Stitching equipment.	1	--	30000

ANNEXURE I

COMMUNITY DEVELOPMENT WORK

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

1. To launch and sustain functional literacy programmes.
2. To make folks aware of Sanitation, Hygiene, 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.

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. Discription of any breakdown and its restoring.
13. Use of computer - if any.
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.

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

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

- 1. Theoretical knowledge -----%
- 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 Engineering the 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 emphasis in the curriculum .

Theory

Practical

17. Kindly state whether your organisation can contribute towards improvement of curriculum in above field. Yes/ No
If yes : Please give names of experts in your organisation willing to do something in this respect
18. Kindly give your valuable suggestions for being considered at the time of finalisation 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:-

M. P. Singh Bhadauria
Asstt. Professor
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)