

B Sc (Honours) AM SEMESTER –III TEACHING & EXAMINATION SCHEME

SR NO	CODE	SUBJECTS	TEACHING SCHEME			CREDITS	HOURS	EXAMINATION SCHEME				TOTAL
			L	T	P			THEORY		PRACT		
								CIE	ESE	CIE	ESE	
1	AM0331	Workshop Practices	4	0	4	6	8	60	40	60	40	200
2	AM0332	Aircraft Maintenance Practices	4	0	4	6	8	60	40	60	40	200
3	AM0333	Electronics Fundamentals and Digital Techniques 2	4	0	4	6	8	60	40	60	40	200
4	AM0334/A M0335	Mathematics/ Indian Knowledge System	3	0	0	3	3	60	40	00	00	100
TOTAL			15	0	12	21	27	240	160	180	120	700

Subject: Workshop Practices								
Program: B Sc (Honours) AM				Subject Code:AM0331			Semester: III	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)-Theory	Continuous Internal Evaluation (CIE)-Practical	Total
4	0	4	6	24/60	24/60	24/60	16/40	200

Course Objectives

1. Safety & precaution to be taken while working in the machine shop.
2. Study about material handling.
3. Study about various types of gears & usage of inspection.
4. Study about various type of welding techniques.
5. Various types of measurement.
6. Study about hoses & pipes.

Course outcomes:

CO 1: Describe various Human performance and limitations.

[BT-2]

CO 2: Analyze various factors related with Social Psychology.

[BT-4]

CO 3: Justify factors affecting the performance in work place or area.

[BT-5]

CO 4: Explain human error models and theories. [BT-2]

CO 5: Define 'Murphy's' law. [BT-1]

CO 6: List Human Error in the Maintenance Environment. [BT-1]

Course Content:

Unit 1	<p>Safety & Precautions to be taken while working in the Machine shop. Various type of aids to be used while working on machines. Basic Machining.</p> <p>Material handling - Sheet Metal Marking out and calculation of bend allowance; Sheet metal working, including bending and forming; Inspection of sheet metal work.</p>	15 Hrs.
Unit 2	<p>Various types of gears and usage and inspection.</p> <p>Various Hand tools for working on bench .Drills and drilling procedures. Simple Turning and Taper turning. Various types of measuring and layout tools.</p> <p>Welding Techniques: Preparation of arc welding of butt joints, lap joints and tee joints. Gas welding practice.</p>	15 Hrs.
Unit 3	<p>Metric Measurement Various forms of Surface Finish and Surface measurement Various forms of Heat Treatment & Testing of Materials Various forms of Taps & Dies.</p> <p>(a) Smithy operations, upsetting, swaging, setting down and bending (b) Foundry operations like mould preparation for gear and step cone pulley</p>	15 Hrs.
Unit 4	<p>Hoses and Pipes Pneumatic, Hydraulic pipes and end fitting identification, pipe bending and flaring, pipe inspection.</p> <p>Types of hoses, identification, hose end fittings, house routing and inspection.</p>	15 Hrs.

Reference Books

1. Workshop technology By: K.P. Roy , A.K. HAJRA CHOWDHARY 2000 edition;
2. Shop Theory By: James Anderson

List of Practical :

1	Sheet metal marking, cutting, sheet metal structural defects	4
2	Practice of 1st model. Butt Joint and inspect	4
3	Practice of 2nd model. Lap Joint and inspect	4
4	Practice of 3rd model. V-Joint and inspect	4
5	Practice of 3rd model. T-Joint and inspect	4
6	Demonstration of 1st model - Dovetail	4
7	Demonstration of 2nd model- Radius Gauge	4
8	Inspection of various welded samples with / without defects and record 4 observation	
9	Soldering Exercises, inspection and defects	
10	Cable splicing and swaging	
11	Pipe bending and inspection of pipe assembly	
12	Taps and Dies, thread cutting and inspection	

Subject: Aircraft Maintenance Practices								
Program: B Sc (Honours) AM				Subject Code: AM0332			Semester : III	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
4	0	4	6	16/40	16/40	24/60	24/60	200

Course Objective :

1. Study about safety precautions in aircraft and workshop.
2. Study about fits and clearances & corrosion.
3. Study about welding, brazing, soldering and bonding.
4. Study about inspection repair and assembly & disassembly, technique
5. Study about maintenance procedures for aircraft.
6. Study about gear types and their application.
7. Study about different types of pipes and unions, pipes and hoses.

Course Outcomes :

CO 1: State safety precautions taken in workshop and at Aircraft while working. [BT- 1]

CO 2: Demonstrate calibration of tools and equipment. [BT-3]

CO 3: Determine operation and use of precision measuring tools. [BT-3]

CO 4: Identifying title block information; Microfilm, microfiche and computerized presentations. [BT-1]

CO 5: Explain Air Transport Association (ATA) of America; Aeronautical and other applicable standards. [BT-2]

CO 6: Categorize different types of welding, brazing and soldering methods. [BT-4]

Course Content:

Unit 1	<p>Safety Precautions-Aircraft and Workshop Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals; Instructions on the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.</p> <p>Workshop Practices Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards.</p> <p>Tools Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods. Operation, function and use of electrical general test equipment;</p> <p>Engineering Drawings, Diagrams and Standards Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information; Microfilm, microfiche and computerized presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams.</p>	17 Hrs.
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<p>Unit 2</p>	<p>Fits and Clearances Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist and wear; Standard methods for checking shafts, bearings and other parts.</p> <p>Corrosion (a) Chemical fundamentals; Formation by, galvanic action process, microbiological, (b) Types of corrosion and their identification; Causes of corrosion; Material types, susceptibility to corrosion.</p> <p>Welding, Brazing, Soldering and Bonding (a) Soldering methods; inspection of soldered joints. (b) Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints.</p> <p>Disassembly, Inspection, Repair and Assembly Techniques (a) Types of defects and visual inspection techniques. Corrosion removal, assessment and re-protection. (b) General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programs; (c) Non-destructive inspection techniques including, penetrant radiographic, eddy current, ultrasonic and borescope methods. (d) Disassembly and re-assembly techniques. (e) Trouble shooting techniques</p>	<p>17 Hrs.</p>
<p>Unit 3</p>	<p>Maintenance Procedures Maintenance planning; Modification procedures; Stores procedures; Certification/release procedures; Interface with aircraft operation; Maintenance Inspection/Quality Control/Quality Assurance; Additional maintenance procedures; Control of life limited components</p> <p>Bearings Purpose of bearings, loads, material, construction; Types of bearings and their application. Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes.</p> <p>Transmissions Gear types and their application; Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns; Belts and pulleys, chains and sprockets. Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems.</p> <p>Control Cables Types of cables; End fittings, turnbuckles and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems. Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems.</p>	<p>17 Hrs.</p>

Unit 4	Pipes and Unions (a) Identification of, and types of rigid and flexible pipes and their connectors used in aircraft; (b) Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes. Pipes and Hoses Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes. Springs Types of springs, materials, characteristics and applications. Inspection and testing of springs.	09 Hrs.
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Reference Books:

Airframe and Powerplant Mechanics (AC 65-15A)-Airframe Hand Book FAA
Civil Aircraft Inspection Procedure (CAP 459) Part II Aircraft
Aircraft Maintenance and Repair By Kroes, Watkin and Delph
Acceptable Methods, Techniques and practices (FAA)-EA-AC 43.13-1 A&2A
Aviation Maintenance Technician Hand book by FAA

Aircraft Maintenance Practice (Practical)

- 1 Draw different projections of a given object – Three View Diagram simple object, structural member, and joints
- 2 Fit and remove thread inserts.
Use of precision measuring instruments, selection, handling of instruments and
- 3 marking
- 4 Removal and installation of hydraulic system pressurized / unpressurized components – safety, handling precautions, selection of appropriate tools and manuals. Use zonal numbers to record location. Use parts catalog & component location manual to locate components. Identify pipes and hoses
- 5 Removal and installation of pneumatic system pressurized / unpressurized components – safety, handling precautions, selection of appropriate tools and manuals. Use zonal numbers to record location. Use parts catalog & component location manual to locate components. Identify pipes and hoses

6 Removal and installation of oxygen system components – safety, handling precautions, selection of appropriate tools and manuals. Use zonal numbers to record location. Use parts catalog & component location manual to locate components. Identify pipes and hoses

Visual inspection

7 of various types of surface defects of aircraft structure using simple aids like magnifying glass, light and mirror. Use zonal and station numbers

to record defect location

Visual inspection

8 of various types of surface defects of aircraft structure and system components like bearings, gears, chain, pulley, spring and cables using

simple aids like magnifying glass, light and mirror and record defects.

9 Selection and use of lubrication technique of bearings, flight / engine / propeller

controls and undercarriages. Identifying lubricants.

Subject: Electronic Fundamentals & Digital Techniques 2Program: **B Sc (Honours) AM**Subject Code: **AM0333**Semester: **III****Teaching Scheme****Examination Evaluation Scheme**

				University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Tot al
Lectu re	Tutorial	Practical	Credits					
4	0	4	6	40	40	60	60	200

Course Objectives :

1. Study about Basic computer structure.
2. Study about multiplexer & demultiplexer.
3. Study about electronic displays and instrument systems.
4. Study about Integrated Modular Avionics (ATA 42).
5. Introduction about Cabin Systems (ATA 44).

Course Outcomes:

CO 1: Explain different types of electronic displays and Instrument system. [BT-2]

CO 2: Designing of Multiplexer and de- multiplexer circuit for various applications. [BT-6]

CO 3: Explain the function of Integrated Modular Avionics (IMA). [BT-2]

CO 4: Analyze circuits of Cabin systems for their functioning. [BT-4]

CO 5: Define computer related terminology associated with memory system. [BT-1]

CO 6: Demonstrate typical system arrangement and cockpit layout. [BT-3]

Unit 1	<p>Basic Computer Structure (a) Computer terminology (including bit, byte, software, hardware, CPU, IC, and various memory devices such as RAM, ROM, PROM); Computer technology (as applied in aircraft systems). (b) Computer related terminology; Operation, layout and interface of the major components in a microcomputer including their associated bus systems; Information contained in single and multi-address instruction words; Memory associated terms; Operation of typical memory devices; Operation, advantages and disadvantages of the various data storage systems.</p> <p>Multiplexing Operation, application and identification in logic diagrams of multiplexers and demultiplexers.</p>	15 Hrs.
Unit 2	<p>Electronic Displays and Instrument Systems: Principles of operation of common types of displays used in modern aircraft, including Cathode Ray Tubes, Light Emitting Diodes and Liquid Crystal Display. Electronic Flight Instrument Systems; Typical systems arrangements and cockpit layout of electronic instrument systems ECAM-Electronic Centralized Aircraft Monitoring; EFIS-Electronic Flight Instrument System; EICAS-Engine Indication and Crew Alerting System Instrument warning systems including master warning systems and centralized warning panels.</p> <p>Typical Electronic/Digital Aircraft Systems: General arrangement of typical electronic/digital aircraft systems and associated BITE(Built in Test Equipment) testing such as: ACARS-ARINC Communication and Addressing and Reporting System; Integrated modular Avionics</p>	15 Hrs.
Unit 3	<p>Integrated Modular Avionics (ATA 42) Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc.; Core System; Network Components.</p>	15 Hrs.
Unit 4	<p>Cabin Systems (ATA 44): The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service) - Includes voice, data, music and video transmissions; The Cabin Intercommunication Data System provides an interface between cockpit/ cabin crew and cabin systems. These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels. The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems: Data/Radio Communication; In-Flight Entertainment System; The Cabin Network Service may host functions such as: Access to pre-departure/departure reports; E-mail/intranet/Internet access; Passenger database; Cabin Core System; In-flight Entertainment System; External Communication System; Cabin Mass Memory System; Cabin Monitoring System; Miscellaneous Cabin System.</p>	15 Hrs.

Reference Books:

Basic Electronics-Bernard Grob

Digital Fundamentals by Malvino and Leech

Principles of Electronics by V K Mehta

List of Practical : Electronics Fundamentals and Digital Techniques 2

1. Familiarization with computer architecture and its components
2. Identification of components of Display systems
3. Operation check of Display system.
4. Familiarization with CRT and various components associated with EFIS
5. Identification of components in engine display systems
6. Bite / self-test of EFIS system.
7. BITE on different aircraft systems.
8. Familiarization with components of system associated with Integral modular avionics systems such Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication.
9. Operation check of ventilation control system.
10. Operation check of IFE system.
11. Operation check of intercom system.
12. Operation check of cabin systems.
13. Inspection of IFE system, intercom system and other cabin systems.
14. Operation of temperature control system

Identify ECAM system components and carry out test

Program: B Sc (Honours) AM				Subject Code:AM0334			Semester: III	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)- Theory	Continuous Internal Evaluation (CIE)- Practical	Total
5	1	00	06	40	00	60	00	100

Course Objectives:

1. Introduction about Linear Algebra.
2. Introduction about Trigonometry Functions.
3. Introduction about Multivariable Differential calculus
4. Introduction about Multivariable Integral calculus & Vector Calculus

Course Outcomes:

CO: 1 Express or reduce a given matrix in row echelon form using the concept of elementary row operations. [BT-2]

CO: 2 Use the concept of row echelon form to find the rank of the matrix. [BT-3]

CO: 3 Apply Gauss elimination method to solve a consistent simultaneous linear equation wherever possible in both homogeneous and non-homogeneous case. [BT-3]

CO: 4 Apply Gauss-Jordan method to find the inverse of a square matrix. [BT-3]

CO: 5 Apply the concept of Eigen values and Eigen vectors of a square matrix in diagonalizing a square matrix wherever possible. [BT-3]

CO: 6 Use the concept of rank of the matrix in checking the consistency of a simultaneous linear equation. [BT-3]

Course Content ;

Unit 1	Linear Algebra: Elementary Row Transformation, Reduction of a Matrix to Row Echelon Form, Rank of a Matrix, Consistency of Linear Simultaneous Equations, Gauss Elimination Method, Gauss-Jordan Method, Eigen Values and Eigen Vectors of a Matrix, Caley-Hamilton Theorem, Diagonalization of a Matrix,	15 Hrs.
Unit 2	Trigonometry Functions:	15 Hrs.

	Elementary trigonometry, sine, cosine and tan functions, reciprocals of trig functions, angle values of trig functions, geometrical problems, trigonometric inverse functions.	
Unit 3	Multivariable Differential calculus Functions of 2 Variables, Limits and continuity, Partial differentiation, Euler's Theorem, Maxima and Minima of two variables, Method of Lagrange Multipliers, Taylor Series and Maclaurin Series of two variables, Jacobian.	15 Hrs.
Unit 4	Multivariable Integral calculus Multiple Integrals-Double integrals, Change of order, Applications to areas, volumes, Triple Integral. Vector Calculus Gradient, Divergence, Curl, Evaluation of Line Integral, Green's Theorem in Plane (without proof), Stoke's Theorem (without proof), Gauss Divergence Theorem (without proof).	15 Hrs.

References Books:

Differential Calculus by Shanti Narain

Integral Calculus by Shanti Narain

Linear Algebra- Schaum Outline Series.

Engineering Mathematics by B.S. Grewal

Program: B Sc (Honours) AM				Subject Code:AM0335			Semester: III	
Teaching Scheme				Examination Evaluation Scheme				
Lecture	Tutorial	Practical	Credits	University Theory Examination	University Practical Examination	Continuous Internal Evaluation (CIE)-Theory	Continuous Internal Evaluation (CIE)-Practical	Total
3	0	0	3	16/40	0	24/60	0	100