MECHANICAL ENGINEERING DRAWING

	L	T	P
Hrs./Week	-	-	8

RATIONALE

Diploma holders in Aeronautical And Maintenance Engineering are required to read and interpret drawings and thereof, it is essential that they have skills of preparing drawings and sketches of various components, tools, jigs and Fixtures. For this purpose, knowledge and skills for preparing drawings of couplings, bearing, bracket, pulleys, pipe joint and I.C. Engine parts are required to be imparted for enabling them to work in the field of Aeronautics. This subject aims at development of drawing competencies in the students aims at development of drawing. Stress should be laid on layout, cleanliness, conceptualization, dimensions and specifications.

DETAILED CONTENTS

Sr. No.	Theory	Time (Hrs.)	Practical	Time (Hrs.)
1.	COUPLINGS	2 Sheets		
	1.1 Universal Coupling	10 Hrs.		
	1.2 Oldham's Coupling			
2.	BEARINGS	5 Sheets.		
	2.1 Simple bushed bearing	30 Hrs.		
	2.2 Ball bearing and roller bearing			
	2.3 Plummer block (detailed drawing)			
	2.4 Plummer block (assembled drawing)			
	2.5 Foot step bearing			
3.	BRACKET	1 Sheet		
		6 Hrs.		
3.1	Wall Bracket			
4.	PULLEYS	2 Sheets		
		10 Hrs.		
4.1	Fast and loose pulley			
4.2	Stepped and V-Pulley			
5.	PIPE JOINT	3 Sheets		
		18 Hrs.		
5.1	Flanged pipe joints, right angle bend			
5.2	Hydraulic pipe joints, spigot and socket join.			

5.3	Expansion pipe joints.	
5.4	Practice of blue print reading on brackets.	
	Pulleys and pipe joints	
6.	SCREW JACK	1 Sheet
		6 Hrs.
7.	ENGINE PARTS	4 Sheets
	15 Hours	
7.1	Aircraft piston, connecting rod, valve mechanisms	
7.2	Crankshaft and fly wheel assembly	
7.3	Linkages	
8.	DRAWING A AIRCRAFT PARTS	
	20 Hrs.	
8.1	Aerofoil's and NACA	
8.2	Wing ribs and body ribs	
9.	GEARS	2 Sheets
	12 Hrs.	
9.1	Use of different types of gears	
9.2	spur gears with actual profile	
	Of involutes teeth.	
9.3	Conventional representation of	
	Bevel gears, worm and worm wheel.	
9.4	Introduction to bevel gears.	
10.	Practice of reading drawings.	

FLIGHT MECHANICS

	L	T	P
Hrs./Week	3	1	1

RATIONALE

An aircraft is capable of flying in spite of its large weight. It has particular shape and becomes airborne beyond certain speeds. In order to appreciate the principles involved in flying it is essential to gain knowledge and skill in the area of mechanics of fluids applied to flying.

Instructors are recommended to design simple suitable tutorial problems and carry out experimental work in the laboratory for better understanding of principles of flight mechanics.

DETAILED CONTENTS

Sr. No.	Theory	Time (Hrs.)	Practical	Time (Hrs.)
1.	Introduction to Fluid mechanics	6	To study flow having viscosity effects and to Study pressure distribution on Immersed bodies	2
1.1	Fluid properties: Pressure, density, relative Density, specific weight, Viscosity, compressibility, Surface tension			
1.2	Types of fluids and flow Regimes		To draw standard atmospheric charts using pressure density Relations for different ranges Of atmosphere.	2
1.3	Standard atmosphere And its characteristics, Aero thermodynamics			
2.	Flow kinematics	8		
2.1	Introduction, streamlines, Path lines and streak lines, Acceleration			
2.2	Euler's equation			
2.3	Bernoulli's equation		Draw Bernoulli's Equation terms for Flow through a ventruimeter	
2.4	Votexnmotion			

3.	fluid Dynamics	3		
3.1	Momentum equation For flowing fluid			
3.2	Non-dimensional Numbers, Reynolds; Number, mach number, coefficients of Lift, drag and moments			
4.	Flight aerodynamics	10	To draw different Kinds of aerofoil	2
4.1	Introduction to 2-D Aerofoils and their Geometrical Parameters; chord, Thickness ratio, Camber, mean camber line, angle of attack; Aerofoil characteristics		And show geometrical parameters and to perform experiment on flow	
4.2	Magnus effect and Vortex theory, lift And drag on inclined Plates		to draw lift-drag curve and pressure distribution for a given set of data	
4.3	lift –drag relation, Types of drag high Drag devices, boundary Layer fence, super stall Load and factors.			
4.5	Pressure distribution and Centre of pressure			
5.	Aircraft performance	7	Estimate parameters For straight and level flight	
5.1	Straight and level powered Flight			
5.2	Gliding flight			
5.3	Knowledge of effect Of altitude, weight and engine Power on aircraft performance/ Minimum drag, minimum Power, stalling and sinking speeds time Of descent and climb, maximum climb rate.			

6.	High speed flows	6		
6.1	Governing equations and Significance of mach number		Study of high speed aerofoil and draw Flow pattern	2
6.2	sonic flows, sound barrier and Shock waves: normal and oblique			
6.3	General shape of supersonic Aerofoil's			
7.	Wind tunnels introduction, Types, components and use & its errors	3	to draw different subsonic wind tunnels and associated basic Instrumentations.	2
8.	Aircraft stability rolling, pitching, Yawing, primary and Secondary controls.	5		

GENERAL WORKSHOP PRACTICES-III

	L	T	P
Hrs. /Week	-	-	8

DETAILED CONTENTS

Advanced Machine shop — 45 Hrs.

1. External and internal threading Exercise (10Hrs.)
2. Generation of flat surface on milling machine (10Hrs.)
3. Gear cutting on Milling (15 Hrs.)
4. Exercise on grinding machines (10 Hrs.)

Painting Shop — 35 Hrs.

1. Painting and coating Exercise (10 Hrs.)
2. Spray painting exercise (10Hrs.)
3. Electroplating and buffing a component (15 Hrs.)

Advance Welding Shop — 35 Hrs.

1. Brazing and soldering exercise (8 Hrs.)
2. Spot and seam welding exercise (7 Hrs.)
3. Exercise do TIG/MIG welding (10 Hrs.)
4. Metal pipe cutting, bending and flatting processors (10 Hrs.)

AIRCRAFT RULES AND REGULATIONS-II

	L	T	P
Hrs./Week	3	-	1

DETAILED CONTENTS

Sr. No.	Theory	Time (Hrs.)	Practical	Time (Hrs.)
1.	Stores: Bonded and Quarantine stores, Storage of various Aeronautical products Including rubber goods, Various fluids.	6	Visit to stores and identification of the areas	6
2.	Knowledge of various Terms such a certificate Of flight release, certificate of Maintenance, approved Certificate.	2		
3.	Condition under Which aircraft is required to be Test flown certificate to be issued By AME for test flight	4		
4.	Circumstances under Which C of A is required	3		
5.	Ferry flight, MEL CDL	3		
6.	Minimum equipment, Instruments required for Various types of operation			
7.	Modification, concession, Airworthiness	10	to see some of the modes/ AD s /SB s on the aircraft	3
8.	Approval of organization	6		
9.	Documents required To be carried on board	2	To physically check and see the documents	
10.	Issues of type approval	2		
11.	Registration Authority	2	To physically check and identify making.	2

BASIC AND DIGITAL ELECTRONICS

	L	T	P
Hfrs./Week	3	-	2

RATIONALE

Diploma holders in Aircraft Maintenance should have knowledge and skills about electronics instruments being used on the aircraft. Hence this subject.

DETAILED CONTENTS

1. Review of Resistor, inductor, capacitor, and transformer, series and parallel combination of R,L and C 3 Hrs.
2. Concepts of semiconductors, impurities and conduction intrinsic, and extrinsic. PN junction as a diode its characteristics and application as rectifier, temperature dependence of diode characteristics. 7 Hrs.
3. Transistor and its characteristics in different configurations; FET and MOSFET construction and characteristics, Biasing of BJT and FET. 3 Hrs.
4. Concept of amplifier, its effect on gain (in db) input and output, impedances, bandwidth, multi stage amplifiers (Qualitative analysis) 5 Hrs.
5. Feedback in amplifier, its effect on gain, band width input and output impedances, and noise.

   Positive feedback and oscillators' (RC LC and crystal type).
6. Operational Amplifiers, its characteristics and application as adder inverter, integrator differentiator, comparator 2 Hrs.
7. Current through RL and RC circuits, transistor as a switch with different loads, definitions of AND, or NOT NAND, NOR XOR gates specifications of TTL and CMOS logic gates. Truth tables and logic expressions, tristate buffer (Only concept) simple problem solving using gates, Boolean's expression. 7 Hrs.
8. Review of number systems and their conversions (Decimal, binary and Hexadecimal) 3 Hrs.
9. Binary arithmetic (1's and 2's complement), half adder, half subtracted, full adder/full subtracter)3Hrs.
10. Latches, flip/Flops (Various types) counters and registers. 3 Hrs.
11. Multiplexer/Dee multiplexer, encoder/Decoder. 2 Hrs.
12. LED/LCD displays, timer chip 555. 2 Hrs.
13. Concept of memories-ROM and RAM. 3 Hrs.

PRACTICALS

1. p-n Junction diode characteristics and its use as half wave and full wave rectifier (2 Hrs.)
2. Common collector and common drain characteristics of NPN transistor. (2 Hrs.)
3. Common source and common drain characteristics of FET. (2 Hrs.)
4. Single stage transistor amplifier and measurement of current and voltage gains and band width. (2 Hrs.)
5. R-C phase shift oscillator and measurement of its output voltage and frequency of oscillation. (2 Hrs.)
6. Operational amplifier circuit as adder, sign changer, integrator, diffentiator, comparator,(2 Hrs.)
7. Transistor as switch characteristics with resistance and capacitance loads. (2 Hrs.)
8. Verification of truth tables of AND, OR,NOT, XOR, NAND,NOR GATES. (2 Hrs.)
9. Implementation of full adder using NAND/NOR gates. (2 Hrs.)
10. Implementation of decade counter using JK flip flops and observations of outputs. (2 Hrs.)
11. Shift left/right 4 bit shift register realization and observations of outputs. (2 Hrs.)
12. Use of multiplexer and demultiplexer for 4 inputs/outputs. (2 Hrs.)
13. Operation of 3 to 8 decoder and observation of output. (2 Hrs.)
14. Operation of 555 chip as non stable and a stable multivibrator. (2 Hrs.)
15. Operation circuit for 7 segments LED display. (2 Hrs.)
16. Operational circuit for 7 segments LCD display. (2 Hrs.)

POWER PLANT CONSTUCTION-PISTON ENGINES

	L	t	P
Hrs. /Week	4	-	2

RATIONALE

Power plant is the heart of any system. It is true for various aircraft also. The diploma holders in Aircraft Maintenance must know about the constructional aspects and about various systems of the power plant in the piston engine. Hence this subject has been divided into two sections. First deals with the construction and the other deals with the power plant system. Which will be covered in 4th semester.

DETAILED CONTENTS

Sr. No.	Theory	Time (Hrs.)	Practical	Time (Hrs.)
1.	Familiarization with different types Of engines such as piston Engines and gas Turbine engine	2		
1.1	Internal combustion heat engines Two stroke and four stroke, inline Radial and opposed engines	2		
2.	Definitions and terms used in Piston engine and classification of engine.	2		
3.	Power and efficiency, their Calculations	2		
4.	Fundamentals requirements construction, Classification material and components And accessories of engine	25	dismantling of engine components and accessories	8
5.	Valve operating mechanism, Its parts, valve timing valve Clearance their checking And adjustments , instruments And tools used	8	Carrying out the valve timing, checking the timings, valve clearance and adjustments	8

6.	Propeller theory, different types of propeller Used, their construction, Operation maintenance and Trouble shooting - Removal and Installations procedure - De-icing anti-icing and Synchronization systems - Propeller balancing, tracking - Propeller governors.	16	Propeller removal and installation - Adjusting propeller Governors controls -Balancing the propeller - Track checking the propeller	
6.1	Engine Instruments			
7.	Power /thrust boosting Devices like water injection, Super charger, turbocharger, Their construction, operation and Maintenance	5	Dismantling the super charger and turbocharger,	2
8.	Fuels, oils contamination And prevention	2	Taking fuel samples	2