

SEMESTER-VII

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: VII B.Tech

Subject: Vibrations and Aeroelasticity

Total Theory Periods: 48 Total Tutorial Periods: 00

Branch: Aeronautical

Code: BT 750

Total Credits: 04

OBJECTIVES:

- To study the effect of time dependent forces on mechanical systems and to get the natural characteristics of system with more degree of freedom systems.
- To study the aero elastic effects of aircraft wing.

UNIT-I BASIC NOTIONS

Simple harmonic motion–Terminologies – Newton’s Law – D’ Alembert’s principle –Energy Methods.

UNIT-II SINGLE DEGREE OF FREEDOM SYSTEMS

Free vibrations – Damped vibrations – Forced Vibrations, with and without damping – support excitation – Vibration measuring instruments.

UNIT-III MULTI DEGREES OF FREEDOM SYSTEMS

Two degrees of freedom systems – Static and Dynamic couplings vibration absorber-Principal co- ordinates, Principal modes and orthogonal condition – Eigen value problems. Hamilton’s principle- Lagrangean equation and application –Vibration of elastic bodies-Vibration of strings- Longitudinal, Lateral and Torsional vibrations.

UNIT-IV APPROXIMATE METHODS

Rayleigh’s and Holzer Methods to find natural frequencies.

UNIT-V ELEMENTS OF AEROELASTICITY

Concepts – Coupling – Aero elastic instabilities and their prevention – Basic ideas on wing divergence, loss and reversal of aileron control – Flutter and its prevention.

OUTCOMES

- Gaining understanding of single and multi degree vibrating systems.
- Ability to use numerical techniques for vibration problems.
- Knowledge acquired in aero elasticity and fluttering.

TEXT BOOKS:

1. “Mechanical Vibrations”, S. S. Rao, Pearson Education Inc, 4th Edition, 2003.
2. “Mechanical Vibrations”, V. P. Singh, Dhanpat Rai & Company Pvt Ltd, 3rd Edition, 2006.

REFERENCES:

1. Bisplinghoff R.L., Ashely H and Hogman R.L., “Aero elasticity” –Addision Wesley Publication, New York, 1983.
2. TSE. F.S., Morse, I.F., Hunkle, R.T., “Mechanical Vibrations”, –Prentice Hall, New York, 1984.
3. Scanlan R.H. & Rosenbaum R., “Introduction to the study of Aircraft Vibration & Flutter”, John Wiley and Sons. New York, 1982.
4. Benson H. Tongue, “Principles of Vibration”, Oxford University Press, 2000.
5. Fung Y.C., “An Introduction to the Theory of Aero elasticity” – John Wiley & Sons, New York, 1995.
6. Timoshenko S., “Vibration Problems in Engineering”– John Wiley and Sons, New York, 1993.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: VII B.Tech

Subject: Avionics

Total Theory Periods: 48

Total Tutorial Periods: 00

Branch: Aeronautical

Code: BT 751

Total Credits: 04

OBJECTIVES:

- To introduce the basic of avionics and its need for civil and military aircrafts.
- To impart knowledge about the avionic architecture and various avionics data buses.
- To gain more knowledge on various avionics subsystems.

UNIT-I INTRODUCTION TO AVIONICS

Need for avionics in civil and military aircraft and space systems – Integrated avionics and weapon systems – Typical avionics subsystems, design, technologies.

UNIT-II PRINCIPLE OF DIGITAL SYSTEMS

Digital computer – Microprocessors – Memories.

UNIT-III DIGITAL AVIONICS ARCHITECTURE

Avionics system architecture – Databuses – MIL-STD-1553B – ARINC – 420 –ARINC – 629.

UNIT-IV FLIGHT DECKS AND COCKPITS

Control and display technologies: CRT, LED, LCD, EL and plasma panel – Touch screen – Direct voice input (DVI) – Civil and Military Cockpits: MFDS, HUD, MFK, HOTAS.

UNIT-V INTRODUCTION TO AVIONICS SYSTEMS

Communications systems- Navigation systems – Flight control systems – Radar –Electronic Warfare – Utility systems Reliability and maintainability – Certification.

OUTCOMES:

- Ability to built Digital avionics architecture.
- Ability to Design Navigation system.
- Ability to design and perform analysis on air system.

TEXT BOOKS:

1. Middleton, D.H., Ed., Avionics systems, Longman Scientific and Technical, Longman Group UK Ltd., England, 1989.
2. Spitzer, C.R. Digital Avionics Systems, Prentice-Hall, Englewood Cliffs, N.J., U.S.A. 1987.

REFERENCES:

1. Malvino, A.P. and Leach, D.P. Digital Principles and Applications, Tata McGraw Hill, 1990.
2. Gaokar, R.S. Microprocessors Architecture-Programming and Applications, Wiley and Sons Ltd., New Delhi, 1990.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: VII B.Tech

Branch: Aeronautical

Subject: Composite Materials and Structures

Code: BT 752

Total Theory Periods: 48 Total Tutorial Periods: 00

Total Credits: 04

OBJECTIVES:

To make the student understand the analysis of composite laminates under different loading conditions and different environmental conditions.

UNIT-I MICROMECHANICS

Introduction-Advantages and application of composite materials- reinforcements and matrices - Micro mechanics – Mechanics of materials approach, elasticity approach to determine material properties–Fibre Volume ratio–Mass fraction–Effect of voids, hygrothermal effects on a lamina.

UNIT-II MACROMECHANICS

Generalized Hooke's Law - Elastic constants for anisotropic, orthotropic and isotropic materials - Macro Mechanics – Stress-strain relations with respect to natural axis, arbitrary axis – Determination of material properties - Experimental characterization of lamina.

UNIT-III LAMINATED PLATES

Governing differential equation for a unidirectional lamina and general laminate, angle ply and cross ply laminate, Failure criteria for composites.

UNIT-IV FABRICATION PROCESS

Various open and closed mould processes, Manufacture of fibres, Types of resins, properties and applications, netting analysis.

UNIT-V SANDWICH CONSTRUCTIONS

Basic design concepts of sandwich construction - Materials used for sandwich construction - Failure modes of sandwich panels - Bending stress and shear flow in composite beams.

OUTCOMES

- Understanding the mechanics of composite materials.
- Ability to analyse the laminated composites for various loading cases.
- Knowledge gained in manufacture of composites.

TEXT BOOKS:

1. Jones, R.M., "Mechanics of Composite Materials," Taylor & Francis, II Edition, 2000.
2. Madhuji Mukhopadhyay, Mechanics of Composite Materials and Structures, University Press, 2004.

REFERENCES:

1. Agarwal, B.D., and Broutman, L.J., "Analysis and Performance of Fibre Composites," John Wiley and sons. Inc., New York, 1995.
2. Lubin, G., Handbook on Advanced Plastics and Fibre Glass, Von Nostrand Reinhold Co., New York, 1989.
3. Autar K Kaw, 'Mechanics of Composite Materials', CRC Press, 1997.
4. Calcote, L R. "The Analysis of laminated Composite Structures", Von –Nostrand Reinhold Company, New York 1998.
5. Allen Baker, Composite Materials for Aircraft Structures, AIAA Series, II Edition, 1999.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: VII B.Tech

Branch: Aeronautical

Subject: Computational Fluid Dynamics

Code: BT 753

Total Theory Periods: 48 Total Tutorial Periods: 00

Total Credits: 04

OBJECTIVES:

- To introduce Governing Equations of viscous fluid flows
- To introduce numerical modeling and its role in the field of fluid flow and heat transfer
- To enable the students to understand the various discretization methods, solution procedures and turbulence modeling.
- To create confidence to solve complex problems in the field of fluid flow and heat transfer by using high speed computers

UNIT-I FUNDAMENTAL CONCEPTS

Introduction - Basic Equations of Fluid Dynamics - Incompressible Inviscid flows: Source, vortex and doublet panel, methods - lifting flows over arbitrary bodies. Mathematical properties of Fluid Dynamics Equations -Elliptic, Parabolic and Hyperbolic equations - Well posed problems - Discretization of partial Differential Equations -Transformations and grids - Explicit finite difference methods of subsonic, supersonic and viscous flows.

UNIT-II PANEL METHODS

Introduction – Source panel method – Vortex panel method – Applications.

UNIT-III DISCRETIZATION

Boundary layer Equations and methods of solution -Implicit time dependent methods for inviscid and viscous compressible flows - Concept of numerical dissipation –Stability properties of explicit and implicit methods - Conservative upwind discretization for Hyperbolic systems - Further advantages of upwind differencing.

UNIT-IV FINITE ELEMENT TECHNIQUES

Finite Element Techniques in Computational Fluid Dynamics; introduction - Strong and Weak Formulations of a Boundary Value Problem-Strong formulation–Weighted Residual Formulation - Galerkin Formulation - Weak Formulation – Variational Formulation - Piecewise defined shape functions - Implementation of the FEM – The Solution Procedure.

UNIT-V FINITE VOLUME TECHNIQUES

Finite Volume Techniques - Cell Centered Formulation - ~ Lax - Von-Neumann Time Stepping - Runge - Kutta Time Stepping - Multi - stage Time Stepping -Accuracy- Cell Vertex Formulation - Multistage Time Stepping - FDM -like Finite Volume Techniques - Central and Up-wind Type Discretizations - Treatment of Derivatives.

OUTCOMES:

Upon completion of this course, the students can able

- To create numerical modeling and its role in the field of fluid flow and heat transfer
- To use the various discretization methods, solution procedures and turbulence modeling to solve flow and heat transfer problems.

TEXT BOOK

1. Fletcher, C.A.J., “Computational Techniques for Fluid Dynamics”, Vols. I and II, Springer - Verlag, Berlin, 1988.
2. “Computational Fluid Dynamics”, T. J. Chung, Cambridge University Press, 2002.

REFERENCES

1. John F. Wendt (Editor), "Computational Fluid Dynamics - An Introduction", Springer – Verlag, Berlin, 1992.
2. Charles Hirsch, "Numerical Computation of Internal and External Flows", Vols. I and II, John Wiley & Sons, New York, 1988.
3. Klaus A Hoffmann and Steve T. Chiang. "Computational Fluid Dynamics for Engineers", Vols. I & II Engineering Education System, P.O. Box 20078, W. Wichita, K.S., 67208 - 1078 USA, 1993.
4. Anderson, John D., "Computational Fluid Dynamics", McGraw-Hill, 1995.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: VII B.Tech
Subject: Aircraft Design Lab-II
Total Practical Periods: 28

Branch: Aeronautical
Code: BT 755
Total Credits: 01

OBJECTIVES:

To make the students prepare their own aircraft design by following various design processes and calculations.

LIST OF EXPERIMENTS

1. V-n diagram for the design study
2. Gust and maneuverability envelopes
3. Critical loading performance and final V-n graph calculation
4. Structural design study – Theory approach
5. Load estimation of wings
6. Load estimation of fuselage.
7. Balancing and Maneuvering loads on tail plane, Aileron and Rudder loads.
8. Detailed structural layouts
9. Design of any two components of wings, fuselage
10. Preparation of a detailed design report with CAD drawings.

LIST OF EQUIPMENTS

(For a batch of 30 students)

S. No.	Details of Equipments	Qty Req.	Expt. No.
1	Engineering Drawing Board	30	4,5
2	Engineering Drawing Instruments	30	4,5

OUTCOMES:

On completion of Aircraft design Lab-II the students will be in a position to design aircraft wings, fuselage, landing gears etc., and also able to angle the design in terms of structural point of view.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: VII B.Tech
Subject: UAV Lab
Total Practical Periods: 28

Branch: Aeronautical
Code: BT 756
Total Credits: 01

OBJECTIVES:

To give the students basic understanding of unmanned aerial vehicles and its operation and working principles.

LIST OF EXPERIMENTS

1. Study of unmanned aerial systems and vehicles
2. Study of classification of unmanned aerial systems and vehicles
3. Study of various components of unmanned aerial systems and vehicles
4. Study of UAV computing capabilities like system on chip (SOC) and single board computers (SBC)
5. Study of UAV sensors
6. Study of UAV actuators like digital electronic speed controllers, servo motors, payload actuators, etc.
7. Study of UAV softwares like Raspberry PIS, Beagleboards, etc.
8. Study of UAV flight controls with manual and automatic flight controls.
9. Study of UAV communication systems
10. Study of advanced UAV systems including swarming technique, LIDAR, TCAS, etc.

LIST OF EQUIPMENTS

(For a batch of 30 students)

S. No.	Details of Equipments	Qty Req.	Expt. No.
1	Engineering Drawing Board	30	1 to 10
2	Engineering Drawing Instruments	30	1 to 10
3	6 channel bus	10	1 to 10
4	Propellers	10	1 to 10
5	Computer with 1 GB Ram	10	1 to 10
6	Open source UAV simulation software	10	1 to 10
7	UAV accessories like battery, transmitter, receiver,	10	1 to 10

OUTCOMES:

Students will be able to understand unmanned aerial vehicles and its operation and working principles.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: VII B.Tech
Subject: Avionics Lab
Total Practical Periods: 28

Branch: Aeronautical
Code: BT 757
Total Credits: 01

OBJECTIVES:

To give students basic understanding of digital electronics, microprocessors & avionics data buses.

LIST OF EXPERIMENTS

DIGITAL ELECTRONICS

1. Addition/Subtraction of binary numbers.
2. Multiplexer/ Demultiplexer Circuits.
3. Encoder/Decoder Circuits.
4. Timer Circuits, Shift Registers, Binary Comparator Circuits.

MICROPROCESSORS

5. Addition and Subtraction of 8-bit and 16-bit numbers.
6. Sorting of Data in Ascending & Descending order.
7. Sum of a given series with and without carry.
8. Greatest in a given series & Multi-byte addition in BCD mode.
9. Interface programming with 4 digit 7 segment Display & Switches & LED's.
10. 16 Channel Analog to Digital Converter & Generation of Ramp, Square, Triangular wave by Digital to Analog Converter.

AVIONICS DATA BUSES

11. Study of Different Avionics Data Buses.
12. MIL-Std – 1553 Data Buses Configuration with Message transfer.
13. MIL-Std – 1553 Remote Terminal Configuration.

LIST OF EQUIPMENTS

(For a batch of 30 students)

S. No.	Details of Equipments	Qty Req.	Expt. No.
1	Adder/Subtractor Binary bits Kit	6	1
2	Timer Kit	6	1
3	Encoder Kit	6	3
4	Decoder Kit	6	3
5	Comparator Kit	6	4
6	Multiplexer Kit	6	2
7	Demultiplexer Kit	6	2
8	Shift Registers Kit	6	4
9	Electronic Design Experimeter	6	6,7,9,10
10	Microprocessor 8085 Kit	9	5,6,7,8,9,10
11	4 Digit 7 Segment Display	3	6
12	Switches & LED's Circuit	3	6
13	16 Channel AD Converter	6	10,9
14	Digital to Analog Converter	6	10
15	Cathode Ray Oscilloscope	3	9,10
16	Regulated Power Supply (5V DC)	9	1, 2,3,4
17	MIL-Std 1553B Setup with Remote Terminal	1	12,13
18	Computers	2	11,12,13

OUTCOMES: Students will be able to understand digital electronics, microprocessors, and avionics data buses.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: VII B.Tech
Subject: Non Destructive Testing Lab
Total Practical Periods: 28

Branch: Aeronautical
Code: BT 758
Total Credits: 01

OBJECTIVES:

To give students basic understanding of non destructive testing methods and implementation in aviation.

LIST OF EXPERIMENTS

1. Hot oil Chalk Powder method.
2. Dye or Liquid Penetrant Testing.
3. Ultrasonic Testing.
4. Magnetic Particle Testing.
5. Radiographic Inspection.
6. Eddy Current Testing.
7. X-Ray Testing.
8. Gamma Rays Testing.
9. Aircraft crack detection methods.
10. Gas Turbine components crack detection.

LIST OF EQUIPMENTS

(For a batch of 30 students)

S. No.	Details of Equipments	Qty Req.	Expt. No.
1	Chalk Powder	1	1
2	Liquid Penetrant	1	2
3	Ultrasonic Testing (UT) Equipment	1	3
4	Iron particles	1	4
5	Magnetic Particle Inspection (MPI) Equipment	1	4
6	Radiographic testing Machine	1	5
7	Eddy Current Testing Machine	1	6
8	X-Ray Machine	1	7
9	Gas Turbine Blade	1	10

OOUTCOMES:

Students will be able to understand non destructive testing methods and implementation in aviation.

LIST OF PROFESSIONAL ELECTIVE-II SUBJECTS FOR 7th SEMESTER

MATS UNIVERSITY, RAIPUR (C.G.) SCHOOL OF ENGINEERING & I.T.

Semester: VII B.Tech

Branch: Aeronautical

Subject: Experimental Aerodynamics

Code: BT 7541

Total Theory Periods: 48 Total Tutorial Periods: 00

Total Credits: 04

OBJECTIVES:

To make the students learn basic wind tunnel measurements and flow visualization methods, flow measurement variables and data acquisition method pertaining to experiments in aerodynamics.

UNIT-I WIND TUNNEL TESTING

Low speed wind tunnels-estimation of energy ratio and power required supersonic wind tunnels-calculation of running time and storage tank requirements.

UNIT-II EXPERIMENTS IN SUBSONIC WIND TUNNELS

Estimation of flow angularity and turbulence factor-calculation of CL and CD on aerofoils from pressure distribution- CD from wake survey-Test section average velocity using traversing rakes-span wise load distribution for different taper ratios of wing.

UNIT-III EXPERIMENTS IN HIGH SPEED TUNNELS

Mach number estimation in test section by pressure measurement & using a wedge – preliminary estimates of blowing and running pressures, nozzle area ratios, mass flow for a given test section size and Mach number-starting problem and starting loads.

UNIT-IV MEASUREMENT TECHNIQUES

Hot wire anemometer and laser Doppler anemometer for turbulence and velocity measurements-Use of thermocouples and pyrometers for measurement of static and total temperatures-Use of pressure transducers, Rotameters and ultrasonic flow meters.

UNIT-V SPECIAL PROBLEMS

Pitot-static tube correction for subsonic and supersonic Mach numbers-boundary layer velocity profile on a flat plate by momentum-integral method -Calculation of CD from wall shear stress-Heating requirements in hypersonic wind tunnels-Re-entry problems

OUTCOMES:

Upon completion of the course, students will learn about the measurement of flow properties in wind tunnels and their associated instrumentation.

TEXT BOOKS:

1. H. C. Pavian, Experimental Aerodynamics, Pitman Publishing, 1st Edition, 1940.
2. Stefano Discetti, Andrea Ianiro, Experimental Aerodynamics, CRC Press, 2017.

REFERENCES:

1. Rae W.H., and Pope, A, "Low speed wind tunnel testing" John Wiley Publication, 1984.
2. Pope A and Goin L "High speed wind tunnel testing" John Wiley, 1985.
3. Rathakrishnan. E "Instrumentation, Measurement and Experiments in Fluids", CRC Press, London, 2007.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: VII B.Tech

Branch: Aeronautical

Subject: Aircraft General Engineering & Maintenance Practices

Code: BT 7542

Total Theory Periods: 48

Total Tutorial Periods: 00

Total Credits: 04

OBJECTIVES:

To make the students learn basics of aircraft general engineering and maintenance practices.

UNIT-I AIRCRAFT MAINTENANCE PRACTICES

General knowledge of procedure of jacking, leveling and mooring of aircraft. Knowledge of maintenance and handling of ground equipment such as engine starting trolley, hydraulic trolley, air condition trolley used in the maintenance of aircraft. Knowledge of safety and fire precautions to be observed during maintenance, refueling and defueling of aircraft. Knowledge of aircraft fire extinguishers Maintenance safety.

UNIT-II WORKSHOP PRACTICES

Uses of Hand tools in aircraft maintenance, precision measuring instruments. Knowledge & terminology, of aircraft bolts, nuts, rivets, screws and locking devices. Knowledge of various types of gears and bearings, their use and common defects. Knowledge of various types of threads, drills, taps, reamers.

UNIT-III Aircraft Materials

Principal of Heat treatment of aircraft steel, Heat treatment of non ferrous metal –solution hardening ,precipitation hardening ,forms of corrosion , & factor affecting corrosion. Process and material used in corrosion control – electroplating, Parco lubrizing, alodizing, anodizing.

UNIT-IV INSPECTION

Purpose –type-inspection interval & inspection schedule. Special inspection. FAR Air worthiness directive Type certificate data sheet, service bulletin.

UNIT-V AIRCRAFT ENGINE, ELECTRICAL & INSTRUMENT

Theory & construction of aircraft engines- reciprocating & turbojet engine, Knowledge of lead & cadmium Batteries and their maintenance, Knowledge of principle of operation of aircraft fuel flow meter, oil temperature indicator, oil pressure indicator.

OUTCOMES:

Students will learn basics of aircraft general engineering and maintenance practices.

TEXT BOOKS:

1. Air frame & power plant Mechanics (General Hand book EA-AC 65 -9A)
2. U S Department of transportation Air frame & power plant Mechanics (Power plant Hand book EA-AC 65 -12A) U S Department of transportation.

REFERENCES:

1. James Anderson, Earl E. Tatro, “Shop Theory”.
2. Larry Reithmaier, “Standard Aircraft handbook”.
3. E H J Pallet, “Aircraft Electrical Systems”.
4. Aircraft materials & processes by Titterton
5. Aviation Maintenance and Technical series,
 - a) General – Dale Crane
 - b) Power plant – Dale Crane Published by Aviation supplies & Academic, DC.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: VII B.Tech

Branch: Aeronautical

Subject: Aero Engine Maintenance and Repair

Code: BT 7543

Total Theory Periods: 48 Total Tutorial Periods: 00

Total Credits: 04

OBJECTIVES

To introduce the knowledge of the maintenance and repair procedures followed for overhaul of aero engines.

UNIT-I CLASSIFICATION OF PISTON ENGINE COMPONENTS

Types of piston engines – Principles of operation – Function of components – Materials used – Details of starting the engines – Details of carburetion and injection systems for small and large engines – Ignition system components – Spark plug details – Engine operating conditions at various altitudes – Maintenance and inspection check to be carried out.

UNIT-II INSPECTIONS OF PISTON ENGINES

Inspection and maintenance and troubleshooting – Inspection of all engine components– Daily and routine checks – Overhaul procedures – Compression testing of cylinders–Special inspection schedules – Engine fuel, control and exhaust systems– Engine mount and super charger – Checks and inspection procedures.

UNIT-III INSPECTIONS OF PISTON ENGINES

Symptoms of failure – Fault diagnostics – Case studies of different engine systems –Tools and equipment requirements for various checks and alignment during overhauling–Tools for inspection – Tools for safety and for visual inspection – Methods and instruments for non destructive testing techniques – Equipment for replacement of part and their repair. Engine testing: Engine testing procedures and schedule preparation – Online maintenance.

UNIT-IV CLASSIFICATION OF JET ENGINE COMPONENTS

12 Types of jet engines – Principles of operation – Functions of components – Materials used – Details of starting and operating procedures – Gas turbine engine inspection & checks –Use of instruments for online maintenance – Special inspection procedures: Foreign Object Damage– Blade damage–etc. Maintenance procedures of gas turbine engines–Trouble shooting and rectification procedures–Component maintenance procedures–Systems maintenance procedures. Gas turbine testing procedures – test schedule preparation – Storage of Engines–Preservation and de-preservation procedures.

UNIT-V OVERHAUL PROCEDURES

Engine Overhaul procedures – Inspections and cleaning of components – Repairs schedules for overhaul – Balancing of Gas turbine components. Troubleshooting - Procedures for rectification – Condition monitoring of the engine on ground and at altitude – engine health monitoring and corrective methods.

OUTCOMES

Ability to maintain and repair the aero engines.

TEXT BOOK

1. Kroes & Wild, "Aircraft Power plants", 7th Edition – McGraw Hill, New York, 1994.

REFERENCES

1. Turbomeca, "Gas Turbine Engines", The English Book Store, New Delhi, 1993.
2. United Technologies' Pratt & Whitney, "The Aircraft Gas turbine Engine and its Operation", (latest edition) The English Book Store, New Delhi.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: VII B.Tech

Branch: Aeronautical

Subject: Air Traffic Control and Aerodrome Design

Code: BT 7544

Total Theory Periods: 48 Total Tutorial Periods: 00

Total Credits: 04

OBJECTIVES:

To introduce the knowledge of the air traffic control and aerodrome design.

UNIT-I BASIC CONCEPTS

Objectives of ATS - Parts of ATC service – Scope and Provision of ATCs – VFR & IFR operations – Classification of ATS air spaces – Various kinds of separation – Altimeter setting procedures – Establishment, designation and identification of units providing ATS– Division of responsibility of control.

UNIT-II AIR TRAFFIC SERVICES

Area control service, assignment of cruising levels minimum flight altitude ATS routes and significant points – RNAV and RNP – Vertical, lateral and longitudinal separations based on time / distance –ATC clearances – Flight plans – position report.

UNIT-III FLIGHT INFORMATION ALERTING SERVICES, COORDINATION, EMERGENCY PROCEDURES AND RULES OF THE AIR

Radar service, Basic radar terminology – Identification procedures using primary /secondary radar – performance checks – use of radar in area and approach control services – assurance control and co-ordination between radar / non radar control –emergencies – Flight information and advisory service – Alerting service – Co-ordination and emergency procedures – Rules of the air.

UNIT-IV AERODROME DATA, PHYSICAL CHARACTERISTICS AND OBSTACLE RESTRICTION

Aerodrome data - Basic terminology – Aerodrome reference code – Aerodrome reference point – Aerodrome elevation – Aerodrome reference temperature – Instrument runway, physical Characteristics; length of primary / secondary runway – Width of runways – Minimum distance between parallel runways etc. – obstacles restriction.

UNIT-V VISUAL AIDS FOR NAVIGATION, VISUAL AIDS FOR DENOTING OBSTACLES EMERGENCY AND OTHER SERVICES

Visual aids for navigation Wind direction indicator – Landing direction indicator –Location and characteristics of signal area – Markings, general requirements – Various markings – Lights, general requirements – Aerodrome beacon, identification beacon –Simple approach lighting system and various lighting systems – VASI & PAPI – Visual aids for denoting obstacles; object to be marked and lighter – Emergency and other services.

OUTCOMES:

Students will get the knowledge of the air traffic control and aerodrome design.

TEXT BOOKS:

1. AIP (India) Vol. I & II, “The English Book Store”, 17-1, Connaught Circus, New Delhi.

REFERENCES:

1. Aircraft Manual (India) Volume I, latest Edition – The English Book Store, 17-1, Connaught Circus, New Delhi.
2. PANS – RAC – ICAO DOC 4444, Latest Edition, The English Book Store, 17-1, Connaught Circus, New Delhi.

**MATS UNIVERSITY, RAIPUR (C.G.)
SCHOOL OF ENGINEERING & I.T.**

Semester: VII B.Tech
Subject: Aviation Management
Total Theory Periods: 48

Total Tutorial Periods: 00

Branch: Aeronautical
Code: BT 7545
Total Credits: 04

OBJECTIVES:

To introduce the knowledge of the aviation management.

UNIT-I

Introduction to Aviation Management – Aviation – Aviation Sector in India - Civil Aviation – Airport – Air Traffic Control – Flight Data Recorder – Airline – Case Study.

UNIT-II

International Civil Aviation Organization – Aeropol Aviation Services Corporation – Aviation Management Consulting Group - AOPA – International Association of Airport Executives – Federal Aviation Interactive Reporting Systems - Case Study.

UNIT-III

Aircraft Regulations and Guidance – Convention on International Civil Aviation – Inter Agency Committee for Aviation Policy – Active Level of Services Reviews – Aircraft Engineers International Affiliation – AVSEC Rules and Regulations – Overview of Indian Air Travel – Case Study.

UNIT-IV:

Air Safety – FAA Aviation Safety Draft Documents – Aircraft Management Interagency Committee for Aviation Policy Safety Standards – Aircraft Management Safety Standards Guidelines for Federal Flight Programmes – National Transportation Safety Board – Airline Water Supplies – JFIM. Overview of Contemporary Global Industry – Airline Industry Profitability – Present State of the Air Transport Industry – Aviation Industry – Global Aviation Industry – Indian Aviation.

UNIT-V

International Air Transport Association (IATA) – Fact Sheet – Financial Services – IATA at the Air Transport Industry - IATA Industrial Priorities – IATA Partners – IATA Corporate and Corporate Governance Structure – IATA Human Capital – IATA Committee's – Cargo, Mandate, Environment, Financial, Legal, Operations, Industry Affairs – Rules and Regulations of the Industry Committee.

OUTCOMES:

Students will get the knowledge of the aviation management.

TEXT BOOKS:

1. Ratandeep Singh, "Aviation Management", Kanishka Publishers, 2008.
2. Andreas Wald, Christoph Fay, Ronald Gleich, Introduction to Aviation Management, LIT Verlag Münster, 2010.

REFERENCES:

1. J. F. Rodwell, A. Coulby, T. Carney, J. Mott, Essentials of Aviation Management: A Guide for Aviation Businesses, 8th Edition, Kendall/Hunt Publishing Company, 2003.