

BEA- 401 Energy Ecology Environments and Society

UNIT- I

SOURCES OF ENERGY Renewable & Non Renewable, Fossil fuel, Biomass Geothermal, Hydrogen, Solar, Wind, hydal, nuclear sources.

UNIT-II

SEGMENTS OF ENVIRONMENT Atmosphere, hydrosphere, Lithosphere, biosphere. Cycles in Ecosystem – Water, Carbon, Nitrogen. Biodiversity: Threats and conservation.

UNIT- III

AIR POLLUTION Air pollutants, classification, (Primary & secondary Pollutants) Adverse effects of pollutants. Causes of Air pollution chemical, photochemical, Greenhouse effect, ozone layer depletion, acid Rain. Sound Pollution: Causes, controlling measures, measurement of sound pollution (deciblage), Industrial and non – industrial.

UNIT- IV

WATER POLLUTION Water Pollution: Pollutants in water, adverse effects. Treatment of Domestic & Industrial water effluent. Soil Pollution – Soil Profile, Pollutants in soil, their adverse effects, controlling measures.

UNIT- V

SOCIETY, ETHICS & HUMAN VALUES Impact of waste on society. Solid waste management Nuclear, Thermal, Plastic, medical, Agriculture, domestic and e-waste). Ethics and moral values, ethical situations, objectives of ethics and its study. Preliminary studies regarding Environmental Protection Acts, introduction to value education, self-exploration, sanyam & swasthya.

References Books :-

1. Svakumar; Energy Environment & Ethics in society; TMH
2. AK De "Environmental Chemistry"; New Age Int. Publ.
3. BK Sharma, "Environmental Chemistry" ; Goel Publ. House.
4. Bala Krishnamoorthy; "Environmental management"; PHI

AEA- 402 Aircraft System & Instrumentation

UNIT- I

AIRCRAFT SYSTEMS Hydraulic systems –Study of typical workable systems –components –Hydraulic systems controllers –Modes of operation –Pneumatic systems –Working principles– Typical Pneumatic Power system –Brake system –Components, Landing Gear Systems Classification –Shock absorbers –Retractive mechanism.

UNIT- II

AIRPLANE CONTROL SYSTEMS Conventional Systems –Power assisted and fully powered flight controls –Power actuated systems –Engine control systems –Push pull rod system– operating principles –Modern control systems –Digital fly by wire systems –Auto pilot system, Active Control Technology.

UNIT- III

ENGINE SYSTEMS Fuel systems –Piston and Jet Engines –Components -Multi-engine fuel systems, lubricating systems -Piston and jet engines –Starting and Ignition systems –Piston and Jet engines.

UNIT- IV

AIRCONDITIONING & PRESSURIZING SYSTEM Basic Air Cycle systems –Vapour Cycle Systems, Boot-strap air cycle system –Evaporative vapour cycle systems –Evaporation air cycle systems –Oxygen systems –Fire protection systems, De-icing and anti-icing system.

UNIT- V

AIRCRAFT INSTRUMENTS Flight Instruments and Navigation Instruments – Accelerometers, Air speed Indicators –Mach Meters –Altimeters -Gyroscopic Instruments– Principles and operation –Study of various types of engine instruments –Tachometers – Temperature gauges –Pressure gauge –Operation and principles.

References Books :-

1. Teager, S. Gas Turbine technology, McGraw Hill 1997.
2. Mckinley, J.L. and Bent R.D. Aircraft Maintenance & Repair, McGraw Hill, 1993.

List Of Experiments:-

1. Study on Mock up system used for aircraft steering.
2. Typical workable hydraulic system used in aircraft.
3. Study of Push pulls rod system.
4. Study of Flight Instruments and Navigation Instruments
5. Study of Vapor Cycle cooling Systems.

AEA- 403 Aerodynamics-I

UNIT- I

REVIEW OF BASIC FLUID MECHANICS System and Control volume approach, substantial, local and convective derivative, Continuity, momentum and energy equations, inviscid flow, Euler equation, incompressible Bernoulli's Equation. Circulation and Vorticity, Green's Lemma and Stoke's Theorem, Barotropic Flow, Kelvin's theorem, Streamline, Stream Function, Irrotational flow, Potential Function, Equipotential Lines, Elementary Flows and their combinations.

UNIT- II

TWO DIMENSIONAL INVISCID IN COMPRESSIBLE FLOW Ideal Flow over a circular cylinder, D'Alembert's Paradox, Magnus effect, Kutta Joukowski's Theorem, Starting Vortex, Kutta condition, Real flow over smooth and rough cylinder.

UNIT- III

AIRFOIL THEORY Cauchy- Riemann relations, Complex Potential, Methodology of Conformal Transformation, Kutta-Joukowski transformation and its applications, Karman Trefftz Profiles, Thin Airfoil theory and its applications.

UNIT- IV

SUBSONIC WING THEORY Vortex Filament, Biot and Savart Law, Bound Vortex and trailing Vortex, Horse Shoe Vortex, Lifting Line Theory and its limitations.

UNIT- V

INTRODUCTION TO LAMINAR & TURBULENT FLOW Boundary layer and boundary layer thickness, displacement thickness, momentum thickness, Energy thickness, Shape parameter, Boundary layer equations for a steady, two dimensional Incompressible flow, Boundary Layer growth over a Flat plate, Critical Reynolds Number, blasius solution, Basics of Turbulent flow, Prandtl's mixing length hypothesis, Free shear layers.

References Books :-

1. Milne Thomson, L.H., Theoretical Aerodynamics, Macmillan, 1952. John J Bertin., Aerodynamics for Engineers, Pearson Education Inc, 2002
2. Clancey, L J., Aerodynamics, Pitman, 1986.

List of Experiments :-

1. Calibration of subsonic wind tunnel.
2. Pressure distribution over smooth and rough cylinder.
3. Pressure distribution over symmetric airfoil.
4. Pressure distribution over cambered airfoil & thin airfoils
5. Force measurement using wind tunnel balance

AEA- 404 Aircraft Propulsion –I

UNIT- I

FUNDAMENTALS OF GAS TURBINE ENGINES Illustration of working of gas turbine engine–The thrust equation–Factors affecting thrust–Effect of pressure, velocity and temperature changes of air entering compressor–Methods of thrust augmentation – Characteristics of turboprop, turbofan and turbojet–Performance characteristics.

UNIT- II

SUBSONIC AND SUPERSONIC INLETS FOR JET ENGINES Internal flow and Stall in subsonic inlets –Boundary layer separation–Major features of external flow near a subsonic inlet –Relation between minimum area ratio and external deceleration ratio –Diffuser performance – Supersonic inlets–Starting problem on supersonic inlets –Shock swallowing by area variation – External deceleration –Models of inlet operation.

UNIT- III

COMBUSTION CHAMBERS Classification of combustion chambers–Important factors affecting combustion chamber design –Combustion process–Combustion chamber performance–Effect of operating variables on performance–Flame tube cooling–Flame stabilization–Use of flame holders–Numerical problems.

UNIT- IV

NOZZLES Theory of flow in isentropic nozzles–Convergent nozzles and nozzle choking–Nozzle throat conditions–Nozzle efficiency–Losses in nozzles–Over expanded and under-expanded nozzles–Ejector and variable area nozzles–Interaction of nozzle flow with adjacent surfaces–Thrust reversal.

UNIT- V

COMPRESSORS Principle of operation of centrifugal compressor–Work done & pressure rise–Velocity diagrams –Diffuser vane design considerations–Concept of pre whirl–Rotation stall–Elementary theory of axial flow compressor–Velocity triangles–Degree of reaction–Three dimensional–Air angle distributions for free vortex and constant reaction designs–Compressor blade design–Centrifugal and Axial compressor performance characteristics.

References Books :-

1. Cohen, H. Rogers, G.F.C. and Saravanamuttoo, H.I.H. “Gas Turbine Theory”, Longman, 1989.
2. Oates, G.C., “Aero thermodynamics of Aircraft Engine Components”, AIAA Education Series, New York, 1985.
3. “Rolls Royce Jet Engine” –Third Edition –1983.
4. Mathur, M.L. and Sharma, R.P., “Gas Turbine, Jet and Rocket Propulsion”, Standard Publishers & Distributors, Delhi, 1999.

List of Experiments:-

1. Study of an aircraft piston engine - assembly of sub systems.
2. Study of an aircraft piston engine - various components, their functions and operating principles.
3. Study of an aircraft jet engine - assembly of sub systems.
4. Study of an aircraft jet engine - various components, their functions and operating principles.
5. Study of forced convective heat transfer

AEA- 405 Aircraft Structure –I

UNIT- I

STATICALLY DETERMINATE STRUCTURES Statically determinate frames –plane truss analysis –method of joints –method of sections 3D trusses –the landing gear tripod –beams of two materials.

UNIT- II

STATICALLY INDETERMINATE STRUCTURES Propped cantilevers –fixed-fixed beams–Clapeyron's 3 moment equation moment Distribution method.

UNIT- III

ENERGY METHODS Strain energy evaluation in structural members –energy theorems – dummy load & unit load methods –Maxwell's reciprocal theorem –energy methods applied to statically determinate and indeterminate beams, frames, rings & trusses.

UNIT- IV

COLUMNS Euler's column curve –inelastic buckling –effect of initial curvature –the South well plot –columns with eccentricity –use of energy methods –theory of beam columns –beam columns different end conditions –stresses in beam columns.

UNIT- V

FAILURE THEORIES Ductile and brittle materials –maximum principal stress theory - maximum principal strain Theory -maximum shear stress theory -distortion energy theory –octa hedral shear stress theory.

References Books :-

1. Donaldson, B.K., „Analysis of Aircraft Structures -An Introduction“, McGraw Hill, 1993.
2. Megson T M G, `Aircraft Structures for engineering students“ Edward Arnold Publishers.
3. Peery, D.J., and Azar, J.J., Aircraft Structures, 2nd edition, McGraw –Hill,N.Y., 1999.

List of Experiments :-

1. Study the construction of fuselage and identify the primary load carrying members
2. Study the construction of wings.
3. Measurement of deflection of Truss members.
4. Study of Composite structure.
5. Study the construction of landing gears

AEA- 406 Java Programming

UNIT-I

Introduction To Java Basics of Java programming, Data types, Variables, Operators, Control structure including selection, Looping, Java methods, Overloading, Math class, Arrays in java.

UNIT-II

Objects And Classes Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference.

UNIT-III

Inheritance And Polymorphism Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.

UNIT-IV

Event And Gui Programming Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames. Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing.

UNIT-V

Multithreading In Java Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.

Text Books:

1. Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.

References Books :-

1. Naughton & Schildt "The Complete Reference Java 2", Tata McGraw Hill.
2. The Complete Reference, Java
3. (Fourth Edition), Herbert Schild, TMH.
4. Java Programming, D. S. Malik, Cengage Learning.

List of Experiment :-

1. Installation of J2SDK
2. Write a program to show Scope of Variables
3. Write a program to show Concept of CLASS in JAVA
4. Write a program to show Type Casting in JAVA
5. Write a program to show How Exception Handling is in JAVA
6. Write a Program to show Inheritance
7. Write a program to show Polymorphism
8. Write a program to show Access Specifiers (Public, Private, Protected) in JAVA
9. Write a program to show use and Advantages of CONSTRUCTOR
10. Write a program to show Interfacing between two classes
11. Write a program to Add a Class to a Package

12. Write a program to show Life Cycle of a Thread
13. Write a program to demonstrate AWT.
14. Write a program to Hide a Class
15. Write a Program to show Data Base Connectivity Using JAVA
16. Write a Program to show "HELLO JAVA " in Explorer using Applet
17. Write a Program to show Connectivity using JDBC
18. Write a program to demonstrate multithreading using Java.
19. Write a program to demonstrate applet life cycle.
20. Write a program to demonstrate concept of servlet.

AEA-407 Industrial Training –I

The following objective should be fulfilled in industrial training –I, and student must participate in any aerospace/aeronautical industry where they can learn to apply the Technical knowledge in real Industrial situations.

- Gain experience in writing Technical reports/projects.
- Expose students to the engineer's responsibilities and ethics.
- Expose the students to future employers.
- Understand the social, economic and administrative considerations that influence the working environment of industrial organizations