



SAE4051	AIRCRAFT PRODUCTION TECHNOLOGY LAB (For Aeronautical)	L	T	P	Credits	Total Marks
		0	0	4	2	100

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1: Join two parts using the lap-, tee- and V- weld joints using the electric arc welding equipment.

CO2: Develop the V-joint and dove tail joint using the fitting tools.

CO3: Perform the external machining operations (facing, turning, knurling, grooving and thread cutting) using a conventional lathe.

CO4: Perform the internal machining operations (drilling, reaming and internal thread cutting) using a conventional lathe.

CO5: Perform the eccentric turning operation using a four jaw chuck in a conventional lathe.

CO6: Perform the taper turning operations using the compound rest swivel method and attachment method.

LIST OF EXPERIMENTS

Lathe Machine

1. Study of lathe and precision tools
2. Facing, Step, taper and turning
3. Internal and external thread cutting
4. Eccentric turning
5. Grooving & knurling
6. Drilling & Boring

Milling Machine

- Spur gears

Shaping machine

- Key way & Angular cutting

Radial Drilling Machine

- Drilling and Taping

Grinding Machine

- Cylinder grinding



SAE1308	AIRCRAFT DESIGN (For Aeronautical)	L	T	P	Credits	Total Marks
		2	1	0	3	100

COURSE OBJECTIVES

To get clear cut idea about aerodynamic design, aircraft structural design and power plant design

COURSE OUTCOMES

CO1: Identify the type of aircraft design specifications and estimate the overall takeoff weight.

CO2: Calculate the design load factor for cruise and stall conditions of the aircraft to be designed.

CO3: Plot the shear force and bending moment diagram for the aircraft wing to be designed.

CO4: Select the appropriate power plant for the aircraft to be designed and estimation of thrust.

CO5: Design of supersonic aircraft wings and its optimization technique to achieve the desired performance.

CO6: Interpret the design features of V/STOL and rotary wing aircrafts

UNIT 1 PRELIMINARY DESIGN

11 hrs

Introduction, Aircraft Design Requirements, specifications, role of users, Aerodynamic and Structural Consideration, Importance of weight. Airworthiness requirements and standards Classifications of airplanes. Special features of modern airplane, Airplane Weight Estimation, Weight estimation based on type of airplane, trends in wing loading, weight-estimation based on mission requirements, iterative approach.

UNIT 2 AERODYNAMIC DESIGN AND PERFORMANCE

10 hrs

Basics of Wing Design, Selection of airfoil selection, influencing factors. Span wise load distribution and plan form shapes of airplane wing. Stalling, take-off and landing considerations. Wing drag estimation. High lift devices, Air Loads in Flight, Symmetrical measuring loads in flight, Basic flight loading conditions, Load factor, Velocity - Load factor diagram, gust load and its estimation, Structural limits

UNIT 3 STRUCTURAL DESIGN

7 hrs

Cockpit and aircraft passenger cabin layout for different categories, types of associated structure features of light airplanes using advanced composite materials, Structural aspects of design of airplane, Bending moment and shear force diagram. Design principles of all metal stressed skin wing for civil and military applications.

UNIT 4 POWER PLANT DESIGN

7 hrs

Estimation of Horizontal and Vertical tail volume ratios. Choice of power plant and various options of locations, considerations of appropriate air –intakes. Integration of wing, fuselage, empennage and power plant. Estimation of center of gravity.

UNIT 5 ADVANCED DESIGN CONCEPTS

7 hrs

Supercritical Wings, relaxed static Stability, controlled configured vehicles, V/STOL aircraft and, rotary wing vehicles. Layout peculiarities of supersonic aircraft – optimization of wing loading to achieve desired performance – loads on undercarriages and design requirements

Max. 45 Hours

TEXT / REFERENCE BOOKS

1. Raymer D.P. "Aircraft Conceptual design", AIAA Series, 1988.
2. Corning G. "Supersonic & Subsonic Airplane Design", II Edition, Edwards Brothers Inc., Michigan, 1953
3. Bruhn E.F, "Analysis and Design of Flight Vehicle Structures", Tristate Offset Co., U.S.A., 1980.
4. Torenbeek E, "Synthesis of Subsonic Airplane Design", Delft University Press, London, 1976.
5. Lebedenski A.A, "Notes on airplane design", Part-I, I.I.Sc., Bangalore



SBA1101	PRINCIPLES OF MANAGEMENT AND PROFESSIONAL ETHICS (For Aeronautical)	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OUTCOMES:

On completion of the course, student will be able to:

CO 1: Acquire familiarity towards Evolution of Management, principles of F.W.Taylor & Henry Fayol, Organizational structures and basics of management including concepts of MBO & MBE.

CO 2: Gains knowledge on the types of business organization, designing a layout for a plant, and the safety measure to overcome industrial accidents.

CO 3: Recognizes the importance of studying individual and group behavior at workplace and its effect on performance in organization.

CO 4: Develop expertise knowledge on the impact of Leadership Communication and Group dynamics in industry.

CO5: Learn the basics of ethical behavior and corporate social responsibility practiced in industries.

CO 6: To solve cases business, to do a role play based on the knowledge gained from the subject and also apply the gained knowledge in industries in real life situations.

UNIT I MANAGEMENT FUNCTIONS & STRUCTURE

9 hrs

Management - Definition -Role of managers- Levels of management-Basic Function - Contribution of Taylor Fayol. Types of structures - Line, staff, Functional, Committee and Project & Matrix - Structures. Departmentalization - Centralization - Decentralization - Span of control. Management by COURSE OBJECTIVES (MBO)- Management by Exception (MBE).

UNIT II MANAGEMENT OF ORGINASATION

9 hrs

Forms of Business / Industrial Ownership - Sole Trader, Partnership, Joint stock Company, Performance Appraisal - Basic Principles - Pitfalls - Methods to Overcome. Industrial Safety - Causes of Accidents - Cost of Accidents - Measures to avoid Accidents. Plant Layout & Maintenance - Need, Types & Managerial Aspects.

UNIT III ORGANISATIONAL BEHAVIOUR

9 Hrs.

Organisational Behaviour - Definition - Nature & Scope - Contributing Disciplines - Importance of OB to Managers. Personality - Definition - Theories - Factors Influencing Personality. Motivation - Definition - Theories.Transaction Analysis. Morale & Job Satisfaction - Factors Influencing Job Satisfaction.

UNIT IV GROUP DYNAMICS

9 Hrs.

Group - Definition - Types - Determinants of Group Cohesiveness. Communication - Process - Barriers -Effective Communication. Leadership-Definition- leadership styles- Theories of leadership - Factors Contributing to Effective Leadership. Trade Unions- Role of Trade Union in Organizations - Types and Functions of Trade Unions.

UNIT V PROFESSIONAL ETHICS

9 Hrs.

Ethics in Workplace - Formulation of Ethics - Managerial Ethics - Managing Ethical Behaviour - Codes of Ethics Encouraging Ethical Behaviour - Ethical Leadership - Ethical Decision making. Corporate Social Responsibility (CSR) -Intellectual Property Rights (IPR)- Meaning- Laws relating to Intellectual Property Rights (IPRs)

Max. 45 Hours

TEXT / REFERENCE BOOKS

1. Gupta C.B., "Management Theory and Practice", 14th Edition, Sultan Chand & Sons, 2009.
2. Prasad L.M., "Principle & Practice of Management", 7th Edition, Sultan Chand & Sons, 2008.
3. Aswathappa, "Organisational Behaviour", 8th Edition, Himalaya Publishing House, 2010
4. Prasad L.M., "Organisational Behaviour", 4th Edition, Sultan Chand & Sons, 2008.
5. Harold Koontz, "Principles of Management", 1st Edition, Tata McGraw Hill, 2004.



SME1206	DYNAMICS OF MACHINERY (Common to Mech, M&P, Aero & Auto)	L	T	P	Credits	Total Marks
		3	1	0	4	100

COURSE OUTCOMES:

At the end of the course, the students will be able to:

CO1: Analyze the principles of static & dynamic forces and flywheels.

CO2: Examine the basics of friction, balancing of rotating and reciprocating unbalanced systems.

CO3: Design the single degree free and damped vibration systems.

CO4: Analyze the forced vibration systems.

CO5: Compute the process parameters of gyroscopes.

CO6: Examine different types of governors and their applicability.

UNIT I INTRODUCTION

12 Hrs

Static and Dynamic Force Analysis (Demonstration of models in video show)- Theory and analysis of Compound Pendulum, Concept of equivalent length of simple pendulum, Bifilar suspension, Trifilar suspension - Inertia force and Inertia torque- Turning moment diagrams -Fly Wheels - Flywheels of punching presses. Dynamics of reciprocating engines: Two mass statically and with dynamism equivalent system, correction couple, static and dynamic force analysis of reciprocating engine mechanism (analytical method only), Crank shaft torque, Introduction to T-θ diagram.

UNIT II BALANCING AND FRICTION

12 Hrs

Tending plane, resistance of screw and nuts, pivot and collar, uniform force, uniform wear, friction circle and friction axis border friction, film lubrication Friction in journal bearing-friction circle, Balancing Of Reciprocating Masses - Balancing of Multi-cylinder inline, V-engines- Balancing a single cylinder engine- Balancing of linkages -- Balancing machines-Field balancing of discs and rotors Balancing of rotating masses single and multiple - single and different planes, use analytical and graphical methods.

UNIT III ONE DOF FREE VIBRATION

12 Hrs

Introduction - vibration - measuring instruments. Free Vibration of spring mass system - oscillation of pendulums Harmonic motion, periodic motion, vibration terminology, complex method of representing harmonic vibration, Fourier series and harmonic analysis, Mathematical modeling for vibrations springs in series and parallel, differential equation of motion, solution of differential equation Transverse and torsional vibrations of two and three rotor systems, critical speeds.

UNIT IV TWO DOF FORCED VIBRATION

12 Hrs

Vibration isolation and transmissibility, elementary treatment of two degree of freedom systems torsional vibrations of single rotor and two rotor systems, transverse Vibration of simply supported beam energy method, Rayleigh's and Dunkerley method. Vibration damper; Properties of vibrating system, flexibility matrix, stiffness matrix, reciprocity theorem. Disturbance caused by unbalance - Support motion -transmissibility

UNIT V PRECESSION AND GOVERNERS

12 Hrs

Gyroscopes and gyroscopic effects-Effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships, gyroscopic couple, (Demonstration of models in video show). Governors: types and applications; Watt, porter and proell governors, spring loaded governors - Hartnell and Hartung with auxiliary springs. Sensitiveness, isochronisms and hunting.

Max.60 Hrs

REFERENCE BOOKS:

1. S. S. Rattan, Theory of Machines, 3rd Ed., Tata McGraw Hill, 2009
2. JohnHannah and Stephens R.C., "Mechanics of Machines", Viva Low-Prices Student Edition,1999
3. T. Bevan. Theory of Machines, CBS Publishers and Distributors, 1984
4. Khurmi, R.S., "Theory of Machines", 14th Edition, S Chand Publications, 2005
5. Benson H. Tongue, "Principles of Vibrations", Oxford University Press, 2nd Edition, 2007



SAE1202	AIRCRAFT ELECTRICAL AND ELECTRONIC SYSTEMS (For Aeronautical)	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

To study the basics of Electronics and electrical systems used for aircrafts.

COURSE OUTCOMES

CO1: Functions of diodes, transistors, stable, bi-stable and bus systems in aircraft electronic systems.

CO2: Inspect the type of generators, motors and batteries used in Aircraft power generation systems.

CO3: Examine the components of AC and DC power generators in Aircraft electrical systems.

CO4: Discover the components of power distribution system used in larger commercial aircrafts.

CO5: Assess the lightning technologies utilized in Aerodrome and Airport for passenger mobility.

CO6: Select the cabin pressurization system technologies suitable for passenger comfortability.

UNIT 1 INTRODUCTION

5 Hrs.

Electrical fundamentals - Electronic fundamentals -Semiconductor theory - Diodes - 2.3 Transistors-Digital fundamentals-Logic gates-Combinational logic systems – Mono stable devices - Bistable devices - Decoders - Encoders – Multiplexers - Bus systems-microprocessors – microcontrollers – Computers

UNIT 2 GENERATORS AND MOTORS BATTERIES & POWER SUPPLIES 9 Hrs.

Description and applications of single - phase and three - phase motors. Connection and starting of three - phase induction motors by star - delta starter. Motors used for driving pumps, compressors, centrifuge, Generator and motor principles - AC generators - Three -phase generation and distribution - AC motors - Practical aircraft generating systems – Storage cells - Lead -acid batteries - Nickel-cadmium batteries - Lithium batteries - Nickel-metal hydride batteries- Battery locations - Battery venting - Battery connections - Regulators - External power - Inverters - Transformer rectifier units - Transformers - Auxiliary power unit (APU) - Emergency power - Wiring and circuit protection - Construction and materials - specifications - Shielding/screening - Circuit protection - Electrical and magnetic fields - Electromagnetic interference - EMI reduction

UNIT 3 AC POWER GENERATION DC POWER GENERATION BASICS 12 Hrs.

Types of alternator – alternator rectifier unit – constant speed alternator – wild frequency alternator – brush less alternator – alternator control unit - synchronizing of alternator – charging and cooling - Disconnection and connection GCU: - Line contactors/ Transfer contactors Static invertors- testing the operation. Auto transformers. Current transformers- differential protection APU – purpose – operation – starting of engine– precautions to be observed before starting — limitations of starting APU. DC generators – construction – Starter generator – checking and testing of generator parts – functional check of generator on aircraft. Paralleling of DC buses. TRUs and DC power generation.

UNIT4 DISTRIBUTION OF POWER SUPPLIES

12 Hrs.

single engine/general aviation - Twin engine general aviation aircraft - Larger aircraft systems - Split bus system - Parallel bus system - Split/parallel bus system - Standby and essential power - Battery charging - Control and protection - Load shedding - Fire and overheat protection - Engine/APU fire detection - Cargo bay/baggage area - Fire extinguishing

UNIT 5 CABIN SYSTEMS & LIGHTS

7 Hrs

Lighting technologies - Flight compartment lights - Passenger cabin lights - Exterior lights - Passenger address system - Galley equipment -In-flight entertainment (IFE) - Satellite communications -Multiplexing - Fiber optics -Air conditioning -Pressurization Air stairs

Max. 45 Hours

TEXT / REFERENCE BOOKS

1. Aircraft Electrical and Electronic Systems : Principles, operation and maintenance , Mike Tooley and David Wyatt ,
2. Butterworth-Heinemann is an imprint of Elsevier USA , First edition, 2009
3. EHJ Pallet: A/C Electrical system
4. Theraja B.L. Electrical Technology
5. Bent Mckinley: A/C Electricityand Electronics
6. Mehta VK Basic Electronics;S Chand and Co., New Delhi



SATHYABAMA

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SAE1604	AIRLINE OPERATIONS AND MANAGEMENT (For Aeronautical)	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVE

- To get idea about airline scheduling, airspace management and to get knowledge objectives of International Civil Aviation Organization.

COURSE OUTCOMES

CO1: Utilize the functions of aviation technology transformation and classify the types of aviation industries.

CO2: Select the standard aircraft possessing best operating cost and moderate passenger capacity for economic class.

CO3: Outline the principles of airline scheduling for preparing flight plans in line with aircraft maintenance practices.

CO4: Interpret the functions of Airspace management for the aircraft other than takeoff and landing handling airport infrastructure.

CO5: Summarize the growth and development of civil aviation organizations in different nations.

CO6: Categorize the growth and development of DGCA rules and regulatory for civil aviation companies.

UNIT 1 INTRODUCTION

9 Hrs.

Introduction to Transportation–Modes–Modal Competition– The Economic Importance– Transportation and Economic Development–Transport as a Factor of Production–International Transportation– Importance of International Transportation–Logistics Management–Concepts and Types of Aviation–History of Civil Aviation Industry–Aviation Technology Transformation (1930 – 2003) –Scope of Aviation

UNIT 2 AIRLINE ECONOMICS

9 Hrs.

Forecasting – Fleet Size, Fleet Planning, The Aircraft Selection Process, Operating Cost, Passenger Capacity, Load Factor Etc. – Passenger Fare and Tariffs – Influence of Geographical, Economic Political Factors on Routes and Route selection. Aircraft Selection Process – Fleet Commonality, Factors affecting choice of fleet, Route Selection and Capital Acquisition – Valuation & Depreciation – Budgeting, Cost Planning – Aircrew Evaluation –Route Analysis – Aircraft Evaluation.

UNIT 3 PRICIPLES OFAIRLINES SCHEDULING

9 Hrs.

Equipment Maintenance, Flight Operations and Crew Scheduling, Ground Operations and Facility Limitations Equipment and Types of Schedule – Hub & Spoke Scheduling, Advantages / Disadvantages & Preparing Flight Plans – Aircraft Scheduling in Line with Aircraft Maintenance Practices

UNIT 4 AIRSPACE MANAGEMENT

9 Hrs.

Aircraft Characteristics – Airport Capacity Management – Terminal Management – Apron Management– Size of Airport Infrastructure – Airports and their Economics in National Economic Growth and Development Indian Scenario–GlobalEmergingTrendsofAirportInfrastructureIndustry–GlobalStudyonAirportPerformance– Modern Aviation Infrastructure Business Trend – Airspace Management – Airports and Airspace Congestion Issues – Regulatory Management

UNIT 5 GROWTH &DEVELOPMENT

9 Hrs.

International Civil Aviation Organization (ICAO)-Introduction– Objectives –Strategic Planning– Annexes– International Air Transport Association(IATA)– Aims– Two Tier Systems– Growth and Development– World Trade Organization –World Tourism Organization –Federal Aviation Administration (FAA) –Civil Aviation Authority (CAA)-EASA (European Aviation Security Agency) – Director General of Civil Aviation (DGCA) – Functions -Concepts of Bilateral, Multilateral and Plurilateral in Air Trade Agreements–Major Factors that Converge Private Sector Initiatives -Modern Airline Trends–Liberalization in Air Transport –Potential Paths Further Liberalization –Privatization in Indian Civil Aviation Industry – Deregulation in Indian Air Pocket – Airport Internalization – Basic Principle behind Privatization– Airport -Privatization–FormsofAirport–Privatization–Airport-Privatization Models–Causes–Objectives–Airport Ownership and Governance Models– Airport Privatization in India–Road Map for the Civil Aviation Sector

Max. 45 Hours

TEXT / REFERENCE BOOKS

- Allan Rossmore, Airline Operations, An Inside View 2000,2 ,illustrated ,Kellmark Aeronautics, Incorporated,2000.
- Massoud Bazargan, Airline operations and scheduling, Ashgate Publishing Limited, Hampshire, England,2008.
- Alexander T.Wells, Seth B.Young, Airport planning &management, McGraw-Hill,2004.
- P.S.Senguttuvan,“Fundamentals of Air Transport Management”,ExcelBooks,First Edition 2006
- John G. Wensveen, Air Transportation: A Management Perspective, Ashgate Publishing Company, 2007



SAE1606	CIVIL AIRCRAFT RULES AND REGULATIONS (For Aeronautical)	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVE

To get knowledge about the rules and regulations of civil Aircrafts

COURSE OUTCOMES

CO1: Describes the CAR series A procedure for civil air worthiness regulations and safety of engineering activities.

CO2: Extend the CAR series B to CAR series C for cockpit and voice recording system for black box.

CO3: Examine the aircraft maintenance programmes and engine reliability are approved through CAR series D.

CO4: Outline the procedure for registration of aircraft and certification of airworthiness through CAR series E, F, L and M.

CO5: List the flight testing of aircraft registration marking through CAR series T.

CO6: List the aircraft log book and Indian document application for aircraft registration through CAR series X.

UNIT 1 SERIES A

9 Hrs.

C.A.R. SERIES 'A' – procedure for civil air worthiness requirements and responsibility operators vis-à-vis air worthiness directorate -Responsibilities of operators / owners- Procedure of CAR issue, amendments etc., Objectives and targets of airworthiness directorate; Airworthiness regulations and safety oversight of engineering activities of operators.

UNIT 2 SERIES B AND C

9 Hrs.

C.A.R. SERIES 'B' – issue approval of cockpit check list, MEL, CDL: deficiency list (MEL & CDL); Preparation and use of cockpit checklist and emergency list. C.A.R. SERIES 'C' – defect recording, monitoring, investigation and reporting -Defect recording, reporting, investigation, rectification and analysis; Flight report; Reporting and rectification of defects observed on aircraft; Analytical study of in-flight readings & recordings; Maintenance control by reliability Method.

UNIT 3 SERIES D

9 Hrs

C.A.R. SERIES 'D' –aircraft maintenance programmes- Reliability Programmes (Engines); Aircraft maintenance programme & their approval; On condition maintenance of reciprocating engines; TBO – Revision programme; Maintenance of fuel and oil uplift and consumption records – Light aircraft engines; Fixing routine maintenance periods and component TBOs – Initial & revisions.

UNIT 4 CAR SERIES E, F, L AND M

9 Hrs.

C.A.R. SERIES 'E' – APPROVAL OF ORGANISATIONS - Approval of organizations in categories A, B, C, D, E, F, & G - Requirements of infrastructure at stations other than parent base.- C.A.R. SERIES 'F' – AIR WORTHINESS AND CONTINUED AIR WORTHINESS: Procedure relating to registration of aircraft; Procedure for issue / revalidation of Type Certificate of aircraft and its engines / propeller; Issue / revalidation of Certificate of Airworthiness; Requirements for renewal of Certificate of Airworthiness. C.A.R. SERIES 'L' & 'M' Issue of AME Licence, its classification and experience requirements, Mandatory Modifications / Inspections.

UNIT 5 SERIES 'T' & 'X'

9 Hrs.

C.A.R. SERIES 'T' & 'X' - Flight testing of (Series) aircraft for issue of C of A; Flight testing of aircraft for which C of A had been previously issued. Registration Markings of aircraft; Weight and balance control of an aircraft; Provision of first aid kits & Physician's kit in an aircraft; Use furnishing materials in an aircraft; Concessions; Aircraft log books; Document to be carried on board on Indian registered aircraft; Procedure for issue of tax permit; Procedure for issue of type approval of aircraft components and equipment including instruments.

Max. 45 Hours

TEXT / REFERENCE BOOKS

1. "Aircraft Manual (India) Volume" – Latest Edition, The English Book Store, 17-1, Connaught Circus, New Delhi.
2. Advisory Circulars from DGCA 2012.
3. "Civil Aviation Requirements with latest Amendment (Section 2 Airworthiness)" – Published by DGCA, The English Book Store, 17-1, Connaught Circus, New Delhi 2010.
4. Aeronautical Information Circulars (relating to Airworthiness) from DGCA 2012