College of Engineering, Pune

(An Autonomous Institute of Govt. of Maharashtra, Permanently Affiliated to S.P. Pune University)

Department of Civil Engineering

Curriculum Structure & Detailed Syllabus (UG Program)

Third Year B. Planning.

(Effective from: A.Y. 2019-20)

Program Education Objectives (PEOs):

The Graduates will be able to:

I. Have successful career in the diversified sectors of the Planning profession by acquiring knowledge in mathematics, science, and planning fundamentals.

II. Analyze societal complex problems to meet specified needs considering cultural, societal, and environmental aspects.

III. Exhibit professionalism as a member and/or leader in a team by adapting appropriate planning techniques and inculcating lifelong learning.

IV. Attain professional as well as administrative proficiency in the diversified sectors of the planning profession with sense of ethics, integrity and social responsibility.

Program Specific Outcomes (PSOs):

On successful completion Graduates will demonstrate:

I. Analyze and solve specific problems relevant to physical planning by applying the knowledge of basic sciences, fundamentals of statistics.

II. Apply the contextual knowledge of town and country planning to assess societal, environmental, health, safety, legal and cultural issues with professional ethics and function effectively as an individual or a leader in a team to manage different projects in multidisciplinary environments as the process of life-long learning.

Program Outcomes (POs):

On successful completion Graduates will be able to:

a. Apply the knowledge of mathematics, science, and planning fundamentals to the solution of complex problems.

b. Identify, formulate, research literature and solve complex planning problems.

c. Design processes that meet the specified needs considering cultural, societal, and environmental aspects.

d. Conduct surveys, analyze and synthesize the information to provide conclusions.

e. Use appropriate planning techniques, tools and software to analyze planning problems with understanding of limitations.

f. Apply informed reasoning to assess societal, health, safety, legal and cultural issues relevant to professional planning practice.

g. Assess local and global impacts of societal issues on planning.

h. Demonstrate professional and ethical responsibilities.

i. Function effectively as an individual, or leader in diverse teams of multidisciplinary settings.

j. Communicate effectively in verbal, graphical and written forms.

k. Apply Planning and Management principles as a member and /or leader in a team to manage projects.

l. Adapt and transform society by understanding the need of independent and lifelong learning.

Correlation between the PEOs and the POs

PO→ PEO↓	a	b	c	d	e	f	g	h	i	j	k	l
I	✓	✓		✓							✓	
II			✓	✓		✓	✓					
III		✓						✓	✓		✓	✓
IV			✓				✓	✓	✓	✓	✓	✓
i	✓	✓		✓		✓						
ii		✓	✓	✓		✓	✓	✓	✓		✓	✓

List of Abbreviations

Sr. No.	Abbreviation	Stands for:
1	DEC	Departmental Elective Course
2	PCC	Program Core Course
3	LC	Lab Course
4	HSSC	Humanities and Social Sciences Course
5	MLC	Mandatory Learning Course
6	SBC	Skill Based Course
7	SLC	Self-Learning Course

CURRICULUM STRUCTURE OF T. Y. B. Planning

Effective from A. Y. 2019-20

V-Semester:

Sr. No	Course Type	Subject Title	Contact Hours			Credits
			L	T	P	
01	PCC1	Land Economics and Valuation	3	0	0	3
02	PCC2	Planning Legislation - I	3	0	0	3
03	PCC3	Planning Practice	3	0	0	3
04	DEC1	Environmental and Social Impact Assessment Urban Renewal and Redevelopment Public Private Partnership Special Area Planning	3	0	0	3
05	SBC2	Geo-Informatics - II	2	0	2	3
06	SLC1	Summer Project	0	0	0	1
07	LC6	Planning & Design Studio - V (Area Planning)	0	0	10	4
08	MLC	Environmental Studies (Institute Level)	1	0	0	0
09	HSSC	Humanities and Social Sciences Course –II • Industrial Psychology • Personnel Psychology • Engineering Economics • Finance For Engineers	2	0	0	2
			17	**0**	**12**	**22**
		Total Academic Engagement and Credits	**29**			**22**

VI-Semester:

Sr. No	Course Type	Subject Title	Contact Hours			Credits
			L	T	P	
01	PCC1	Project Formulation, Appraisal and Management	3	0	0	3
02	PCC2	Planning Legislation - II	3	0	0	3
03	PCC3	Inclusive Planning	2	0	2	3
04	PCC4	Applied Geology and Hydrology	3	0	0	3
05	DEC2	Urban Heritage Conservation Climate Resilience and Disaster Management Urban Energy Planning Water Resource Management	3	0	0	3
06	LC7	Planning &Design Studio - VI (Development Plan)	0	0	10	4
07	COI	Constitution of India	1	0	0	0
08	HSSC	Humanities and Social Sciences Course –I • English Proficiency • German Language • Japanese Language • Spanish Language	2	0	0	2
09	MLC	Entrepreneurship Principles and Process	1	0	0	1
			18	**0**	**12**	**22**
		Total Academic Engagement and Credits	**30**			**22**

PL-21001Land Economics and Valuation

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Students will able to learn Definition and Scope of Economics.
CO2: Students will able to understand Theory of Firm Production.
CO3: Students will able to realize Land Economics.
CO4: Students will able to differentiate Land Uses and Land Values
CO5: Students will able to understand Development Economics

Unit 1 **(8 hrs)**

Definition and Scope of Economics
Definition & Scope of Economics and its importance in Planning; types of Economics- Positive & Normative Economics, Classical & Non-classical Economics, Macro & Micro Economics, etc.; Concept of Market Demand & Supply, Elasticity & Consumer Markets; Concept of Cost, and Revenue; Economics and Social Costs;

Unit 2 **(8hrs)**

Theory of Firm Production
Theory of Production; Factors of Production, Production and Factor Market; Pricing under different Market Conditions; Perfect & Imperfect Market Types; Economics of Scale; Economics of Conglomeration & Agglomerations; Growth and Development Indicators; measures of national income, defining development and under development

Unit 3 **(8 hrs)**

Land Economics
Cost, Price and Value of Commodity, Perfect Market Conditions; Concept of Pareto Optimality, Welfare Economics; Land Characteristics: Immobility, Divisibility, Modification, Non-standardized Commodity, etc.; Attributes of Land: Location, Area, Configuration, Permissibility, Restriction, etc.; Effect of Government Policies and Taxation on Land as a Resource, etc.

Unit 4 **(8 hrs)**

Land Uses and Land Values
Determination of Price of Land: Ricardian Theory of the Land Market, Agricultural Land Rent Theory by Von Thunen, Alonso's Bid Rent Function Theory, etc.; Determination of Location of Land Uses: Types of Land Uses, Factors Determining Land Uses, Locational Choices,

Pattern of Land Use, Invasion &Succession, etc.; Approaches to Industrial Location Theory: Least Cost Approach, Market Area Analysis, Profit Maximization Approach, etc.

Unit 5 **(8hrs)**

Development Economics
Economic Development & Economic Growth - Definitions, Concepts, Characteristics, Comparisons, etc.; Measurement of Economic Development- Gross National Product, Gross National Product per capita, Welfare Economics, Social Indicators, etc., Quality of Life; Human Development Index, poverty and income distribution, employment and livelihood; Economic principles in Land - use Planning; Policies and Strategies in Economic Planning, etc.

Reference Books

- IC Dhingra Principles of Micro economics 2011 Sultan Chand
- MK Goyal Principles and Theories of 2006 ABD Publishers Economics
- Mclann Philip Urban and Regional Economics 2001 Oxford University Press
- Centre for Good Application of Urban Economic Cgg.gov.in/pdf/wp-1 Governance Theory to Land Use and (CGG) Transport-Hyderabad Metro Region
- SaskiaSassen Cities in World Economy 2000 Pine Forge Press
- UNHABITAT State Of World Cities 2007 UN HABITAT

PL-21002 Planning Legislation - I

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Students will understand the basic Concept of Law
CO2: Students will understand the concept of Indian Constitution and its significance in planning domain.
CO3: Students will be able to learn and differentiate the various Laws and Acts in the field of planning.
CO4. Students will be able to apply their understanding of Land acquisition and resolve various nature of disputes.
CO5: Students will be able to correlate the role, responsibilities of different organizations/boards involved in implementation of plans

Unit 1 **(4 hrs)**

Concept of law
(custom, legislation and precedent); meaning of the term of law, legislation, ordinance, bill, act, regulations and bye-laws; significance of law and its relationship to planning; benefits of statutory backing for planning schemes; eminent domain and police powers

Unit 2 **(4 hrs)**

Indian Constitution
Concepts and contents of Indian Constitution; provisions regarding property rights; evolution of planning legislation and overview of legal tools connected with urban planning and development; model town planning laws

Unit 3 **(6 hrs)**

Laws and Acts for Planning and Development
Town and Country Planning Act, Municipality Act, MMRDA Act, Land Acquisition Act Development Authorities Act, 73rd and 74th Constitution Amendment Acts; Environmental and Pollution Control Acts, etc.; Case studies.

Unit 4 **(5 hrs)**

Land Acquisition Act
Introduction to Land Acquisition Act, 1984, Historical background, need, advantages, limitations; Relevance in today's context; Case studies highlighting nature of contention, parties in dispute and the decisions in specific planning dispute

Unit 5 **(5 hrs)**

- The Maharashtra District Planning Committees (Constitution and Functions) Act, 1998
- The Maharashtra Metropolitan Planning Committees (Constitution and Functions) (Continuance Of Provisions) Act, 1999

PL-21003Planning Practice

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Students will understand various town planning authorities in India
CO2: Students will understand role and functions of Government authorities in development of cities
CO3: Students will understand the working with building bye-laws, and UDPFI Guidelines
CO4: Students will know the role of private sector in various development projects

Unit 1 **(6 hrs)**

Framing Planning Policies
Role of Town and country planning organization at central level and town and country planning department at state level. Actors framing public planning policies; Influences of various stakeholders on policy formulation; Implementation of public policies

Unit 2 **(6 hrs)**

Development Authorities
Types, functions and spatial jurisdictions of development authorities; Reasons for the establishment of development authorities; Place of development authorities in local government

Unit 3 **(6 hrs)**

Development and Development Regulations
Working of building bye-laws in planning practice; Requirements for grant of building permissions; Streamlining the development control regulations; Making development control regulations work for the poor; UDPFI Guidelines; National Building Code and its implementation

Unit 4 **(8 hrs)**

Coordination in Planning Practice
Meaning and types of co-ordination; Mechanisms of coordination; Case examples of coordination from planning practice

Unit 5 **(8 hrs)**

Privatization of Planning Practice
History of privatization of planning; Special Economic Zones; Retail sector developments; Infrastructure development by the private sector such as Metro etc.

Reference Books

- Planning legislation and Professional Practice, ITPI New Delhi
- Urban and Regional Planning in India: Handbook for professional practice by S.K. Kulshrestha. Sage Publications new Delhi 2012
- UDPFI Guidelines, GoI, ITPI New Delhi 1996

PL(DE)-21001Environmental and Social Impact Assessment

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: To provide a basic understanding of the EIA process as it is used for research Planning, project or program evaluation, monitoring, and regulatory enforcement.
CO2: To introduce students to the legal, economic, social, administrative and technical process of preparing and/or evaluating environmental impact documents.
CO3: To relate the uses of scientific research to practical situations in project planning and decision making.
CO4: To provide experience and training in environmental planning and related professions.

Unit 1 **(6 hrs)**

Introduction
Role of Environmental Impact Assessment in the planning and decision making process; Definition and need, evolution and objectives, tasks and scope. Methods of Environmental Impact Assessment; Advantages and limitations; Case studies from India and abroad on projects of various types covering different levels of planning

Unit 2 **(6 hrs)**

Impacts on Land Uses and Resources
Assessment of impacts on land use, Urban and regional; Assessment of impacts on resources (including air, water, flora and fauna); Case studies from India and abroad on projects of various types covering different levels of planning

Unit 3 **(6 hrs)**

Environmental Impact Assessment
Public - private - people's participation in Environmental Impact Assessments: definition and concepts, objectives, techniques, advantages and limitation; PRA techniques; Case studies from India and abroad on projects of various types covering different levels of planning; Practical exercises on Environmental Impact Assessments

Unit 4 **(6 hrs)**

Introduction to Social Impact Assessment
Brief history of social impact assessment and the virtue ethics model versus the outcomes-focused mode, General environment for social impact assessment in India, Methods and tools for outcomes-based social impact measurement (cost-benefit analysis, SROI, CEA etc), Benefits of measuring social impact for organizational decision-making

Unit 5 **(6 hrs)**

Measuring Social Impact
Introduction to quantitative and qualitative research methods for understanding impact, introduction to monetary valuation methods for use in cost-benefit analysis and SROI, Techniques of data collection for impact analysis, assessing impact reports and interpreting and using the results from social impact tools like cost-benefit analysis and SROI, Key problems in social impact measurement

Reference Books

- Environment Impact Assessment by A.K. Shrivastava. Aph Publishing Corporation. Ist Edition
- Environmental Impact Assessment for Developing countries by Asit K. Biswas. Butterworth- Heinemann Ltd.
- Environmental Impact Assessment by S.A. Abbasi. Discovery Publishing House, IstEdition
- RabelBurdge, Frank Vanclay. Social Impact Assessment: A Contribution to the State of the Art Series., 1996

PL(DE)-21002Urban Renewal and Redevelopment

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Identify the built forms, land parcels and historic neighbourhoods for redevelopment
CO2: Assess the form, extent and direction of planning interventions for redevelopment
CO3: Workout a planned layout for the existing slums refer to the statutory provisions for redevelopment

Unit 1 **(6 hrs)**

Introduction
Urban redevelopment / renewal /reconstruction / regeneration – definitions and distinctions; Urban redevelopment as a part of urban plan; Identification of areas to be redeveloped; Conservation, rehabilitation and redevelopment – the interrelationship

Unit 2 **(6 hrs)**

Economic, Financial and Management Aspects
Economic and spatial implications of urban renewal programs; Mobilization of resources; Urban renewal through Incentive zoning

Unit 3 **(6 hrs)**

Urban Conservation and Development
Understanding the context of both built heritage and historic neighborhoods; Conservation: socio-economic and traffic management aspects; Redevelopment of brown fields; Heritage conservation - case studies

Unit 4 **(6 hrs)**

Housing Redevelopment
Issues of old, dilapidated, vacant stock; Infrastructure inserts in old city area and augmentation of services; land management; FSI utilization and re-densification/de-densification issues; socio- economic issues; gentrification and de-gentrification; public participation; Convergence of government schemes

Unit 5 **(6 hrs)**

Legal and Administrative Aspects
Implementation of urban renewal programs – an overview of national and international experiences; Legal and administrative aspects: archaeological acts/ charters and institutional mechanism in urban redevelopment and conservation in India

Reference Books

- Environment Impact Assessment by A.K. Shrivastava. Aph Publishing Corporation. Ist Edition
- Environmental Impact Assessment for Developing countries by Asit K. Biswas. Butterworth- Heinemann Ltd.
- Environmental Impact Assessment by S.A. Abbasi. Discovery Publishing House, IstEdition
- RabelBurdge, Frank Vanclay. Social Impact Assessment: A Contribution to the State of the Art Series., 1996

PL(DE)-21005 Public Private Partnership

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Profile the risk, constraints and preconditions of PPP projects
CO2: Evaluate a PPP project
CO3: List the steps in the development and implementation of PPP projects
CO4: Workout the bankability of a PPP project

Unit 1 **(6 hrs)**

PPP in Urban Development
Salient features of urban services; PPP – indispensability; PPP – risk profile, constraints and preconditions; Overview of best PPP practices in urban development

Unit 2 **(6 hrs)**

PPP – Various Forms
Various forms of PPP – management contract, service contract, lease, divestiture and concessions; Strengths and weaknesses of each form of PP

Unit 3 **(6 hrs)**

Promoting PPP
Advantages of collaboration; Methods of promoting effective participation

Unit 4 **(8 hrs)**

PPP – Principles and Guidelines
Cardinal principles in PPP; Regulations and guidelines for PPP; Development of project proposal; Due diligence process; Competitive bidding process and documentation (EOI, RFQ, PIM, DCA, RFP); Regulatory authority; Transaction Adviser; Survey of PPP policies

Unit 5 **(8 hrs)**

Financing PPP projects
Bankability of PPP project; Equity investment; Refinancing; Sources of PPP funding

Reference Books

- Guidebook on promoting Good Governance in Public Private Partnerships by Bernan. United Nations 2008
- Participation and Partnership in Urban Infrastructure Management by Peter

Scheubeler. World Bank Publications
- Sustainable Urbanization: Bridging the Green and Brown agendas by Adriana Allen, Nicholas You. UNHABITAT 2002

PL(DE)-21006 Special Area Planning

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Delineate the functional domain of special areas
CO2: Collate and tabulate the information on socio economic, geo historic, physical and political features of special areas
CO3: Analyze the land management system in special areas
CO4: Identify planning issues for special areas
CO5: Refer to the relevant acts, standards, program and policies for special areas

Unit 1 **(6 hrs)**

Classification of Special Areas
Need for Special Area Planning; Defining special areas; Typology of formal and functional special areas: boarder area, hill area, coastal area, desert area, extremist affected area, Special Economic Zones, port City, aerotropolis, medi-City, knowledge City, defiance area etc.; Contemporary approaches for Special Area Planning

Unit 2 **(6 hrs)**

Characteristics of Special Area
Socio economic, physiographic, geographic and political features of special areas

Unit 3 **(6 hrs)**

Governance of Special Areas
Governance framework of special areas; Land management in special areas; Survey of statutes governing special areas

Unit 4 **(6 hrs)**

Infrastructure for Special Areas
Unique infrastructural needs of special areas; Planning standards for special areas

Unit 5 **(6 hrs)**

Programs and Projects for Special Areas
Survey of programs and projects for special areas; Best practices of Special Area Planning

Reference Books

- Guidebook on promoting Good Governance in Public Private Partnerships by Bernan. United Nations 2008
- Participation and Partnership in Urban Infrastructure Management by Peter Scheubeler. World Bank Publications
- Sustainable Urbanization: Bridging the Green and Brown agendas by Adriana Allen, Nicholas You. UNHABITAT 2002

PL-21004Geo-Informatics – II

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Develop understanding of advance Remote Sensing through various exercises
CO2: Apply the understanding of Remote Sensing through ERDAS software
CO3: Apply the knowledge in digitizing maps using various data management tools and spatial entry in GIS Software;
CO4: Apply modeling techniques like Suitability and Network analysis techniques to projects

Unit 1 **(6 hrs)**

Advance Remote Sensing
Introduction to Image Correction and Spectral Indices, Effects of Atmosphere on Electromagnetic Radiation, Spectral Vegetation Index, Land Use/Land Cover Mapping Project Phases

Unit 2 **(6 hrs)**

Supervised and Unsupervised Classification
Definition of Supervised and unsupervised classification; Delineate the steps of Classification; Explain the Significance of Training Samples; Classify images using suitable decision rule or algorithm, Overview of image processing in ERDAS

Unit 3 **(6 hrs)**

Fundamentals of Information Technology and GIS
Information technology support- Introduction to Information systems and IT ; Information system infrastructure and Architecture; The Evolution and types of information systems; Managing of Information Technology; Information Technology Infrastructure Hardware, software and Data related issues, Systems Application software, Enterprise software; Basic of Data Arrangement and access, file Environment, DBMS, Logical Data model, Data Warehouses, Meta Data and Global Databases

Unit 4 **(6 hrs)**

Introduction to GIS Packages (e.g., ArcInfo, ArcView, QGIS)
Concept and history of developments in the field of information systems; Computer fundamentals for GIS ; Hardware and software requirements for GIS; Coordinate System and Projections in GIS – Conic, cylindrical and planner ; Projection; Data structure and formats ;Spatial data models – Raster and Vector; Data inputting in GIS ; Data base design - editing and topology creation in GIS, Linkage between spatial and non spatial data

Unit 5 **(6 hrs)**

Spatial data analysis
Georeferencing and projection: map projection, transformation, Types of map projections, parameters of map projection, Commonly used map Projections, projected coordinate systems, Options for coordinate system, spatial interpolation techniques, digital elevation model and different types of resolutions. Systems, introduction, data storage, database structure models, database management systems, Entity relationship model, normalisation, spatial data accuracy, Standard attribute data.

Unit 6
(6 hrs)
Data models and data structure
Introduction, GIS data models, raster data models, vector data models, comparison, advantages and disadvantages, database management system. Significance and type, Attribute Query, spatial query; Vector based spatial data analysis. Raster based spatial data analysis; Buffer analysis, Data quality and sources of errors, Integration of RS and GIS data, Digital Elevation Model , Network Analysis in GIS , Suitability analysis, Data analysis and modeling in GIS– types of GIS modeling , Decision support systems . Integration of GIS and GP

Reference Books

- Michael N. Demers Fundamentals of Geographic Information Systems - John Wiley
- Chor Pang Lo, Albert Yeung Concepts and Techniques of GIS 2007 Prentice Hall
- ESRI Getting to know Arc View GIS ESRI
- John Peter Wilson Handbook of GIS 2008 Blackwell Publishing
- Paul Longley and Michael Betty Spatial Analysis – Modeling in GIS Environment 1996 John Wiley
- Michele Campagna GIS for Sustainable Development 2005 Taylor and Francis

PL-21005 Summer Project

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Teaching Scheme

Examination
End Sem Exam – 100 Marks

Course Outcomes:

CO1: To articulate academic learning and how it will be applicable to professional career goals .
CO2: To identify career paths that may be of interest through firsthand exposure to the profession
CO3: To develop additional skills including office administration, software skills, developing broader network to ensure career readiness.

Summer Project is an off-campus experiential learning activity designed to provide students with an opportunity to make connections between the academic study and the practical application of that study in a professional work environment.

Students seek an internship of 6-8 weeks in government, autonomous and private organizations in planning and allied fields. At the end of the summer project the students are expected to analyze the internship experience, reflecting on lessons learned including new skills developed and results obtained during the internship.

The students are required to submit a 'Satisfactory' certificate from the relevant Planning Office after completion of internship duration. The summer project culminates in the form of a report and presentation prepared by students. The report should highlight the Profile of the Planning Office, its organization structure, key work areas, etc.; Introduction to the project(s) worked upon during training; planning brief; methods employed; and planning - design solutions / proposals. The students will also be required to present their work through drawings / visuals, power point presentations in the form of a Seminar to the faculty and students of the Department over the seventh semester.

PL-21006 Planning & Design Studio - V (Local Area Planning)

Teaching Scheme
Lectures : 10 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Learn various approaches to plan making and their relationships
CO2: Learn the framework of zonal plans and various planning standards.
CO3: Learn to prepare Area Plan and using various planning standards and using different planning tools.

Unit 1

Approaches to Plan Making
The different approaches to plan making; the concepts of master plan, comprehensive development plan - the structure plan, the sector plan, the area/ zonal plan, and other types of plan making processes

Unit 2

Relationship among Plans
Relationship of higher order plans with lower order plans

Unit 3

Framework for Zonal Plans
The approach to developing the area/ zonal plan within the framework of Master Plan

Unit 4

Planning Standards
The study and development of the relevant planning standards for different land uses

Unit 5

Zonal Plans / Area Plans
Detailing of specific sites in the proposed Zonal Plans / Area Plans, covering different land uses

Reference Books

- Ashutosh Joshi Town Planning 2008 New India Publishing Regeneration of Cities
- Simon Eisher Arthur The Urban Pattern Sixth Wiley Publications Gallion, Stanky Eisner Edition
- Donal L Elliot A Better Way to Zone: Ten 2008 Island Press Washington DC Principles to create More
- Livable Cities

[ML-21002] Environmental Studies

(Adopted from the 'Ability Enhancement of Compulsory Courses: Environmental Studies' as prescribed by the Expert Committee of University Grants Commission as per directives of Hon'ble Supreme Court)

Teaching scheme
Lectures: 1 hr / week

Evaluation scheme
Periodic Assignments & Tests

Assignment:2 hrs/week

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

- Comprehend Sustainable Development Goals for present generation

- Appreciate environmental resources, functioning of an ecosystem, significance of biodiversity and environmental challenges
- Analyze the current status of environment with respect to precautionary mechanisms and control measures
- Appreciate the role of an engineer for better tomorrow

Unit 1 **[2 Hrs]**

Multidisciplinary nature of environmental studies
Definition, scope and importance
Need for public awareness.

Unit 2 **[8 Hrs]**

Natural Resources: Renewable and non-renewable resources
Natural resources and associated problems .
Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.Water resources : Use and over-utilization of surface and ground water,floods, drought, conflicts over water, dams-benefits and problems.Mineral resources : Use and exploitation, environmental effects of extractingand using mineral resources, case studies.Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, waterlogging, salinity, case studies.Energy resources : Growing energy needs, renewable and non renewableenergy sources, use of alternate energy sources. Case studies.Land resources : Land as a resource, land degradation, man inducedlandslides, soil erosion and desertification. Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyles.

Unit 3 **[6 Hrs]**

Ecosystems
Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem :-Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 4 **[8 Hrs]**
Biodiversity and its conservation
Introduction – Definition : genetic, species and ecosystem diversity, Bio geographical classification of India, Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation, Hot-sports of biodiversity, Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Unit 5 **[8 Hrs]**

Environmental Pollution
Definition, Cause, effects and control measures of :-Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste Management : Causes, effects and control measures of urban andindustrial wastes, Role of an individual in

prevention of pollution, Pollution case studies, Disaster management : floods, earthquake, cyclone and landslides.

Unit 6 **[7 Hrs]**

Social Issues and the Environment
From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns. CaseStudies, Environmental ethics : Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclearaccidents and holocaust. Case Studies, Wasteland reclamation, Consumerism and waste products. Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.

Unit 7 **[6 Hrs]**

Human Population and the Environment
Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and human health, Case Studies.

Unit 8 **[5 Hrs]**

Field work
Visit to a local area to document environmental assets river/forest/grassland/hill/mountain Visit to a local polluted site-Urban/Rural/Industrial/Agricultural, Study of common plants, insects, birds, Study of simple ecosystems-pond, river, hill slopes, etc.

Reference Books

- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
- Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd.,Ahmedabad – 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
- Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
- Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001,
- Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
- De A.K., Environmental Chemistry, Wiley Eastern Ltd.
- Down to Earth, Centre for Science and Environment (R)
- Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
- Hawkins R.E., Encyclopedia of Indian Natural History, Bombay NaturalHistory Society, Bombay (R)

Humanities and Social Sciences Open Courses-II

[AS (HS)-21005] Industrial Psychology

Teaching Scheme
Lectures: 2 hrs/week

Examination Scheme
Assignment/Test: 40 marks
Final Assessment: 60 marks
Field Visit/Expert Lecture Report: 20 marks
Mini-Project Report: 40 marks

Course Outcomes:

At the end of the course, student will demonstrate the ability to:

- determine the psychological factors that influence individual differences at work and appraise the role of research.
- explain the concepts of motivation and job satisfaction at work and Utilize the elements of organizational culture for enhancing group/team behavior.
- evaluate the relevance & functioning of leadership & diversity in workforce and acknowledge the multicultural factors influencing workplace behavior.
- illustrate the process of recruitment & selection and Experiment with the information required to sustain employability.
- interpret the nuances of Human Factors in Engineering and Analyze its role in their disciplines.
- measure the behavioral findings from self-lead projects and Propose corrective actions to improve quality of workplace behavior.

Unit 1 **[6 Hrs]**

Basics of Industrial Psychology (IP)
Difference between IP & Business Programs; Major fields & Employment in IP
Brief History- Scientific Management,Time and Motion Study, Hawthorne Studies,World War I & II
Research in Social Sciences
Individual Differences at Work: Personality, Intelligence, Emotional Intelligence, Creativity & Innovation, Perception & Attitudes

Unit 2 **[8 Hrs]**

People at Work
Motivation & Job Satisfaction- Employee Predisposition, Expectations, Goals, Incentives& Equity; Job Characteristic Theory (Diagnostic Model)
Understanding Groups & Teams- Group dynamics, Factors affecting Group performance; Understanding work teams, Types of teams, Team development, Issues with teamwork

Leadership (Co-Teaching 4 hrs)- Leader characteristics, Leader & situation, Leader & follower; Specific leadership skills, Introduction to Organizational Development (OD)
Diversity- Multiculturalism- Hofstede's theory, Diversity dynamics

Unit 3 **[8 Hrs]**

Human Factors Engineering (HFE)
Introduction & Brief History of HFE; Essentials of HFE
Person-Machine Systems- Basic Human Factors: Sensory systems, Perception, Cognition, Information Processing approach, Memory, Decision Making
Workspace Designs- General Principles, Designing work areas; Machine Displays &Controls; Physical work environment & Anthropometry; Managing workplace strain through Ergonomics (Self-study)
Current trends in HFE- Use of artificial intelligence, cognitive engineering, sociotechnical systems, etc.

Unit 4 **[6 Hrs]**

Managing People at Work
Job Analysis- Brief Background, Types & Importance; Job description
Recruitment & Selection- Overview, Process, Evaluation
Gearing for Selection- Interviews & Job Search Skills
Performance Appraisal (Co-Teaching 2 hrs): Steps in the Evaluation Process; Appraisal Interview

Text Books:

- Aamodt, M.G. (2013). Industrial Psychology. Cengage Learning: Delhi.
- Wickens, C. D.; Lee, J. D., Liu, Y. & Gordon Becker, S. E. (2015). An Introduction to Human Factors Engineering. 2nd Edition. Pearson Education: New Delhi.
- Landy, F. J. & Conte, J. M. (2010). Work in the 21st Century: An Introduction to Industrial and Organizational Psychology. 2nd Edition. Wiley India: New Delhi.

References:

- Matthewman, L., Rose, A. & Hetherington, A. (2009). Work Psychology. Oxford University Press: India.
- Schultz, D. & Schultz, S. E. (2013). Psychology and Work Today: An Introduction to Industrial and Organizational Psychology. 7th Edition. Pearson Education: New Delhi.
- Schultz, D. & Schultz, S. E. (2002). Psychology and Work Today. Pearson Education: New Delhi.

[AS (HS)-21006] Personnel Psychology

Teaching scheme
Lectures: 2 hrs / Week

Evaluation scheme
Assignments: 70 marks
End Sem. Exam: 30 marks

Course Outcomes:

At the end of the course, student will demonstrate the ability to:

- acquire organizational concepts and will recognize their own personality attributes suitable for corporate world.
- realize the importance of motivation and apply motivational principles to their lives
- experience group dynamics and apply those principles in their lives
- grasp and apply different techniques to maintain mental health.

Unit 1 **[6 Hrs]**

Introduction- Understanding own personality and corporate world Basic concepts in Organizational set up and its importance, Know own personality attributes. Preparing for corporate world, work ethics, and self- management

Unit 2 **[6 Hrs]**

Motivation
Motivational theories for self- motivation and motivating others at work place, Approaches to work

Unit 3 **[8 Hrs]**

Group dynamics
Group behavior and leadership, Effective group behavior, Leadership and management principles, virtual teams and Performance appraisal

Unit 4 **[6 Hrs]**

Mental health at work place
Occupational stress and conflict and strategies for its management, Emotional Intelligence, spiritual Intelligence

Text Books

- Khana S.S.- (2016) Organizational Behaviour(Text and Cases) Chand and company Pvt.Ltd.Delhi.
- Rae Andr'e :- (2008) organizational behavior. Dorling Kindersley (India) Pvt. Ltd.
- Wallace H.and Masters L.- (2008) Personality development..Cengage Learning India Pvt. Ltd.

Reference books:

- Robbins S, JudgeA, Vohra N:- (2013)Organizational behavior.(15th ed) Pearson Education,Inc.
- Singh Kavita:- (2010) Organizational behavior-Text and cases. Dorling Kindersley

[AS (HS)-21007] Engineering Economics

Teaching Scheme	**Examination Scheme**
Lectures: 2 hrs/week	Assignment/Test: 40 marks End Sem. Exam: 60 marks

Course Outcomes:

At the end of the course, student will demonstrate the ability to:

- demonstrate understanding of economic theories and policies.
- identify economic problems and solve it by applying acquired knowledge, facts and techniques in the available framework.
- categorize, classify and compare economic situations and draw inferences and conclusions.
- adapt to changing economic atmosphere and propose alternative solutions to the problems.

Unit 1 **[6 Hrs]**

Introduction to Economics:
Definitions, basic concepts of economics: Cost, efficiency and scarcity, Opportunity Cost
Types of economics: Micro Economics, Macroeconomics and Managerial Economics.
Difference between micro economics and macroeconomics. Application of Managerial economics

Unit 2 **[8 Hrs]**

Micro Economics Analysis
Demand Analysis, Supply Analysis, Theories of Utility and Consumers Choice, Cost analysis, Competition and Market Structures. Application of micro economics theories

Unit 3 **[8 Hrs]**

Macro Economic Analysis
Aggregate Demand and Supply, Economic Growth and Business Cycles, inflation,
Fiscal Policy, National income, theory of Consumption, savings and investments, Commercial and Central banking. Use of macroeconomic theories.

Unit 4 **[8 Hrs]**

International Economics

Balance of Trade and Balance of Payments, Barriers to Trade, Benefits of Trade/Comparative Advantage, Foreign Currency Markets/Exchange Rates, Monetary, Fiscal and Exchange rate policies, Economic Development.
Application of exchange rate policies

Reference Books

- Macroeconomics: N. Gregory Mankiw, 2018
- Managerial Economics: Economic Tools for Today's Decision Makers: by Paul Keat (Author), Philip Young (Author) 2013
- Principles Of Macro Economics: Misra and Puri.2009, Himalaya publishing house, New Delhi.
- Modern Microeconomics, A. koutsoyiannis , Macmillan , London
- Microeconomics Robert S. Pindyck and daniel L. rubinfeld:,pearson education Inc. New Delhi
- Micro economics: K. N. Verma

[AS (HS)-21008] Finance for Engineers

Teaching scheme
Lectures:2 hrs / week

Evaluation scheme
Assignments 40 Marks
End Semester 60 Marks

Course Outcomes:

At the end of the course, student will demonstrate the ability to:

- comprehend basics of accounting, cost concepts, will be able to read Financial statements of companies
- enable them to understand critical financial principles and to enable them to integrate & analyze financial information necessary for Business Decision Making.
- establish relationship between Risk & Return, time value of money, sources of finance & working capital
- appreciate the digital platform of future finance, cryptocurrency, the terms associated with Financial Markets
- such as Money market, capital market, SEBI & other Regulatory authorities

Unit 1 **[6 Hrs]**

Introduction to Accounting & Finance
Basic elements of financial accounting, cost concepts, preparation of Profit & Loss Account & Balance Sheet & concept of Budgetary control

Unit 2 **[6 Hrs]**

Read & interpret Financial Statements
As per Schedule III of Companies Act 2013, Financial statement analysis, concept of cash flow statement

Unit 3 **[8 Hrs]**

Break-even analysis, Risk & Return relationship, time value of money, sources of finance & working capital

Unit 4 **[4 Hrs]**

Digital Platform such as Net Banking, Cryptocurrency, Algorithm based stock exchange trading, Basics of Money market, capital market, Commodities market, IPO & Regulatory authorities

****Pedagogy:** Lectures and PPTs, Use of basic Excel tools for preparation of final accounts, Annual Reports of companies.

Reference Books:

- Accounting for Managers – C Rama Gopal (2012), Accounting for Management, New Age International Publishers
- Financial Management – Theory and Practice - Prasanna Chandra [Mc Graw Hill] publication

Semester VI

PL-21007 Project Formulation, Appraisal and Management

Teaching Scheme	**Examination Scheme**
Lectures : 3 hrs/week	T1 and T2 – 20 Marks each
	End - Sem Exam – 60 Marks

Course Outcomes:

CO1: List the attributes of a successful project manager
CO2: Measure project cost and benefits
CO3: Carry out financial appraisal of a project through various methods
CO4: Estimate the break-even point
CO5: Calculate CPI, SPI, PPI and cost overrun
CO6: Draw the CPM for project scheduling
CO7: Carry out resource loading and resource levelling
CO8: Estimate project cash flow

Unit 1 **(6 hrs)**

Defining Project and Project Management
Definition of project and project management; Importance of project management; Stages of project life cycle; Causes of project delay; Behavioral aspects of project management; Role of project manager; Attributes of a successful project manager

Unit 2 **(6 hrs)**

Project Formulation and Appraisal
Project formulation: process and constraints; Project feasibility: types and components; Project appraisal: financial and economic; Ascertaining project costs and benefits; Financial appraisal techniques – payback period, benefit cost ratio, net present value, internal rate of return; Social cost benefit analysis (an overview)

Unit 3 **(6 hrs)**

Project Planning
Project planning process; Planning for project work (work breakdown structure); Planning for manpower and organization; Planning for information system; Breakeven analysis; Cost performance / Schedule performance / Project performance index; Cost overrun; Project budgeting

Unit 4 **(6 hrs)**

Project Scheduling and Monitoring
Project scheduling: definition and steps; Network techniques in project scheduling; Activity on arc/node; Forward and backward pass; Critical path and slack; CPM Simulation; PERT (Concept only); Gantt Chart (Concept only); Project monitoring: definition and criteria

Unit 5 **(6 hrs)**

Project Resource Management
Resource management: resource loading and resource levelling; Project reporting; Project cash flows: elements, principles, estimation; Financial closure

Reference Books

- Manual on Project Formulation by ITTO
- Projects by Prassana Chandra. McGraw Hill Publications
- Project Management by K. Nagrajan. New Age International Publishers
- Project Management by A. Kanda. PHI Learning Pvt. Ltd. 2011

PL-21008 Planning Legislation – II

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Students will understand the Concept of Law
CO2: Students will analyse various laws and acts pertaining to planning exercises and understand its significance in planning domain.
CO3. Students will be able to apply their understanding of acts in planning exercises and resolve various nature of disputes.

Acts to be covered :

1. MLR Court
2. Slum Rehabilitation Act 1971
3. Environmental Protection Act 1954
4. MHADA Act
5. MIDC Act (Industrial Act)
6. Highway Authority Act
7. Cantonment Act 2006

PL-21009Inclusive Planning

Teaching Scheme	**Examination Scheme**
Lectures : 2hrs/week	T1 and T2 – 20 Marks each
	End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Students will realize the concept and issues related of urban poverty and basic need.
CO2: Students will identify the alternative approaches for delivering the basic services to the urban poor.
CO3: Students will be able to realize the migratory impulses and impact on informal sector.
CO4: Students will be able to realize the Consequences of Spontaneous Growth.

Unit 1 **(10hrs)**

Urban Poverty
Dimensions of urban poverty, magnitude of problem, urban poverty alleviation programs, impact of macro-economic structural adjustment policies on poor urban households. Basic Needs: Development of the concept of basic needs; identification of basic needs and their provision for various target groups and informal sectors; standards for basic needs, NGO's and voluntary organizations associated with provision of basic needs.

Unit 2 **(8hrs)**

Alternative Approaches for Delivery of Basic Services to the Urban Poor
Community planning approach, low cost alternatives and institutional reforms approach, best national or international case studies.

Unit 3 **(8hrs)**

Migratory Impulses and Impact on Informal Sector
Characteristics of migrants and their association with growth of informal sector; socio-economic deprivation and informal sector; development of informal sector concept; Role of informal sector in housing stock, economy, commercial activities, etc.; Implications in physical planning.

Unit 4 **(10 hrs)**

Consequences of Spontaneous Growth
Study of major aspects; spontaneous living and working, their characteristics and functions in urban context, actions for improvement; appraisal of the role of government, private and voluntary organizations; existing management; their organizational set-up and limitations; planning and development of urban settlements in respect of the spontaneous growth; case studies from India and other developing countries.

Unit 5

Role of informal sector in urban economics, Vending policy (Street vendors Act) and Urban local body, Town vending committee, Disabled friendly Act (Ministry of Social Justice), SPAB planning for informal sector.

Reference Books

- Informal sector in Indian Economy by Dipa Mukherjee, Rawat Publications, 2009
- Revisiting the Informal Sector by SarabjitChauhan and UjjaniMukhopadhyay, Springer Publications, 2010
- A General Equilibrium Approach, Informal Sector Concept, Dynamics Linkages and Migration by Kishor C. Samal, Concept Publishing Company, New Delhi, 2008

PL-21011Applied Geology and Hydrology

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Students will be able to understand earth science that help in projects related to disaster management
CO2: Students will understand various land forms, ground water characteristics that will help in various development work
CO3: Students will understand the appropriate selection of site with respect to earth geology

Unit 1 **(6 hrs)**

Introductory Earth Science and Meteorology
Earth as a planet, the solar system, movement of the earth, atmosphere and its composition, composition of the earth; the earth processes, geological cycles, igneous activities, volcanoes, minerals and their properties; rock types and their character; bedding, outcrop and strikes; rockcycle; geological and time scale; Indian stratigraphy.

Unit 2 **(6 hrs)**

Geological Structure, Land Forms, Weathering, Landslides and Mass Wasting
Description and classification of folds, faults, joints, unconformities, fault planes, geometrical destruction, etc; land form types; erosional, depositional fluvial, glacial, deolian and marine rock weathering and climate; mechanical and chemical processes, soil formation, landslides, sources and causes of crystal displacements, soil formation, landslides, sources and causes of crystal displacements, types, characters and effects, instability of hill slopes, prevention.

Unit 3 **(6 hrs)**

Earthquakes
Historical account, tectonic behavior and seismic belts; causes, intensity and magnitude of earthquakes, seismic zoning in India, earthquake waves and their character, particle motion and behavior in various geological formations; seismography, accelerograms and their interpretation, prediction and prevention; earthquake resistant structures. General considerations, sources of preliminary geological data particularly related to Indian stratigraphic sequences and the types of foundations, nature and preparation of foundation for road, bridge, building and other geo-technical structures; geophysical explorations.

Unit 4 **(6 hrs)**

Selection of Site and Foundations
General considerations, sources of preliminary geological data particularly related to Indian stratigraphic sequences and the types of foundations; nature and preparation of foundations for roads and bridges, buildings and other geo-technical structures; geophysical explorations

Unit 5 **(6 hrs)**

Ground Water
Concept and role in town planning of different types of terrain, hydrologic cycle, vertical distribution of groundwater, interstices; Groundwater bearing properties of different lithological formations,porosity, permeability, specific yield, specific retention, transmissivity and storage coefficient ground water in igneous, sedimentary and metamorphic rocks; aquifers; types and classification(geological), aquiclude,aquitard; aquifuge, water table and piezometric surface; surface water reservoirs and springs; artificial recharge and ground water mound hydrological features in relation of seepage, fluctuation of water table and hydrographs, geological structure and underground passages for water supply.

Reference Books

- Applied Geology by D.V. Reddy. Vikas Publishing House,, 2010
- Applied Engineering Geology by M.T.M. Reddy. New Age International Publishers 2007
- Applied Geology for Engineers by Institute of Civil Engineers. Institute of Civil Engineers 1976

PL(DE)-21003 Urban Heritage Conservation

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Graduates will be sensitized to heritage presence in urban areas and the issues faced.
CO2: Graduates will be sensitized to Architecture and Heritage in India and rest of the world
CO3: Graduates will be able to understand Industrial Revolution and its impact on Urban Heritage and conservation
CO4: Graduates will be able to prepare urban Heritage and conservation proposals.

Unit 1 **(6 hrs)**

Introduction
Overview and introduction of the basic concepts of conservation; values, attitudes and principles for judging the conservation importance of sites, areas and related typology; scope and basic technique of urban conservation; Introduction to Heritage and its importance. Introduction of INTACH (Indian National Trust for Art and Cultural Heritage), ASI (Archaeological survey of India), etc. and its work

Unit 2 **(6 hrs)**

Approaches and ethics of heritage conservation
Divergent approaches and ethics of conservation; history of conservation movement; concepts and definitions; international agencies like ICCROM, UNESCO and their role in conservation.
Heritage Classification, Urban Conservation Act & Regulations, Ancient Monument Act, Urban
Heritage and conservation as a part of development plan and Development control regulations

Unit 3 **(6hrs)**

Introduction of Architecture and Heritage in India
Introduction to Art and Architecture and prelude to historical era, Origin of Rock-cut Architecture, Eastern India, Western Deccan, Eastern Deccan, Central India, Origin of Temple Architecture- Theoretical aspects, Temple Architecture during various dynasties in India, Introduction to Islamic Architecture and heritage structures

Unit 4 **(6hrs)**

Introduction of Architecture and Heritage in the world from classical architecture period to medieval period

Study of principles of design, proportion, Optical corrections and Classical Orders. Building types viz., Temples, Sanctuaries, Thermae, Amphitheatres, Circus, Aqueducts etc. Study of planning principles adopted, Agora, Forum and their effect on settlement planning. Study of Architectural character, evolution and transformation of Church form, building typologies and building elements viz., Pointed arch, church towers etc. and their influence on the church form; Influence of structural elements like Pendentive, Flying buttress, Stained glass etc. on the built form and the resultant settlement planning.

Unit 5 **(6hrs)**

Industrial Revolution and its impact on Urban Heritage and conservation

Advent of Industrial Revolution, technological changes, Development of the railways and changes in settlement systems; Building of factory towns Rapid urbanisation and urban crisis; Birth of modern town planning; Garden City, City Beautiful and other visionary movements; New building technologies and implications on architecture – usage of use of concrete, steel and glass; new Industrial Exhibitions.

Unit 6 **(12hrs)**

Study of Heritage structures, precincts and various conservation plans and policies

Study of National and international experience in implementing urban heritage policies and programs; Legal and administrative aspects, various schemes, case studies of proposals for urban conservation of sites/ areas in India and abroad. (Study of Delhi Urban Arts Commission, INTACH- Indian National Trust for Art and Cultural Heritage, ASI- Archaeological survey of India, etc. and its work) Heritage Categories, types and issues of heritage precincts, zones and historic areas; planning for heritage districts, towns and cities; selected case studies.

Reference Books

- Luigi Fusco Girard and Peter Nijkamp (editors) Cultural Tourism and Sustainable Local Development2009 Ashgate, Burlington
- NirmalaRaoKhadpekar Urban revitalization: perspectives and initiatives /2008 ICFAI University Press
- Richard Longstreth (editor) Cultural Landscapes: Balancing Nature and Heritage in Preservation Practice 2008 University of Minnesota Press
- Cohen, Naoum Urban Planning Conservation and Preservation 2001 McGraw-Hill
- IsmailbSerageldin, EphimShluger, Joan Martin-Brown (editors) Historic Cities and Sacred Sites: Cultural Roots for Urban Futures 2001 The World Bank
- The Ancient Monuments and Archaeological Sites and Remains Act 1958 and its amendments
- Model Heritage Regulations, MoUD
- Development Plan and DCR Regulations

PL(DE)-21004 Climate Resilience and Disaster Management

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Graduates will understand the challenges posed by disaster to urban settlements
CO2: Graduates will be able to apply the Disaster Management Continuum to various disasters
CO3: Graduates will be able to contribute in the preparation of disaster management plan.

Unit 1 **(6 hrs)**

Climate Resilience
National Action plan for climate changes (National Sustainable Habitat Mission)

Unit 2 **(5 hrs)**

Basic Concepts of Disaster Management
Disaster – definitions, concept and perceptions; different types of disasters; recent initiatives at national and state level; Kyoto Framework of disaster mitigation and management; Disaster management policy – national and states; Disaster Management Act – national and states

Unit 3 **(5 hrs)**

Disaster Management Mechanisms
Disaster management mechanisms – national, state and district levels; select global practices; disaster and development; physical planning and disaster management plans; various role players in disaster management – NGOs / CBOs and Armed Forces; Community Based Disaster Preparedness(CBDP)

Unit 4 **(5 hrs)**

Disaster Risk Mitigation for Natural Disasters
Natural Disasters – physical phenomenon, causes and consequences mitigation and management practices – cyclones, floods, earthquakes, landslides etc.; causes and risk mitigation strategies. Land use planning, building bye laws and disaster safe construction practices for different types of disasters

Unit 5 **(5 hrs)**

Disaster Risk Mitigation for Man Made Disasters
Industrial, chemical and biological disasters; land use planning, building bye laws and disaster safe construction practices for different types of disasters, Land-use Planning and integration in other

plans

Unit 6 **(5 hrs)**

Disaster Preparedness
Forecasting and early warning systems for various types of disasters; communication and information technology in disaster management; disaster education and awareness; documentation and case studies on natural disasters. Urbanization, land requirements, social and affordability issues of land use, Climate change and its implications in disaster mitigation

Unit 7 **(4 hrs)**

Post Disaster Management and Cross Cutting Issues
Post disaster management; rehabilitation and reconstruction of disaster affected areas; urban disaster mitigation; natural resource management for disaster safe habitation; relationship between disaster and environment; safe hill area development guidelines and coastal zone regulations for safe habitation; human settlement planning for consequence mitigation of global warming and climate change.

Reference Books

- Introduction to international disaster management by Damon P Capolla. Butterworth Heinemann, 2007
- Introduction to emergency management by George D Haddow and Jane A Bullock. Elsevier Butterworth Heinmann, 2006
- Text book of Disaster Management by Dr.Anniruddha Joshi. Lotus Publications, 2009
- Disaster Management Guidelines, NDMA. 2007-11

PL(DE)-21007 Urban Energy Planning

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Provide Planning aspects for the energy consumption and city planning principles.
CO2: Be a guide to be considered for conservation of these Energy Systems.
CO3: Act as a link to the sustainable development course in the next semester.

Unit 1 **(2 hrs)**

Introduction to Urban Energy Basics
Urban Development Scenarios: Meaning and Disciplinary perspectives for process of urbanization; Understanding of Urban Energy Systems; Human settlement and energy consumption; Meaning and Types of Energy, Current Energy Systems, Alternative Energy Systems) Classification of Energy. Various Forms and Grades of Energy.

Unit 2 **(6 hrs)**

Building Level Energy Consumption

Passive and Active construction techniques related to Indian scenario and related calculations. Energy Consumption Details, Clean Energy Technologies, Energy Control Regulations (GRIHA, Energy Conservation Building Code, etc.); Refrigerant Progression vs. Natural refrigerants; HC-AC vs. Conventional Split/Window AC's; Energy Efficiency Ratio Comparison; Home Cooling and Global Warming calculations; Psychometric – Human Comfort Levels.

Unit 3 **(6 hrs)**

Urban Energy Consumption Patterns

Urban Energy requirements and consumption calculations, Sector wise consumption (Residential, commercial, Industrial and others). Power Sector in India and Financial Planning: Five Year plans; Strategies to achieve 'Power for all", Beginning of economic reforms & privatization of generation; Policies and Urban Energy Management: Managing Energy, Energy Attributes; Energy saving Components; India: Energy Demand-Supply Gap, Energy Policy leverages and Stylized Hierarchy in Indian Scenario; Energy Management Planning Process, Energy Audit and Economic Considerations.

Unit 4 **(8 hrs)**

National Energy Consumption Patterns

The study of energy systems linking and leading towards to the sustainable development. Climate Change scenarios and the basic processes that drive global climate change and then explore how cities can mitigate and adapt to climate change, like for instance temperature rise, flood risks, and other weather extremes. Connecting Geo Information Systems and opportunities to use new ICT technologies and provide cities with real-time feedback, and help empower citizens.

Unit 5 **(4 hrs)**

Global Scenario and Energy Management

Energy Environmental Interactions, Economic Considerations.World Energy and Challenge of Sustainability.Traditional Fuels of Today and Yesterday, Nuclear Energy, Energy Use/Waste and Society, Consequences.Role of United Nations in Energy Sustainability. Global Policies – Millennium Development Goals, Sustainable Development Goals and their parameters related to Energy Scenario.

Reference Books

1. Urban Energy Systems: An Integrated Approach by James Keirstead, Nilay Shah. Routledge (T&F) 2013
2. Energizing Sustainable Cities: Assessing Urban Energy by ArnulfGrubler, Fisk. Routledge (T&F) 2012

PL(DE)-21008 Water Resource Management

Teaching Scheme
Lectures : 3 hrs/week

Examination Scheme
T1 and T2 – 20 Marks each

End - Sem Exam – 60 Marks

Course Outcomes:

CO1: Analyze data like inflow, crop data, evaporation, sediments, etc. (po-a, d)
CO2: Plan and design reservoir for irrigation and hydropower. (po-c)
CO3: Evaluate the most economic project from the available options. (po-b, c, e)
CO4: Formulate a mathematical model for irrigation project and obtain optimal solution using graphical approach and software. (po-a, b, e)

Unit 1 **(7 hrs)**

Introduction
Introduction, National water policy, Development stages for conservation and flood protection purpose, reservoir yield and capacity, mass curve, sequent peak method, reservoir sediment distribution by various methods, flood routing and various methods.

Unit 2 **(7 hrs)**

Reservoir Planning (Irrigation)
Planning for irrigation, evapotranspiration, methods of evapotranspiration, crop irrigation requirement, reservoir regulation, Reservoir operation- standard operating policy, Hedging rules and rule curves

Unit 3 **(7 hrs)**

Reservoir Planning (Hydropower)
Planning for hydropower, flow duration curve and load duration curve, planning for run-of-river plant, planning of storage plant, base load plant, peak load plant and its planning, reservoir regulation.

Unit 4 **(7 hrs)**

Systems Analysis in water resources planning
Concepts, optimizing techniques, conventional and evolutionary, simulation, applications of soft computing techniques for water resources planning and management. Linear programming, Formulation of model, solution by Graphical method and software

Unit 5 **(7 hrs)**

Water resources economics
Water resources economics- cash flow diagram, discounting Factors, discounting techniques-benefit cost ratio, internal rate of return, Annual cost and Present worth method, Evaluation

of discounting techniques

Unit 6 **(7 hrs)**

Watershed management and Basin Planning:
concept and principles of watershed management, Water balance of a basin, integrated river basin development, River water disputes, Inter-basin river water transfers, Environmental considerations in water resources planning

Reference Books

- Goodman, A.S., Principles of Water Resources Planning, Prentice Hall Inc., New Jercy, 1984.
- James, L.D. and Lee, R.R., Economics of Water Resources Planning, McGraw Hill, 1971.
- Warnic, C.C., Hydropower Engineering, Prentice Hall Inc., New Jercy, 1984.
- Vedula, S. and Majumdar, P. P., Water Resources Systems. Modeling Techniques and Analysis,TATAMcGraw Hill, 2005
- Linsley, R.K. and Franzini, J.B., Water Resources Engineering, Third Edition, McGrawHill,Inc.
- Kuiper, E., Water resources development: planning, engineering and economics, Butterworths, 1965.

PL-21010Planning &Design Studio - VI (Development Plan)

Teaching Scheme	**Examination Scheme**
Lectures : 10 hrs/week	T1 and T2 – 20 Marks each
	End - Sem Exam – 60 Marks

Course Outcomes:

CO1: To understand various types and hierarchy of Urban Plans, their Characteristics and Contents.
CO2: To evolve Development Policies; Land Use Plan, priorities and Implementation Mechanism for a selected Urban Area.

Unit 1

Studying Development Plans
The study shall involve understanding of contents of various types of development plans.

Unit 2

Secondary Source Information for a Selected City or Town
Identification and preparation of secondary source information of the towns or cities selected for the study

Unit 3

Organization of Field Surveys

Visit to the case study area, collection of primary and secondary data and information on various aspects such as demography, social, economic, housing, transportation, etc.; conduct of primary and secondary surveys

Unit 4

Analysis and Synthesis

Analysis and synthesis of data and information collected on various aspects; projections of population and workforce; trends and issues identification

Unit 5

Plan, Policies and Proposals

Preparation of policies and proposals with different scenarios and identification of priorities and action areas; phasing and monitoring; governance structures for implementation; land use plan and the plan document

Reference Books

- UDPFI Guidelines, GOI 1996
- National Building Code, Bureau of Information Statistics 2006
- Master Plan for Delhi 2021. Delhi Development Authority, 2010

[ML-21001] Constitution of India

Teaching scheme	**Evaluation scheme**
Lectures: 1hr / week	T1: 20 marks T2: 20 marks End Semester 60 Marks

Course Outcomes:

At the end of the course, student will demonstrate the ability to:

- Interpret the Preamble and know the basics of governance of our nation.
- Identify the different aspects covered under the different important Articles.
- Apprehend the basic law, its interpretation and the important amendments.
- Understand our Union and State Executive better.
- Recognize the basic that along with enjoying the rights one needs to fulfill one's duties.
- Summarize and Gain confidence on our Constitution by knowing it better.

Unit 1 **[5 Hrs]**

Understanding the concept 'Rule of Law '
Meaning and history of Constitution.
Introduction to The Constitution of India, understanding its objects.
Preamble to the constitution of India

Unit 2 **[4 Hrs]**

Understanding the concept of Human Rights and Fundamental Rights.
Fundamental rights under Part – III, exercise of the Rights, limitations and important cases.
Prerogative Writs.
Fundamental duties & their significance.

Unit 3 **[4 Hrs]**

Relevance of Directive principles of State Policy.
Legislative, Executive & Judiciary (Union and State)
Constitutional Provisions for Scheduled Castes, Scheduled Tribes, & Backward classes.
Constitutional Provisions for Women & Children

Unit 4 **[2 Hrs]**

Emergency Provisions.
Electoral procedure in India
Amendment procedure and few important Constitutional Amendments

Text Books :

- Introduction to the Constitution of India by Durga Das Basu (Students Edn.) Prentice – Hall EEE, 19th/20th Edn..
- Engineering Ethics by Charles E.Haries, Michael. S.Pritchard and Michael J. Robins Thompson Asia,.

Reference Books:

- An Introduction to Constitution of India by M.V. Pylee, Vikas Publishing

Humanities and Social Sciences Open Courses-I

[AS (HS)-21001]English Proficiency Language

Teaching scheme
Lectures: 2 hrs / week

Evaluation scheme
T1&T2 : 60 Marks
End Semester: 40 Marks

Course Outcomes:

At the end of the course, student will demonstrate the ability to:

- understand concepts of English language and apply them practically.
- reproduce meaningful and well-structured sentences for conversation or speech in English.
- analyze, comprehend and write well and effectively produce enhanced formal communication in English.
- display their Presentation skills and participate and produce healthy discussions both formally and informally among peers using English.
- create impact by acquiring professional skills, confidently face interviews and be better employable and industry ready.

Unit 1 **[8 Hrs]**

English for communication
Basic understanding of language and its need for effective business communication for Engineers, Formal and informal expressions, Vocabulary Building, Business Idioms

Unit 2 **[6 Hrs]**

Presentation Skill Development
Oral Presentations, Basic Mannerisms and Grooming required for professionals, Cross cultural communication, Business Etiquette

Unit 3 **[8 Hrs]**

Business Writing
Writing Mechanics, Note making, Summarizing, Letter &Email Writing, Business Reports, Statement of Purpose

Unit 4 **[6 Hrs]**

Employability Enhancement
Job Readiness, Interview Skills and Mock Interviews

Reference books

- Business Communication by ShaliniVerma (2nd Edition) (Vikas Publishing House)
- Communication for Business: A Practical Approach by Shirley Tailor (Longman)
- Communication Skills for Engineers by S. Mishra & C. Muralikrishna (Pearson)
- Communication Skills for Technical Students by T.M. Farhathullah (Orient Longman)
- Enhancing Employability at Soft Skills by ShaliniVarma (Pearson)
- Written Communication in English by Saran Freeman (Orient Longman)
- Corporate Communication by JaishriJethwaney (Oxford University Press)
- Business Correspondence and Report Writing, R. C. Sharma & Krishna Mohan (Tata McGraw Hill)
- Essential English Grammar (Intermediate&Advanced) Raymond Murphy (CUP)

[AS (HS)-21002]German Language

Teaching scheme
Lectures:2 Per Week

Evaluation scheme
Assignments 40 Marks
End Semester:60 Marks

Course Outcomes:

At the end of the course, student will demonstrate the ability to:

- acquire knowledge of facts about Germany and German culture (cultural sensitization).
- adapt pronunciation of German letters and greetings.
- identify and calculate numerical till 1000.
- describe themselves and third person.

- construct simple questions or sentences and interact with the teacher and classmates.
- comprehend time and time related phrases, illustration of the same in conversations.
- handle day to day situations like placing an order in the restaurant or interact with shopkeeper in the supermarket.

Unit 1 **[6 Hrs]**

Guten Tag! (Good day)
Greetings, self introduction and partner introduction, numbers till 100, how to mention telephone number and email address, about countries, nationalities and languages.

Unit 2 **[6 Hrs]**

Freunde, Kollegen und ich (Friends, colleagues and myself)
Hobbys, days of the week, months, seasons and professions, classroom objects and classroom communication

Unit 3 **[6 Hrs]**

Dining out
Understanding German cusine, meal courses, names of the ingredients, conversation with the waiter and in the supermarket.

Unit 4 **[6 Hrs]**

Uhrzeit (Timing)
Mention time, daily routine, making appointments

Unit 5 **[6 Hrs]**

Grammatik (grammar)
Vocab, Verb conjugations, WH-question, verbs, pronounciation, personal pronouns, articles, Singular and Plural, negation.

Reference Books:

- Dengler.S., Rusch. P., Schmitz.S., & Sieber.T. Netzwerk, Deutsch als Fremdsprache. 2015. Goyal Publishers & Distributors Pvt. Ltd. Delhi, India
- You tube video series "learn German", "easy German" etc.
- Funk.H., Kuhn.C., & Demme.S. Studio d A1. Deutsch als Fremdsprache. 2011. Goyal Publishers & Distributors Pvt. Ltd. Delhi, India.

[AS (HS)-21003] Japanese Language

Teaching scheme
schemeLectures: 2 hrs / Week

Evaluation
Assignments 40 Marks

End Semester 60 Marks

Course Outcomes:
At the end of the course, student will demonstrate the ability to:

- acquire knowledge of facts about Japan and Japanese culture,
- familiarize with pronunciation of Japanese letters and daily greetings, Accent, Intonation and Japanese writing System Hiragana, Katakana and Kanji
- identify numbers, Colors, Years,Months and Days, Time expressions, Directions to read the city map
- describe themselves and third person and family members
- construct simple questions or sentences and interact with the teacher and classmates.
- apply Engineering Terminology and Japanese work culturesuch as Monozukuri, 5S, Kaizen, 3M, 5W1H etc.

Unit 1 **[3 Hrs]**

Introduction to Japanese Language (Nihongo)
Recognize Japanese Characters Hiragana. Can read /write Hiragana script
Use basic classroom expressions
Exchange greetings Can thank someone or apologize someone
Recognize Japanese Characters Katakana Can read /write Katakana script
Can ask someone to say something again if you don't really understand

Unit 2 **[3 Hrs]**

About Me
Give simple self introduction Can ask and answer where you live and your age.
Can write your name, nationality, date of birth and occupation in Japanese.
Recognize the parts of a business card
Talk someone briefly about your family using a family photo and answer simple questions such as who is that? Number of family members.

Unit 3 **[3 Hrs]**

Food
Talk about your favorite foods you like and dislike. Talk about your breakfast.
Can respond when offered a drink. For example saying what you want to drink.
Can look at menu in a fast food restaurant and understand what is available.
Can look at different restaurants' signboards and understand what each place is.

Unit 4 **[3 Hrs]**

Home
Say what kind of house you live in. Say what you have in your home.
Write an e mail inviting someone to your home. Visit/ Welcome a friend.
Ask /say where to put things in the room. Can read the buttons on an electric appliance
Can listen to a simple explanation when being shown around a room and understand the layout.
Recognize the name and address on signs.

Unit 5 **[3 Hrs]**

Daily life
Talk about your daily routine. Say the time you do something. .
Talk about your schedule at work for the week.
Can listen to short and simple instructions at work and understand what to do.

Can read a simple, handwritten note at work and understand the instructions.
Can ask someone to lend you something at work .
Can look at a list of equipment and confirm if you have all the items.

Unit 6 **[3 Hrs]**

Holidays and Days off 1
Can give a simple answer when asked about your hobbies and favorite things to do .
Talk about what you do on your days off.
Can read an event poster and find the important information such as the date, time and place.
Can ask and answer questions about whether you are going to an event etc.
Can say when you are available, when you are inviting someone to something or being invited

Unit 7 **[4 Hrs]**

Towns
Recognize station and Taxi signs.
How to get to particular destination using a map
Can say how you go to work and how long it takes.
Describe places in town and location
Can look at common signs in a station and understand what they mean.

Unit 8 **[3 Hrs]**

Shopping
Talk about what you want to buy.
Can ask staff in a shopping center etc .Where to go for a certain item and understand the answer .
Can look at discount signs and read the prices.
Make a brief comment on things in a shop.

Unit 9 **[3 Hrs]**
Holidays and Days off 2
Can read a short blog / simple e mail

Can talk in simple terms about impressions of the holiday / trip .
Can write a simple post for social media etc . About what you did in holiday.

References Books

- Marugoto A1 Katsudo Starter Coursebook for Communicative Language Activities.
- Marugoto A1 Rikai Starter Coursebook for Communicative Language Competences
- The Japan Foundation
- Minna no Nihongo Main Textbook Elementary Lesson 1-12
- Minna no Nihongo Translation & grammatical Notes in English Elementary Lesson 1-12,3A Corporation Goyal Publishers

[AS (HS)-21004] Spanish Language

Teaching scheme
Lectures: 2 hrs / Week

Evaluation scheme
Assignments 40 Marks
End Semester 60

Marks

Course Outcomes:

At the end of the course, student will demonstrate the ability to:

- acquire knowledge of facts about Spain and Latin Americaand Spanish culture, pronunciation of Spanish letters and greetings.
- identify and calculate numerical till 1000.
- describe themselves and third person.
- construct simple questions or sentences and interact with the teacher and classmates.
- comprehend time and time related phrases, illustration of the same in conversations, handle day to day situations like placing an order in the restaurant or interact with shopkeeper in the supermarket.

Unit 1 **[6 Hrs]**

¡Hola! (Hello)
Greetings, self introduction and partner introduction, numbers till 100, how to mention telephone number and email address, about countries, nationalities and languages. Hobbys, days of the week, months, seasons and professions, classroom objects and classroom communication.

Unit 2 **[6Hrs]**

La comida (Food)
Understanding Spanish cusine, meal courses, names of the ingredients, converstaion with the waiter and in the supermarket.

Unit 3 **[6 Hrs]**

La ropa (clothing)
Clothing, accessory (as per weather), season + weather, vocabulary, Demonstrative pronouns, how to ask about price, numbers till 1000.

Unit 4 **[6 Hrs]**

La hora (Timing)
Mention time, daily routine, making appointments

Unit 5 **[6 Hrs]**

La gramática (grammar)
Vocab, Verb conjugations, WH-question, verbs, pronounciation, personal pronouns, articles, Singular und Plural, negation.

Reference Books

- Aula internacional 1Jaime Corpas, Eva García, AgustínGarmendia, Neus Sans Baulenas (contributor), published by GoyalPublisher's and Distributors Pvt. Ltd.

[HS-21001] Entrepreneurship Principles and Process

Teaching scheme
Lectures: 1 hr / week
Marks

Evaluation scheme
Field Work/Assignments 40

End Semester 60 Marks

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

- Discover, develop, and assess different types of Entrepreneurial ventures and opportunities.
- Learn about opportunity and risk analysis
- Use the strategies for valuing your own company, and how venture capitalist and angel investors use valuations in negotiating milestones, influence and control
- Pick correct marketing mix and how to position the company in the market by using analytical tools
- Learn how to sale themselves and the product/service and to handle objections
- Know how organizations operates, their process matrices, start new ventures, write winning business plans

Unit 1 [3 Hrs]

Market Research, Types of Companies and Organizations
Introduction to Entrepreneurship, Profile of the Entrepreneur, Market Gap /Opportunity Analysis, Market Research Methods, Defining the Focal Market: Market Segmentation, Industry analyzing– Research /Competitive Analysis. Company/ Organization Types, Legal Aspects, Taxation, Government Liaison, Building the Team, Mergers and Acquisitions

Unit 2 [4 Hrs]

Business Finance, Marketing & Digital Marketing
Shares and Stakes, Valuation, Finance Creation (Investors/Financers), Revenue Plans and Projections, Financial Ratios, Business Lifecycle, Break Even. Marketing Basics, Marketing Strategy and Brand Positioning, Plans and Execution Techniques, Marketing Analytics, Online Marketing

Unit 3 [3 Hrs]

Sales & Operations Management
Understanding Sales, Pitching Techniques, Sales strategies, Inside Sales v/s Outside Sales, RFP
Operational Basics, Process Analysis, Productivity, Quality

Unit 4 **[2 Hrs]**

Start-ups

Start-up Basics, Terms, Start-up Financing, Start-up Incubation, Start-up Incubation, Getting Listed

Text Books

- TheStartupPlaybook:SecretsoftheFastest-GrowingStartupsFromTheirFoundingEntrepreneursbyDavidKidder
- True North by Bill George and Peter Sims
- Cardullo,M.W.P.E.(1999).Technological entrepreneurism: Enterprise formation, financing, and growyh. England: Research Studies Press Ltd.

Reference Books

- Kanungo,R.N.(1998).Entrepreneurship and innovation:Modelsfordevelopment(Ed.,Vol.2). New Delhi: Sage.
- Van Nostrand. Verma , J.C.,& Singh ,G.(2002).Small business and industry: A hand book for entrepreneurs. New Delhi: Response-Sage.
- RichardABrealy&StewardCMyres.PrinciplesofCorporateFinance,McGrawHills, 7thEdn,2004
- PrasannaChandra,FinancialManagement:TheoryandPractice,TataMcGrawHills, 6thEdn, 2004IMPandey,FinancialManagement,VikasPublishing.