



MATS UNIVERSITY

Raipur (C.G.)

Syllabus Scheme

(8th Semester)

For

Bachelor of Engineering

In

AERONAUTICAL



MATS School of Engineering & Technology

ARANG, RAIPUR (C.G.)



MATS UNIVERSITY

ARANG, RAIPUR



Subject Code for School of Engineering & Technology

8th Semester (AERONAUTICAL)

S.No.	Subject Code	Subject Name
1	BE850	Rockets and Missiles
2	BE851	Air Transportation and Aircraft Maintenance
3	BE852	Computational Fluid Dynamics
4	BE853	Industrial Aerodynamics
5	Refer Table	Elective –III
6	BE855	Aircraft System Lab
7	BE856	Advanced Composite Structures Lab
8	BE857	Project Work Phase-II

Table – 3

Elective – III

S.N.	Subject Code	Subject Name
1	BE8540	Airframe Maintenance and Repair
2	BE8541	Fatigue And Fracture Mechanics
3	BE8542	Helicopter Maintenance
4	BE8543	Air Traffic Control and Aerodrome Design
5	BE8544	Entrepreneurship Development

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Scheme of Teaching & Examination B.E. VIII SEMESTER AERONAUTICAL ENGINEERING

S.N.	code	Subject	Periods per week			Scheme of marks		Total Marks
			L	T	P	ESE	IM	
1.	BE850	Rockets and Missiles	4	1	-	70	30	100
2.	BE851	Air Transportation and Aircraft Maintenance	4	1	-	70	30	100
3.	BE852	Computational Fluid Dynamics	4	1	-	70	30	100
4.	BE853	Industrial Aerodynamics	4	1	-	70	30	100
5.	Refer Table	Elective –III	4	1	-	70	30	100
6.	BE855	Aircraft System Lab	-	-	3	20	30	50
7.	BE856	Advanced Composite Structures Lab	-	-	3	20	30	50
8.	BE857	Project Work Phase-II	-	-	3	100	100	200
		Total	20	5	9	490	310	800

L – Lecture, T – Tutorial, ESE – End Semester Examination,

P – Practical, IM – Internal Marks (Include Class Test & Teacher's Assessments)

Table - 3
Elective - III

S.N.	Subject Code	Subject
1	BE8540	Airframe Maintenance and Repair
2	BE8541	Fatigue and Fracture Mechanics
3	BE8542	Helicopter Maintenance
4	BE8543	Air Traffic Control and Aerodrome Design
5	BE8544	Entrepreneurship Development

Note (1) – $\frac{1}{4}$ of total strength of students subject to minimum of twenty students is required to offer an elective in the college in a particular academic session

Note (2) – Choice of elective course once made for an examination cannot be changed in future examinations.

MATS UNIVERSITY, RAIPUR

Semester	:	8th BE Course
Branch	:	Aeronautical
Subject	:	Rockets and Missiles
Total Theory Periods	:	45
Total Tutorial Periods	:	15
Code	:	BE 850

UNIT-I ROCKETS SYSTEM

Ignition System in rockets– types of Igniters–Igniter Design Considerations–Design Consideration of liquid Rocket Combustion Chamber, Injector Propellant Feed Lines, Valves, Propellant Tanks Outlet and Helium Pressurized and Turbine feed Systems–Propellant Slash and Propellant Hammer–Elimination of Geysering Effect in Missiles–Combustion System of Solid Rockets.

UNIT-II AERODYNAMICS OF ROCKETS AND MISSILES

Airframe Components of Rockets and Missiles – Forces Acting on a Missile While Passing Through Atmosphere – Classification of Missiles – methods of Describing Aerodynamic Forces and Moments – Lateral Aerodynamic Moment – Lateral Damping Moment and Longitudinal Moment of a Rocket – lift and Drag Forces – Drag Estimation – Body Upwash and Downwash in Missiles – Rocket Dispersion – Numerical Problems.

UNIT-III ROCKET MOTION IN FREE SPACE AND GRAVITATIONAL FIELD

One Dimensional and Two Dimensional rocket Motions in Free Space and Homogeneous Gravitational Fields–description of Vertical, Inclined and Gravity Turn Trajectories–Determination of range and Altitude Simple Approximations to Burnout Velocity.

UNIT-IV STAGING AND CONTROL OF ROCKETS AND MISSILES

Rocket Vector Control – Methods – Thrust determination – SITVC – Multistaging of rockets – Vehicle Optimization – Stage Separation Dynamics – Separation Techniques.

UNIT-V MATERIALS FOR ROCKETS AND MISSILES

Selection of Materials –Special Requirements of Materials to Perform under Adverse Conditions.

TEXT BOOKS

1. Sutton G. P, “Rocket Propulsion Elements”, John Wiley & Sons Inc., New York, 1993.
2. Cornelisse, J.W., “Rocket Propulsion and Space Dynamics”, J.W., Freeman & Co. Ltd., London, 1982.

REFERENCES

1. Mathur, M., and Sharma, R.P., “Gas Turbines and Jet and Rocket Propulsion”, Standard Publishers, New Delhi 1998.
2. Parker, E. R., “Materials for Missiles and Spacecraft”, McGraw-Hill Book Co. Inc., 1982.
3. M. J. Zucrow, “Missile Propulsion”, John Wiley & sons.
4. H. S. Mukunda, “Understanding Aerospace Chemical Propulsion”, Interline Publishing Company Bangalore.

MATS UNIVERSITY, RAIPUR

Semester	:	8th BE Course
Branch	:	Aeronautical
Subject	:	Air Transportation and Aircraft Maintenance
Total Theory Periods	:	40
Total Tutorial Periods	:	15
Code	:	BE 851

UNIT-I INTRODUCTION

Development of air transportation, comparison with other modes of transport – Role of IATA, ICAO – The general aviation industry airline – Factors affecting general aviation, use of aircraft, airport: airline management and organisation – levels of management, functions of management, Principles of organisation planning the organisation – chart, staff departments & line departments

UNIT-II AIRLINE ECONOMICS

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.

FLEET PLANNING: The aircraft selection process – Fleet commonality, factors affecting choice of fleet, route selection and Capitol acquisition – Valuation & Depreciation – Budgeting, Cost planning – Aircrew evaluation – Route analysis – Aircraft evaluation.

UNIT-III PRINCIPLES OF AIRLINES SCHEDULING

Equipment maintenance, Flight operations and crew scheduling, Ground operations and facility limitations, equipments and types of schedule –hub & spoke scheduling, advantages/disadvantages & preparing flight plans – Aircraft scheduling in line with aircraft maintenance practices.

UNIT-IV AIRCRAFT RELIABILITY

Aircraft reliability – The maintenance schedule & its determinations – Condition monitoring maintenance – Extended range operations (EROPS) & ETOPS – Ageing aircraft maintenance production.

UNIT-V TECHNOLOGY IN AIRCRAFT MAINTENANCE

Airlines scheduling (with reference to engineering) – Product support and spares –Maintenance sharing – Equipments and tools for aircraft maintenance – Aircraft weight control – Budgetary control. On board maintenance systems – Engine monitoring – Turbine engine oil maintenance – Turbine engine vibration monitoring in aircraft – Life usage monitoring – Current capabilities of NDT – Helicopter maintenance – Future of aircraft maintenance.

TEXT BOOKS

1. FEDRIC J.H., “Airport Management”, 2000.
2. C.H. FRIEND, “Aircraft Maintenance Management”, 2000.

REFERENCES

1. Gene Kropf, “Airline Procedures”.
2. Wilson & Bryon, “Air Transportation”.
3. Philip Locklin D, “Economics of Transportation”.
4. “Indian Aircraft manual” – DGCA Pub.
5. Alexander T Wells, “Air Transportation”, Wadsworth Publishing Company, California, 1993.

MATS UNIVERSITY, RAIPUR

Semester	:	8th BE Course
Branch	:	Aeronautical
Subject	:	Computational Fluid Dynamics
Total Theory Periods	:	45
Total Tutorial Periods	:	15
Code	:	BE 852

UNIT-I FUNDAMENTAL CONCEPTS

Introduction - Basic Equations of Fluid Dynamics - Incompressible In viscid 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 - Vondoroff 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.

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

Semester	:	8th BE Course
Branch	:	Aeronautical
Subject	:	Industrial Aerodynamics
Total Theory Periods	:	45
Total Tutorial Periods	:	15
Code	:	BE 853

UNIT-I ATMOSPHERE

Types of winds, Causes of variation of winds, Atmospheric boundary layer, Effect of terrain on gradient height, Structure of turbulent flows.

UNIT-II WIND ENERGY COLLECTORS

Horizontal axis and vertical axis machines, Power coefficient, Betz coefficient by momentum theory.

UNIT-III VEHICLE AERODYNAMICS

Power requirements and drag coefficients of automobiles, Effects of cut back angle, Aerodynamics of trains and Hovercraft.

UNIT-IV BUILDING AERODYNAMICS

Pressure distribution on low rise buildings, wind forces on buildings. Environmental winds in city blocks, Special problems of tall buildings, Building codes, Building ventilation and architectural aerodynamics.

UNIT-V FLOW INDUCED VIBRATIONS

Effects of Reynolds number on wake formation of bluff shapes, Vortex induced vibrations, galloping and stall flutter.

TEXT BOOKS

1. M.Sovran (Ed), "Aerodynamics and drag mechanisms of bluff bodies and road vehicles", Plenum press, New York, 1978.
2. P. Sachs, "Winds forces in engineering", Pergamon Press, 1978.

REFERENCES

1. R.D. Blevins, "Flow induced vibrations", Van Nostrand, 1990.
2. N.G. Calvent, "Wind Power Principles", Charles Griffin & Co., London, 1979.

MATS UNIVERSITY, RAIPUR

Semester : 8th BE Course
Branch : Aeronautical
Subject : Aircraft System Lab
Code : BE 855

LIST OF EXPERIMENTS

1. Aircraft “Jacking Up” procedure
2. Aircraft “Leveling” procedure
3. Control System “Rigging check” procedure
4. Aircraft “Symmetry Check” procedure
5. “Flow test” to assess of filter element clogging
6. “Pressure Test” To assess hydraulic External/Internal Leakage
7. “Functional Test” to adjust operating pressure
8. “Pressure Test” procedure on fuel system components
9. “Brake Torque Load Test” on wheel brake units
10. Maintenance and rectification of snags in hydraulic and fuel systems.

LIST OF EQUIPMENTS

(For a batch of 30 students)

S. No.	Details of Equipments	Qty Req.	Expt. No.
1	Serviceable aircraft with all above systems	1	1 to 10
2	Hydraulic Jacks (Screw Jack)	5	1,2,4,8
3	Trestle adjustable	5	1,2,4,8
4	Spirit Level	2	8
5	Leveling Boards	2	8
6	Cable Tensiometer	1	8
7	Adjustable Spirit Level	1	8
8	Plumb Bob	1	8

MATS UNIVERSITY, RAIPUR

Semester : 8th BE Course
Branch : Aeronautical
Subject : Advanced Composite Structures Lab
Code : BE 856

LIST OF EXPERIMENTS

1. Fabrication of glass epoxy laminates using vacuum bag method
2. Fabrication of Carbon polyester laminates using compression moulding
3. Fabrication of glass fiber filament wound pipes using filament winding machine
4. Calculation of material properties of bi directional composite laminate
5. Determination of material properties of cross ply laminate
6. Determination of shear modulus of composite laminate
7. Fabrication of sandwich beam
8. Determination interlaminar strength of a composite laminate
9. Failure analysis of composite laminate using matlab
10. Determination of material properties using plate theory.

LIST OF EQUIPMENTS

(For a batch of 30 students)

S. No.	Details of Equipments	Qty Req.	Expt. No.
1	Computers	30	9
2	MATLAB Software	30 License	9
3	UPS 10 KV _a 3 Phase	1	9
4	Vacuum Bag Fabrication Apparatus	1	1
5	Filament Winding Machine	1	3
6	Compression Moulding Apparatus	1	2
7	Epoxy/ Glass Fibers	1	1,3,7
8	Polyester/ Carbon Fibers	1	2
9	Sandwich Panel Material	1	7

MATS UNIVERSITY, RAIPUR

Semester : 8th BE Course
Branch : Aeronautical
Subject : Project Work Phase-II
Code : BE 857

The objective of the project work is to enable the students in convenient groups of not more than 4 members on a project involving theoretical and experimental studies related to the branch of study. Every project work shall have a guide who is the member of the faculty of the institution. Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.

Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion. This final report shall be typewritten form as specified in the guidelines.

The continuous assessment shall be made as prescribed by the regulation.

LIST OF ELECTIVE-III SUBJECTS FOR 8th SEMESTER

MATS UNIVERSITY, RAIPUR

Semester	:	8th BE Course
Branch	:	Aeronautical
Subject	:	Airframe Maintenance and Repair
Total Theory Periods	:	45
Total Tutorial Periods	:	15
Code	:	BE 8540

UNIT-I WELDING IN AIRCRAFT STRUCTURAL COMPONENTS

Equipments used in welding shop and their maintenance – Ensuring quality welds –Welding jigs and fixtures – Soldering and brazing.

SHEET METAL REPAIR AND MAINTENANCE

Inspection of damage – Classification – Repair or replacement – Sheet metal inspection– N.D.T. Testing – Riveted repair design, Damage investigation – reverse technology.

UNIT-II PLASTICS AND COMPOSITES IN AIRCRAFT

Review of types of plastics used in airplanes – Maintenance and repair of plastic components – Repair of cracks, holes etc., various repair schemes – Scopes. Inspection and Repair of composite components – Special precautions – Autoclaves.

UNIT-III AIRCRAFT JACKING, ASSEMBLY AND RIGGING

Airplane jacking and weighing and C.G. Location. Balancing of control surfaces –Inspection maintenance. Helicopter flight controls. Tracking and balancing of main rotor.

UNIT-IV REVIEW OF HYDRAULIC AND PNEUMATIC SYSTEM

Trouble shooting and maintenance practices–Service and inspection–Inspection and maintenance of landing gear systems. – Inspection and maintenance of air-conditioning and pressurization system, water and waste system. Installation and maintenance of Instruments –handling– Testing – Inspection. Inspection and maintenance of auxiliary systems – Fire protection systems – Ice protection system – Rain removal system –Position and warning system – Auxiliary Power Units (APUs).

UNIT-V SAFETY PRACTICES

Hazardous materials storage and handling, Aircraft furnishing practices – Equipments. Trouble shooting - Theory and practices.

TEXT BOOK

1. KROES, WATKINS, DELP, “Aircraft Maintenance and Repair”, McGraw-Hill, New York, 1992.

REFERENCES

1. LARRY REITHMEIR, “Aircraft Repair Manual”, Palamar Books, Marquette, 1992.
2. BRIMM D.J. BOGGES H.E., “Aircraft Maintenance”, Pitman Publishing corp. New York, 1940.

MATS UNIVERSITY, RAIPUR

Semester	:	8th BE Course
Branch	:	Aeronautical
Subject	:	Fatigue and Fracture Mechanics
Total Theory Periods	:	45
Total Tutorial Periods	:	15
Code	:	BE 8541

UNIT-I FATIGUE OF STRUCTURES

S.N. curves - Endurance limits - Effect of mean stress, Goodman, Gerber and Soderberg relations and diagrams - Notches and stress concentrations - Neuber's stress concentration factors - Plastic stress concentration factors - Notched S.N. curves.

UNIT-II STATISTICAL ASPECTS OF FATIGUE BEHAVIOUR

Low cycle and high cycle fatigue - Coffin - Manson's relation - Transition life – cyclic strain hardening and softening - Analysis of load histories - Cycle counting techniques -Cumulative damage - Miner's theory - Other theories.

UNIT-III PHYSICAL ASPECTS OF FATIGUE

Phase in fatigue life - Crack initiation - Crack growth - Final Fracture - Dislocations -fatigue fracture surfaces.

UNIT-IV FRACTURE MECHANICS

Strength of cracked bodies - Potential energy and surface energy - Griffith's theory -Irwin - Orwin extension of Griffith's theory to ductile materials - stress analysis of cracked bodies - Effect of thickness on fracture toughness - stress intensity factors for typical geometries.

UNIT-V FATIGUE DESIGN AND TESTING

Safe life and Fail-safe design philosophies - Importance of Fracture Mechanics in aerospace structures - Application to composite materials and structures.

TEXT BOOKS

1. Prasanth Kumar – “Elements of fracture mechanics” – Wheeler publication, 1999.
2. Barrois W, Ripely, E.L., “Fatigue of aircraft structure”, Pergamon press. Oxford, 1983.

REFERENCES

1. Sin, C.G., “Mechanics of fracture” Vol. I, Sijthoff and w Noordhoff International Publishing Co., Netherlands, 1989.
2. Knott, J.F., “Fundamentals of Fracture Mechanics”, Buterworth & Co., Ltd., London, 1983.

MATS UNIVERSITY, RAIPUR

Semester	:	8th BE Course
Branch	:	Aeronautical
Subject	:	Helicopter Maintenance
Total Theory Periods	:	45
Total Tutorial Periods	:	15
Code	:	BE 8542

UNIT-I HELICOPTER FUNDAMENTAL

Basic directions – Ground handling, bearing – Gears.

UNIT-II MAIN ROTOR SYSTEM

Head maintenance – blade alignment – Static main rotor balance – Vibration – Tracking – Span wise dynamic balance – Blade sweeping–Electronic balancing–Dampener maintenance– Counter weight adjustment – Auto rotation adjustments – Mast & Flight Control Rotor -Mast – Stabilizer, dampeners – Swash plate flight control systems collective – Cyclic – Push pull tubes – Torque tubes –Bell cranks – Mixer box –Gradient unit control boosts – Maintenance & Inspection control rigging.

UNIT-III MAIN ROTOR TRANSMISSIONS

Engine transmission coupling – Drive shaft – Maintenance clutch – Freewheeling units –Spray clutch – Roller unit – Torque meter –Rotor brake–Maintenance of these components – vibrations – Mounting systems – Transmissions.

UNIT-IV POWER PLANTS & TAIL ROTORS

Fixed wing power plant modifications – Installation –Different type of power plant maintenance. Tail rotor system – Servicing tail rotor track – System rigging.

UNIT-V AIRFRAMES AND RELATED SYSTEMS

Fuselage maintenance – Airframe Systems – Special purpose equipment.

TEXT BOOK

1. JEPPESEN, “Helicopter Maintenance”, Jeppesons and Sons Inc., 2000.

REFERENCES

1. “Civil Aircraft Inspection Procedures”, Part I and II, CAA, English Book House, New Delhi, 1986.
2. LARRY REITHMIER, “Aircraft Repair Manual”, Palamar Books Marquette, 1992.

MATS UNIVERSITY, RAIPUR

Semester	:	8th BE Course
Branch	:	Aeronautical
Subject	:	Air Traffic Control and Aerodrome Design
Total Theory Periods	:	45
Total Tutorial Periods	:	15
Code	:	BE 8542

UNIT-I BASIC CONCEPTS

Objectives of ATS - Parts of ATC service – Scope and Provision of ATCs–VFR & IFR operations – Classification of ATS air spaces – Varies 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.

TEXT BOOK

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

Semester	:	8th BE Course
Branch	:	Aeronautical
Subject	:	Entrepreneurship Development
Total Theory Periods	:	45
Total Tutorial Periods	:	15
Code	:	BE 8543

UNIT-I ENTREPRENEURSHIP

Entrepreneur – Types of Entrepreneurs – Difference between Entrepreneur and Intrapreneur – Entrepreneurship in Economic Growth, Factors Affecting Entrepreneurial Growth.

UNIT-II MOTIVATION

Major Motives Influencing an Entrepreneur – Achievement Motivation Training, self Rating, Business Game, Thematic Apperception Test – Stress management, Entrepreneurship Development Programs – Need, Objectives.

UNIT-III BUSINESS

Small Enterprises – Definition, Classification – Characteristics, Ownership Structures –Project Formulation – Steps involved in setting up a Business – identifying, selecting a Good Business opportunity, Market Survey and Research, Techno Economic Feasibility Assessment–Preparation of Preliminary Project Reports–Project Appraisal–Sources of Information–Classification of Needs and Agencies.

UNIT-IV FINANCING AND ACCOUNTING

Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution, management of working Capital, Costing, Break Even Analysis, Network Analysis Techniques of PERT/CPM – Taxation – Income Tax, Excise Duty – Sales Tax.

UNIT-V SUPPORT TO ENTREPRENEURS

Sickness in small Business – Concept, Magnitude, causes and consequences, Corrective Measures – Government Policy for Small Scale Enterprises – Growth Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub Contracting.

TEXT BOOKS

1. S.S.KHANKA “Entrepreneurial Development” S. Chand & Co. Ltd. Ram Nagar New Delhi, 1999.
2. Hisrich R D and Peters M P, “Entrepreneurship” 5th Edition Tata McGraw-Hill, 2002.

REFERENCES

1. Rabindra N. Kanungo “Entrepreneurship and innovation”, Sage Publications, New Delhi, 1998.
2. EDII “Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development” Institute of India, Ahmadabad, 1986.