

M.ARCH (ARCHITECTURAL DESIGN) –  
CURRICULUM



**FIRST SEMESTER**

CODE	SUBJECT TITLE	L	T	P	C
AR 601	Contemporary processes in Architecture	3	-	-	3
AR 603	GIS & Remote Sensing	2	1	-	2
AR 605	Advanced structural systems	2	1	-	2
AR 607	Urban design	3	-	-	3
<b>STUDIO COURSES</b>					
AR 609	Advanced Computer Studio -I	-	-	8	4
AR 611	Design studio I - Urban Infrastructure projects	-	-	12	6
<b>Total</b>		10	2	20	20

**SECOND SEMESTER**

CODE	SUBJECT TITLE	L	T	P	C
AR 602	High Rise buildings	3	-	-	3
	Elective -I	2	1	-	2
AR 604	Architectural Conservation	3	-	-	3
AR 606	Intelligent Building systems	2	1	-	2
<b>STUDIO COURSES</b>					
AR 608	Advanced Computer Studio -II	-	-	8	4
AR 610	Design studio – II - Intelligent Building systems / High rise buildings	-	-	12	6
<b>Total</b>		10	2	20	20

**THIRD SEMESTER**

CODE	SUBJECT TITLE	L	T	P	C
AR 701	Environmental Strategies	3	-	-	3
	Elective - II	2	1	-	2
AR 703	Real Estate Management	3	-	-	3
AR 705	Sustainable development & technologies	2	1	-	2
<b>STUDIO COURSES</b>					
AR 707	GIS Studio	-	-	8	4
AR 709	Design studio – III - Environmental planning & Design	-	-	12	6
<b>Total</b>		10	2	20	20

**FOURTH SEMESTER**

CODE	SUBJECT TITLE	L	T	P	C
AR 710	Dissertation	-	-	12	12
<b>Total</b>		-	-	12	12

**LIST OF ELECTIVES**

CODE	THIRD SEMESTER	L	T	P	C
<b>Elective - I</b>					
AR 612	New age materials & construction	2	1	-	2
AR 614	Computer Aided Structural Design	2	1	-	2
AR 616	Landscape Construction	2	1	-	2
<b>Elective - II</b>					
AR 711	Vernacular building traditions	2	1	-	2
AR 713	Bio-architecture	2	1	-	2
AR 715	Financial Management	2	1	-	2

**TOTAL NUMBER OF CREDITS**

**72**

**SCHEME OF EXAMINATION**

Course	Duration In Hours	Internal Marks	External Marks	Total	Passing Minimum	
					External	Aggregate
Theory Courses	3 hrs.	30	70	100	35	50
Studio courses	Not Applicable	50	50	100	25	50

## I SEMESTER

<b>AR 601</b>	<b>CONTEMPORARY PROCESSES IN ARCHITECTURE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### PURPOSE

Architects & Scholars are finding many new methods at arriving at design solutions. An exposure to the latest processes in design methodology & pioneering works of contemporary architects.

### OBJECTIVES

Knowledge of the theoretical pursuits in contemporary design methodologies & a study of the resulting new movement that is prevalent across the world.

<b>UNIT I</b>	<b>FRACTALS IN ARCHITECTURE</b>	<b>9</b>
The fractional landform – spiral geometry plus concentric curve plus grid – complex land forms – Fluid fractals – Fractals in nature – Fractals in cities – Post modern science of cities.		

<b>UNIT II</b>	<b>DIAGRAMS &amp; DIAGRAMMATICS</b>	<b>8</b>
Texture fields - Field constructions – Logistics of contexts – Think surfaces – moirés & mats – Digital fields – Patterns of congruity – Fields of affinity – Dynamic policies & programs.		

<b>UNIT III</b>	<b>NON LINEARITY</b>	<b>8</b>
Non Linear Dynamic Systems – Properties – chaos – Biological development – Punctuated equilibria – Self organization – The Gia hypothesis – Generic properties – Catastrophe theory & Phylloxera etc.		

<b>UNIT IV</b>	<b>NEW PROCESSES</b>	<b>10</b>
The flow of traffic as a generator of forms – Continuous structure deformed by circumstances – Advanced form of movement – Multi source synthesis – Architects in Cyber space – Hyper aesthetics – The cinematic section organic forms – The rotating disc etc.		

<b>UNIT V</b>	<b>CONTEMPORARY ARCHITECTURE</b>	<b>10</b>
Study of the works of Frank Gehry , Peter Eisenmann ,Greg Lynn ,Enrique Miralles, Daniel Libeskind ,Roger Penrose ,Heinz Gallinski , Zaha Hadid, Santiago Calatrava etc – Modern trends in urban design & town planning – Helsinki ,Finland –Landsberger alle ,Berlin –Master plan of Bucharest ,Romania- High speed railway complex at Busan South Korea.		

**TOTAL 45**

## REFERENCES

1. New Science – New Architecture – AD Vol 67 , no 9/10 Sep – Oct 1997
2. Architecture after Geometry –AD Vol 67 , no 5/7 may / June 1997
3. Architects in Cyber space – AD Vol no11/12 Nov/ Dec 1995.

<b>AR 603</b>	<b>GIS &amp; REMOTE SENSING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>1</b>	<b>0</b>	<b>2</b>

<b>UNIT I</b>	<b>INTRODUCTION</b>	<b>5</b>
Definition, map and map analysis, automated cartography, history and development of GIS, Hardware requirement, system concepts, co-ordinate systems, standard GIS packages		

<b>UNIT II</b>	<b>DATA ENTRY, STORAGE AND MAINTENANCE</b>	<b>10</b>
Types of data, spatial and non spatial data, data structures, points, lines, polygon, vector and raster, files and file organisation, database, data entry, digitiser, scanner, Dbase, files and data formats, data compression		

<b>UNIT III</b>	<b>DATA ANALYSIS AND MODELLING</b>	<b>10</b>
Spatial analysis, data retrieval, query, simple analysis, recode, overlay, vector data analysis, raster data analysis, modelling in GIS, digital elevation model, DTM, cost and path analysis. Artificial Intelligence – Expert system		

<b>UNIT IV</b>	<b>DATA OUTPUT AND ERROR ANALYSIS</b>	<b>10</b>
Types of output data, display on screen, printer, plotter, other output devices, sources of errors, types of errors, elimination, accuracies.		

<b>UNIT V</b>	<b>GIS APPLICATIONS</b>	<b>10</b>
Resource management, agriculture, soil, water, resources management, cadastral records and LIS, integration of Remote Sensing in GIS, knowledge based techniques		

**TOTAL 45**

## REFERENCES

1. Burrough, P.A., Principles of GIS for land resource assessment, Oxford Publication, 1980
2. Jeffrey Star and John Estes, Geographical Information System – An Introduction, Prentice Hall inc., Engelwood cliffs, New Jersey, 1990
3. Lillesand T.M. and Kiefer, R.W, Remote Sensing and Image interpretation, John Wiley and Sons, New York, 1989

4. Marble, D.F.Calkins, H.W. and Peuquest, Basic readings in Geographic information system, Spad system Ltd., New York, 1984

<b>AR 605</b>	<b>ADVANCED STRUCTURAL SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>1</b>	<b>0</b>	<b>2</b>

**PURPOSE**

Recent advances in materials & construction technology have led to the development of space structures as efficient solutions to large span roofing. Space structures offer the architects exceptional freedom in design and as there are many types such as braced domes, single, double and multi-layered grids, braced folded structure, cable roofs and stressed skin systems. Also they can be built of steel, aluminium, wood or concrete. It is the aim of this course to expose scholars to the tremendous range of solutions & possibilities offered by space structures, and tensile structures.

**OBJECTIVES**

- To create awareness among the students about the range of solutions possible for long span roofing
- To foster understanding of the basic principles of space frames, tensile structures, folded plates and trusses and girders for long spans.

**UNIT I SPACE FRAMES 9**

Definitions, Types – single & multilayered grids – two way & three way space grids, connectors – types of nodes, ball joint system, socket joint systems, plate joint systems, slot joint systems, shell joint systems, DDC system, space deck system SERC jointing system, MERO joints etc.

Braced domes – basic geometries, types of braced domes, scwedler domes, stiff jointed framed domes, plate type domes, network domes, Zimmermann domes, lamella domes, geodesic domes & grid domes – single layer & double layered domes, practical examples

**UNIT II BRACED FOLDED STRUCTURES 9**

Steel frame folded plate roofs, types of folded systems, type of bracing systems, types of braced barrel vaults, practical examples

**UNIT III TENSILE STRUCTURES 9**

Suspended cable structures – types of cable network systems, shapes of cable suspended systems, examples of tensile membrane structures – types of pneumatic structures – structural materials & coatings - tent structure – principles – example – tensegritic structures – tensegritic nets – morphology characteristics – tension strut dome – truss structures stabilised by cable tension, suspend-dome structure, flying mast fabric roof system

**UNIT IV STRESSED SKIN SYSTEMS 9**

Principles, necessary conditions – stressed skin grids – types of pyramids, advantages – stressed skin domes & folded plates – structures – various types

**UNIT V SPACE STRUCTURES WITH CHANGING GEOMETRIES 9**

Deployable structures – foldable / extensible structures – examples, adaptive trusses – pentadome system –principles –examples  
Retractable roofs – examples in Canada, Japan etc.

**TOTAL 45**

**REFERENCES**

1. N. Subramanian – Principles of Space Structures 2<sup>nd</sup> ed. Wheeler publishing New Delhi 1999
2. Malcolm Millais – Building structures – E & FN spon, London, 1977
3. Henry J. Cowan – structural systems – van no stand Reinhold company, New York, 1981

<b>AR 607</b>	<b>URBAN DESIGN</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**PURPOSE**

The overall goal of the course is to help students further their understanding of the complex forces which shape urban forms and spaces. This requires study of the theory and practice of urban design and development throughout the world, including case studies of various urban design solutions.

**OBJECTIVE**

Students will have an understanding of urban design concepts and understand the methodology for arriving at urban design solutions and formulating policies.

**UNIT I THEORIES OF URBAN DESIGN 6**

Introduction and Scope of urban design; Cities in history ; City forms and forces that shape them; Theories and concepts of urban design - Natural models, Utopian models, Models from arts and science

**UNIT II CASE STUDIES IN URBAN DESIGN 9**

International case studies in Urban design - Urban design solutions; Economic, Engineering, Social, Professional and Formal solutions. Some case studies will be presented by students in a seminar.

**UNIT III CITY PLANNING AND URBAN DESIGN 10**

Aims and objectives of planning; The Legal and Administrative Basis for Planning; The Comprehensive plan; Land utilization; Presentation and

Implementation techniques in urban design; Zoning -- As a Mechanism for Design Control

**UNIT IV URBAN DESIGN AND HIGH RISE DEVELOPMENT 8**

The concept and context of high-rise in urban design; urban growth and change towards high-rise in developing countries; Urban skyline and roofscape

**UNIT V URBAN DESIGN PROJECT 12**

Prepare an independent and original study of a specific area – Present the data collected and give suggestions for urban design control in that area.

**TOTAL 45**

**REFERENCES**

1. Concepts of Urban design ,David Gosling, Academy editions
2. City shaped, Spiro Kostof, Bulfinch Press
3. Architecture of town and cities, Paul D. Speriregon, The MIT press
4. An introduction to Urban design, Johnathan Barnet, Harper& Row Publishers

<b>AR 609</b>	<b>ADVANCED COMPUTER STUDIO - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>8</b>	<b>4</b>

**PURPOSE**

This course gives a holistic approach to three dimensional visualisation in building design by integrating the concepts of two dimensional & three dimensional parameters with the application of parametric data manipulation.

**OBJECTIVES**

- To enable the students use computer aided design in parametric data manipulation efficiently.
- To encourage the students in building up a working environment in two dimension and three dimension simultaneously.

**CONTENTS**

1. Introduction to parametric application – concept of working in 2D and 3D simultaneously. Drawing management features , sheet set mechanism , call out tools, archiving and sheet index creation.
2. Design objects- working with conceptual models, object viewers, tools for design objects, documenting design data, materials and display system.
3. Detailing components , tools for detail drafting utilities, integrating details with user interface, tool palettes, properties palettes and annotation tools.
4. Rendering and visualisation module –photo realistic presentation techniques.

5. Project works and exercises incorporating all the above features.

**TOTAL 120**

**REFERENCES**

1. Architectural Desktop Reference Manual ,Auto Desk Inc
2. Architectural Desktop user

<b>AR 611</b>	<b>DESIGN STUDIO I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>URBAN INFRASTRUCTURE PROJECTS</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>6</b>

**PURPOSE**

This is a design studio course with its main focus as the Planning of Transportation facilities such as Airport terminals and MRTS nodes. Apart from educating students about the planning standards, International Aviation regulations, MRTS norms and Environmental Planning legislations, the course encourages students to use the computer as a design tool.

**DESIGN PROJECT – I**

**PLANNING AND DESIGN OF AIRPORTS 90**

Students would be required to prepare a Master plan after careful site selection regarding capacity, air traffic control and climatic aspects. They would be encouraged to design the Terminals and other service facilities after acquiring sufficient knowledge about design standards, runways, taxiways and aircraft characteristics related to airport design.

**DESIGN PROJECT - II**

**PLANNING AND DESIGN OF AN MRTS NODE 90**

A brief study of the existing MRTS in Chennai would lead to fostering awareness about the conventional standards in the design of a MRTS Station that could incorporate the best in Public Architecture. The use of Architectural CAD Software in presentation will be encouraged.

**TOTAL 180**

**REFERENCES**

1. Robert Horonjeff - Planning and Design of Airports - Mcgraw hill, USA 1975
2. Henry sanoff - Planning and Design of Airports - VNR California 1976

## SECOND SEMESTER

<b>AR 602</b>	<b>HIGH RISE BUILDINGS URBAN INFRASTRUCTURE PROJECTS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **PURPOSE**

The council for tall buildings defines High rise buildings as a building whose height creates different conditions in the design construction and use than those that exist in common building of a certain region and period. As more and more buildings in India are tending towards high rise it becomes imperative for aspiring architects to acquire knowledge and expertise in this field.

### **OBJECTIVES**

- To expose the students to the various types of structural systems that are employed for tall buildings,
- Knowledge of the various building service systems that are required by tall buildings.

### **UNIT 1 INTRODUCTION TO TALL BUILDINGS 5**

Classification of tall building structural system - Types - Shear frames, Interacting systems, Partial tubular systems, Tubular systems.

### **UNIT II TALL BUILDING FLOOR SYSTEMS 10**

Composite steel floor systems, prestressed and post tensioned concrete floor systems - Examples.

### **UNIT III LATERAL LOAD RESISTING SYSTEMS 10**

Braced frames and moment resisting frame systems – Examples, Shear wall systems – Examples, Core and outrigger systems - Benefits and drawbacks – Examples, Tubular systems - Advantages and Disadvantages – Examples, Hybrid systems - Examples

### **UNIT IV SERVICES FOR TALL BUILDINGS 10**

Express elevators - Sky lobbies - Local elevators, Service floors etc., - Water supply systems - Skip stage pumping - Energy conservation methods - Location and sizing of water tanks.  
Electrical and Communication systems etc.,

### **UNIT V FIRE PROTECTION OF TALL BUILDINGS 10**

Wet risers, Sumps, Smoke detectors, Alarms, Sprinkler systems, Fire escape stairs, Fire resistant doors, Fire resistant rating of materials and Fire fighting equipments etc.,

**TOTAL 45**

9

## **REFERENCES**

1. Bennetts, Ian et al - Tall building Structural Systems
2. Proceedings of the Council for Tall buildings - Vol 1 to 10

<b>AR 604</b>	<b>ARCHITECTURAL CONSERVATION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### **PURPOSE**

The overall goal of the course is to help students further their understanding of the concepts in historic preservation & conservation of urban forms & spaces. This requires study of the theory & practice of conservation & the various techniques of conserving individual materials & the documentation of the same.

### **OBJECTIVES**

Students will have an understanding of conservation concepts & understand the methodology for arriving at such solutions and formulating policies aimed at preservation & conservation. A brief study of various developments related to conservation and heritage across the world, including case studies of various conservation solutions.

### **UNIT I ETHICS & PHILOSOPHY OF CONSERVATION 5**

Defining heritage – Cultural value and Cultural capital –Terminologies , attitudes and approaches to conservation.

### **UNIT II LISTING OF BUILDINGS & HERITAGE PRECINCTS 10**

.Various criteria for listing buildings & documentation techniques. Statues of listed buildings – spot listing & delisting, Inter disciplinary approaches to building recording. Conservation & management – adoptive re use, character & issues of heritage towns- delineating zones , planning for heritage precincts and areas.

### **UNIT III CONSERVATION TECHNIQUES 10**

Documenting material , use and structural issues of historic buildings , focus on restoring and conserving brick structures, technology, use and repair of iron and steel members, understanding wooden and timber structures / methods of conserving timber structures, traditional plaster work skills, introduction to the significance and use of lime, working with lime- repairing and replacing plaster, conserving stone structures, issues concerning terracotta and mud structures.

### **UNIT IV LEGISLATION , POLICY AND ORGANISATIONS 10**

Explore legislation for the heritage from an international perspective, reviewing various charters of ICOMOS, ICCROM, UNESCO, World heritage sites- review legislative measures adopted in India – Ancient sites and monument

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protection act . Bombay and Hyderabad heritage regulations- proposed  
Tamilnadu heritage act . role of various agencies in the promotion of  
conservation such as ASI / INTACH/ Heritage societies / Urban arts  
commission

**UNIT V ECONOMICS OF HERITAGE 10**

An introduction to the economic aspects of conservation , cultural value and  
economic , incentives for conservation like transferable development rights  
and the institution of National Cultural fund, overview of incentive schemes  
adopted in other countries.

**TOTAL 45**

**REFERENCES**

1. Charles Mynors (1995) Listed Buildings and Conservation Areas FT Law & Tax , London
2. R.D.Pickard (1996) Conservation in the built environment , Longman, Harlow James Stevens Curl , Encyclopaedia of architectural terms , Donhead Publishing , 1993 Stewart
3. Stewart Brand, How buildings learn : What happens after they are built, London , Viking, 1994.

<b>AR 606</b>	<b>INTELLIGENT BUILDING SYSTEMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>1</b>	<b>0</b>	<b>2</b>

**PURPOSE**

This course enlightens the students about the components of intelligent  
buildings – automatic environment control systems, automatic emergency  
systems, automatic security systems and flexible furniture systems

**OBJECTIVES**

- Knowledge about intelligent building management and energy efficient systems
- Application of these technologies to current building practices

**UNIT I INTRODUCTION TO INTELLIGENT BUILDING 5**

The emergence of the intelligent office building in USA, Japan and Europe,  
Alternative intelligent building scenario

**UNIT II DESIGN OF INTELLIGENT BUILDINGS 10**

Choosing and installing a building management system, Integration of fire and  
security system in intelligent building, Sensing and control system

**UNIT III MANAGEMENT OF INTELLIGENT BUILDINGS 10**

Building energy management – trends and advances in energy management  
systems, Building management systems for retrofit , Shared tenant services

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**UNIT IV NETWORKING 10**

Cable management - Fibre optic network design for intelligent buildings -  
Generic requirements for intra-building optical fibres - Beyond the intelligent  
building – EDI (electronic data interchange) and telecommuting

**UNIT V THE FUTURE 10**

Intelligent design teams - Expert systems and intelligent building - The future  
of communities, buildings and building systems

**TOTAL 45**

**REFERENCES**

1. Ed. By Stephen Mc clelland, Intelligent buildings, IFS publication, 1988
2. Proceedings of the conference held in London April 1987, High Tech Buildings, online publications 1987
3. Bernaden. A & R.E.Neuba, Intelligent building source book, Fairmount press inc. 1988
4. Riewoldt otto, Intelligent spaces-Architecture for the information age
5. Andrew Harrison et al., Intelligent building in south east asia, IB Asia lts. 1998

<b>AR 608</b>	<b>ADVANCED COMPUTER STUDIO – II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>8</b>	<b>4</b>

**PURPOSE**

This course gives an integrated approach in building design and management  
by integrating the concepts of CAD in creating 2D and 3D presentations with  
the process of estimation, information management and documentation  
practices.

**CONTENTS**

- Introduction to parametric software; Concept of integrated project management with reference to the software
- Design (2D/3D) and graphic module; Graphic component editing; Rendering and visualization module
- Parametric modelling techniques; Interoperability of software; Concepts of bi-directional associativity;
- Project documentation; Building information management; Automated estimation and scheduling
- Change management and information reuse; Data sharing
- Exercises integrating all the above features

**TOTAL 120**

12

## REFERENCES

1. Revit Reference manual, Autodesk Inc.
2. Revit user Guide, Autodesk Inc.

<b>AR 610</b>	<b>DESIGN STUDIO - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>HIGH RISE BUILDINGS</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>4</b>

## PURPOSE

Students will be thorough in their understanding of the programme requirements and design of tall buildings.

## OBJECTIVES

- Students will use Internet and library resources provided to develop a thorough understanding of the facilities and standards required in the design problem.
- Students will understand the problems associated with services and structural problems associated with high rise, tall structures.

## DESIGN PROJECT – I

### PLANNING & DESIGN OF HIGH RISE BUILDINGS 90

Students would be required to prepare detailed plans and sections of any suitable tall building after careful site selection and with regard to the function, imageability, climatic & cultural aspects. They would be encouraged to study and apply suitable structural and service systems after acquiring knowledge about design standards & case studies of contemporary high rise buildings. Special features of skyscrapers such as service floors, sky lobbies, express elevators, skip stage pumping system, fire fighting arrangements etc., will be given importance.

## DESIGN PROJECT – II

### MULTIUSE STRUCTURES 90

Multiuse structures which incorporate commercial spaces in the lower floors, office spaces in the upper floors and residential apartments at the top floors have become the emerging typology in many cities worldwide. Students will be encouraged to investigate this type of buildings and explore design solutions that would lead to a smooth integration of various functions, while keeping in mind the cultural and local factors. Integration of intelligent building management systems that lead to energy efficiency, intelligent security and enhanced fire fighting services would be mandatory. Students will be encouraged to design building form and fabric in response to the cultural values and lifestyle that is in vogue in Indian cities.

**TOTAL 180**

## REFERENCES

1. John Zukowsky - Skyscrapers , New millennium - Prestel, London.
2. Harriet Scoenholz Bee-Tall Buildings, The museum of modern art- The museum of modern art ,New York – 2003
3. Johasin Eiselle & Ellen Klofr –High rise manual – Typology design construction & Technology - Birkhanser,Basel - Switzerland – 2003
4. Mathew Wells - Skyscrapers , Structure & Design - Lawrence King publishing London 2005.
5. Judith Dupre -Skyscrapers ,History of the world's most famous skyscrapers – Blackdog & Leventhal publishers ,New York 1996.
6. Hamzah T.R & Ken Yeang- Ecology of the sky – Images publishing ,Victoria 2001.
7. Riewoldt (Otto) –Intelligent spaces –Architecture for the information age- Lawrence King , London -1997

## III SEMESTER

<b>AR 701</b>	<b>ENVIRONMENTAL STRATEGIES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

## PURPOSE

The aim of this course is to foster awareness about environmental issues and to explore environmental strategies that ensure environmental protection. Also the development of knowledge about EIA of large scale urban projects & their legal aspects is intended.

## OBJECTIVES

- To train scholars in the methodology of preparing EIA for facilities planned at a city level (Airport, transportations notes etc)
- To expose students to the legal & economical aspects of environmental management.

## UNIT I APPROACHES AND STRATEGIES

Global and National environmental issues , Sustainable resource management and strategies for sustainable development – Environmental strategies for developing environmental awareness and protection.

## UNIT II LEGAL ASPECTS

National and International standards for environmental quality , MINAS , BIS – Rationale for environmental legislation – Overview of international protocols , Indian environmental legislation and regulatory system – regulatory non-compliance liabilities – environmental audit.

### UNIT III ENVIRONMENTAL ECONOMICS

Environmental marketing , environmental labeling and certifications, ISO14,000 – Environmental management systems – Trade and the environment – International trade agreement – cost of cleaner environment – fiscal incentives and disincentives – market based instruments – environmental damage costing.

### UNIT IV ENVIRONMENTAL IMPACT ASSESSMENT

EIA of projects – regional and strategic assessments – elements of EIA – prediction and assessment of impacts on the physical – chemical, biological and socio economical environmental – EIA methodologies, cost-benefit analysis, comparison of alternatives, public participation, mitigation plans, monitoring plans, environmental management plan – expert system in EIA - use of regional AQM – carrying capacity studies – life cycle analysis – post project audit procedures.

### UNIT V CASE STUDIES

Case studies on EIA of development projects and on environmental auditing.

**TOTAL 45**

### REFERENCES

- 1, Larry W. Canter – Environmental impact assessment – McGraw-Hill publishers 1996.
- 2, EIA Manual – Download from the website of ministry of environment & forests (MOEF) – Government of India.

<b>AR 703</b>	<b>REAL ESTATE MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

### PURPOSE

- To enable the students understand the concept of Real Estate management
- To give an overview of the Real Estate Market to the students
- Providing exposure, at an advanced level, to the wide range of issues that reflect the principal areas of specialization in the real estate profession;
- Stimulating an awareness of the issues involved in international real estate;
- Developing analytical and methodological skills that are critical for management, decision-making and problem-solving roles.

### OBJECTIVES

By the end of the course, students will be thoroughly exposed to the aspects of Real Estate Management. .Students shall be capable of managing retail real estate and corporate real estate effectively.

### UNIT – I REAL ESTATE DEVELOPMENT

Fundamental concepts and techniques, recognizing institutional and entrepreneurial elements, issues encountered in various phases of development like site evaluation and land procurement, development team assembly, market study and development scheme, construction and project management, project marketing and hand-over of completed projects.

### UNIT – II DEVELOPMENT & PROJECT FINANCING

Project Feasibility, Development Financing, Asset Disposal and Redevelopment Options, Analyses of Development Sites and Case Studies, integrated case study on a specific development project, which requires reviewing, analysing and resolving the problems or strategic issues.

### UNIT III URBAN POLICY & REAL ESTATE MARKETS

Impact of Government Regulations and Public Policies on Real Estate Markets, include urban land rent and location theories, land use structures, community and neighbourhood dynamics, degeneration and renewal in urban dynamics, private-public participation, government policies on public and private housing, and urban fiscal policy including property taxation, local government finance.

### UNIT IV CORPORATE REAL ESTATE ASSET MANAGEMENT

Strategic plans to align real estate needs with corporate business plans; Performance measurement techniques to identify asset acquisition or disposal; methods for enhancing value through alternative uses, efficient space utilization or improving user satisfaction.

### UNIT V COMMERCIAL REAL ESTATE APPRAISAL

Determination of the capitalization rates across different types of properties; Appraisal of freehold and leasehold interests; Critical analysis of the valuation approaches adopted for securitized real estate; Asset pricing models; investment flexibility and future redevelopment opportunities.

**TOTAL 45**

### REFERENCES

1. Barron's real estate hand book V Edition, Hauppauge, NY, Barron , 2001
2. Project planning scheduling & control in construction an encyclopedia of terms & applications , New York, Wiley, 1995



<b>AR 705</b>	<b>SUSTAINABLE DEVELOPMENT &amp; TECHNOLOGIES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>1</b>	<b>0</b>	<b>2</b>

<b>UNIT I</b>	<b>INTRODUCTION</b>				<b>6</b>
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Sustainable development - need, issues and goals.

<b>UNIT II</b>	<b>ANALYSIS OF THE URBAN ENVIRONMENT</b>				<b>9</b>
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Quantifying the urban environment - application of remote sensing; urban heat islands; prediction and evaluation of the urban environment; ecological footprint of cities.

<b>UNIT III</b>	<b>ENERGY AND THE BUILT ENVIRONMENT</b>				<b>9</b>
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Energy and sustainability issues in the building environment; basics of energy- definitions and terminology, energy flows and balance; techniques of Life Cycle Assessment –applied to building materials.

<b>UNIT IV</b>	<b>SUSTAINABLE TECHNIQUES</b>				<b>9</b>
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Sustainable techniques to maintain and / or improve air quality, water quality and biodiversity; transport systems; urban forestry, park system and greenways.

<b>UNIT V</b>	<b>CASE STUDIES</b>				<b>12</b>
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Case studies on sustainable development - study of urban form, city quarter, urban street block and green buildings.

**TOTAL 45**

**REFERENCES**

1. Anna Ray - Jones, Sustainable Architecture In Japan wiley- academy, 2000.
2. Cliff Moughtin, Urban Design: Green Dimensions Reed Educational And Professional Publishing Ltd. 1996
3. Sandra Mendler, William Odell, The Guide Book Of Sustainable Design, John Wiley & Sons, 2000.
4. Lawson.B , Bulding Materials, Energy And The Environment; Towards Ecologically Sustainable Development Raia, Act, 1996

<b>AR 707</b>	<b>GIS STUDIO</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>GIS modelling in Urban &amp; Regional planning</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>4</b>

<b>UNIT I</b>	<b>INTRODUCTION</b>				<b>30</b>
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Classification of spatial and non-spatial data – application of spatial data in urban and regional planning – objectives and functions of GIS models in Urban and Regional planning

<b>UNIT II</b>	<b>SPATIAL DATA INPUT</b>				<b>30</b>
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Defining the objectives of a GIS planning problems – Identification of required spatial data layers – coding schemes – digitisation of spatial data – editing spatial data usable for the given planning problem

<b>UNIT III</b>	<b>ATTRIBUTE DATA INPUT</b>				<b>30</b>
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Role of attribute data in defining geographic features – adding attribute data file – topology generation – joining attribute data to its geographic features

<b>UNIT IV</b>	<b>SPATIAL ANALYSIS USING GIS</b>				<b>30</b>
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Performing overlay functions – manipulating attribute data – GIS modelling – map and report generation – case problems on regional analysis, impact assessment study, project formulation and land suitability analysis

**TOTAL 120**

**REFERENCES**

1. Brail K.R. (1990) Integrating GIS into Urban and Regional planning. Alternative approaches for developing countries. Regional development Dialogue, Vol.11, No.3, UNCRD, Japan 1990
2. Cartwright T.J. (1991) Information Systems for Urban and Management in Developing countries. The concept and reality, computers, environment and urban systems Vol.15, 1991
3. Klosterman RE. (1990) Micro computer packages for planning Analysis, American planning Association Journal, Autrenn, 1990
4. ERSI (1992) Understanding GIS. The ARCI INFO methods, ERSI, USA
5. Tomlin C.D. (1990) Geographic Information systems and cartographic Modelling, Prentice Hall, Englewood cliffs, U.S.A.

<b>AR 709</b>	<b>DESIGN STUDIO III</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>ENVIRONMENTAL PLANNING &amp; DESIGN</b>	<b>0</b>	<b>0</b>	<b>12</b>	<b>6</b>

**PURPOSE**

Students will be exposed to the principles of environmental planning and understanding of ecological, social and economic factors while planning for sustainable development of hilly areas and coastal buildings.

**OBJECTIVE:**

- Students will use Internet and library resources provided to develop a thorough understanding of the facilities and standards required in the design problem.

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- Students will understand the problems associated with the environment.

## DESIGN PROJECT

### PLANNING AND DESIGN FOR TOURISM IN HILL / COASTAL AREAS

Hill and coastal areas are environmentally fragile due to their location, topography and natural vegetation. They are especially vulnerable in our country where the population density is very high and the environmental byelaws are not stringent. Environmental analysis of such areas and their development for tourism requires an inter disciplinary approach involving remote sensing, Geographical information systems, environmental modeling techniques, ecological sustainability and socio economic factors.

Scholars will be encouraged to conduct case studies of such environmentally susceptible hill / coastal areas and analyze the same using Satellite imagery, GIS software, environmental modeling techniques and field surveys. Moreover analysis of these areas for tourism development and land suitability will be carried out in order to develop a broad framework for planning and development. Students would be encouraged to investigate the special building rules and byelaws prevalent for hill / coastal areas from an ecological perspective.

Both hill & coastal areas are rich in resources such as scenic areas, views and vistas .Hence while planning for the optimized development of these areas scholars have to consider the visual impact assessment as an integral part of environmental impact assessment, so as to conserve hill sites and coast. It can be inferred that this exercise would advocate a balanced approach between conservation, sustainability & development.

**TOTAL 180**

### REFERENCES

1. Robert Kay & Jacqueline Alder -Coastal planning & Management – E& F spon New York -1999
2. James Steel – Ecological Architecture –A critical history , Thames and Hudson ,London 2005.
3. Anna Ray Jones -Sustainable architecture in Japan –Green buildings of Nikken Sekkei - John wiley & sons , W.Sussex 2000
4. Saudra Mendler & William Odell –A guide book to Sustainable design , John wiley & sons USA ,2000.3
5. George F.Thompson & Frederick R.Steiner -Ecological design &Planning , John wiley & sons , Canada 1997.

## ELECTIVE -I

<b>AR612</b>	<b>NEW AGE MATERIALS AND CONSTRUCTION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>1</b>	<b>0</b>	<b>2</b>

### PURPOSE

To expose the students to the new construction materials used in the construction industry and the state of art and technology in building construction.

### OBJECTIVES

The student will learn the detailing and construction of buildings using modern building materials like stainless steel, plastics, glass reinforced concrete etc., involving new techniques in construction.

### UNIT I MATERIALS AND CONSTRUCTION DETAILS FOR CURTAIN WALLS 9

Glass curtain walls, steel cladding, aluminum cladding, and other metallic / non-metallic cladding details for multi-storied buildings. Ribbed metal cladding systems. Sloping and curved glass walls, Steel plate shear walls. Metallic cladding – for roof.

### UNIT II MATERIALS AND CONSTRUCTION DETAILS OF TENSILE STRUCTURES 9

Achievement of shape - curvature, pre-stressing and supports; Materials – fabric and high strength cables; Multiplicity of tents and achieving complexity of form; fabrication and erection details. Pneumatic structures – materials; construction details and erection procedure.

### UNIT III MATERIALS AND CONSTRUCTION DETAILS FOR SPACE FRAMES AND SPACE TRUSSES 9

Long-span trussed arched roof ; steel space frames using box sections, angles, channels and tubes ; Geodesic domes. Materials, support systems, construction and erection details.

### UNIT IV PREFABRICATION 9

application in housing, steel structural systems for high-rise buildings, long span structures, space trusses and RCC vierendeel trusses. Dismantlable structures, movable staircases.

**UNIT V PLASTIC 9**  
 Plastic as a structural material – load bearing plastic spandrel panels, fiberglass plastic application in construction.

**TOTAL 45**

**REFERENCES**

1. Details in Architecture – creative detailing by some of the world’s leading architects, The Images Publishing Group Pty Ltd., Australia, 1999.
2. Engineering & Architecture, Architectural Design Profile 70, Academy Group Ltd., London, 1987.
3. Robert E. Fischer, Engineering for Architecture, Mcgraw-Hill book company, New York, 1980.
4. Fred Nashed. AIA, Time-saver details for Exterior Wall design, McGraw Hill, USA, 1996.
5. Belen Garcia, Earthquake Architecture, Paco Asensio.

<b>AR 614</b>	<b>COMPUTER AIDED STRUCTURAL DESIGN</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>1</b>	<b>0</b>	<b>2</b>

**PURPOSE**

By the end of the course, the students shall be capable of discriminating the various structural softwares and selecting the appropriate one for the given structure. They shall also be confident enough to analyse simple problems independently.

**OBJECTIVES**

To expose the students to computer analysis of structures and enable the students to use structural analysis for simple 2D and 3D structures.

**UNIT I COMPUETR AIDED DESIGN 5**

Introduction to computer aided structural analysis methods – stiffness method – concept of forming stiffness martin for element and transforming into global stiffness matrix ( only brief outline) – use of computers to facilitate the same.

**UNIT II STRUCTURAL ANALYSIS 10**

Introduction to structural analysis softwares – GTD STRUDL , STAAD PRO, SAP 2000, ANSYS –their relative merits and demerits – applications.

**UNIT III SOFTWARE FOR DESIGN 10**

Familiarisation with usage of structural engineering software – input commands co – ordinate systems geometry creation – member connectivity – member properties – materials constant – loading – load combinations – analysis commands – design.

**UNIT IV ANALYSIS OF STRUCTURES I 10**

Analysis and design of 2D single storey rigid frames – Taking out design forces – design (Gravity and wind loads only)

**UNIT V ANALYSIS OF STRUCTURES II 10**

Analysis and design of 3D –single storey and multi storied buildings – taking out design (Gravity and wind loads only)

**TOTAL 45**

**REFERENCES**

1. Finite element methods by C.S.Krishnamoorty
2. Moshe F.Rubinstein ,Matrix computer analysis of structures, Prentice –Hall Inc , Englewood cliffs New Jersey.
3. STAAD Manual for STAAD PRO 2000, R&D Engineers .
4. Manual for GT.STRUDL.

<b>AR 616</b>	<b>LANDSCAPE CONSTRUCTION</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>1</b>	<b>0</b>	<b>2</b>

**PURPOSE**

This course enlightens the students about the components of landscape features and the construction of the same.

**OBJECTIVES**

Knowledge of the various features of innovative and modern landscape design application of innovative detailing and appropriate technologies to further better landscape planning.

**UNIT I DESIGN OF LANDFORMS 9**

Contours – representation of land forms design, interpolation of contours slope analysis, uses and function, grading – symbols and abbreviations, basic grading exercises, grading & aligning of roads and paths. earth works-principles of earthwork, cut and fill calculations- precautions to be taken in earth fill methods in relation to precipitation and soil conditions.

**UNIT II WATER AS RESOURCE 9**

Use of water in an appropriate context of time, political / religious power, way of thinking, technical advancements and influences from other regions. Qualities of water and scopes of display, drainage- surface drainage, calculation of surface run off, design of surface and storm water drainage. Design of water such as swimming pools, cascades fountains etc., and their technical requirements, considerations for design and detail. Water bodies, natural ponds.

**UNIT III HARD LANDSCAPES 9**

Design of detail of hard landscape , roads, paving, barriers, edge conditions functions, types criteria for selection, design aspects, detail design. Low energy design and construction- application of low energy architecture in landscape design, special emphasis on solar energy and lighting.

**UNIT IV OUTDOOR LIGHTING 9**

Design of technical terms , types of electrical lighting, types of fixtures, auxiliary fixtures principles of design for outdoor lighting, design and type of effects with electrical lighting, safety precautions with electrical lighting , electrical accessories and their installation.

**UNIT V STREET FURNITURE 9**

Criteria for the selection of materials and specifications for street furniture in various environments. Design of sign ages and simple outdoor structures like pavilions, gazebos etc., Use of waste materials in landscape architecture, recycling and re use of materials and their impact on landscape design.

**TOTAL 45**

**REFERENCES**

1. Dietrich ,Kerrs , Landscape construction 1994
2. Charles.W.Harris an Nicholas .T.Dines , Times saver standards fir Landscape architecture, Mc Graw hill 1985.

**ELECTIVE –II**

<b>AR 711</b>	<b>VERNACULAR BUILDING TRADITIONS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>1</b>	<b>0</b>	<b>2</b>

**PURPOSE**

This course enlightens the students about the components of vernacular buildings – building material and construction used in vernacular architecture.

**OBJECTIVES**

Knowledge about vernacular building technologies and their use in contemporary buildings , use of natural materials and energy efficient systems ,application of these technologies to current building practices.

**UNIT I INTRODUCTION 9**

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Traditional principles of planning, primitive forms , symbolism, color, folk art etc., in the architecture of rural and tribal India ; deserts of Rajasthan , Kutch and subterranean architecture of Gujarat.

**UNIT II VERNACULAR BUILDING TRADITIONS–NORTH INDIA 9**

Wooden houses, Mansions (Havelis ) Gujarat and Rajasthan – Shekawati Havelis, Havelis at Jaisalmer ,House boats (Dhungas), Kashmir – materials of construction and constructional details – settlement planning

**UNIT III VERNACULAR BUILDING TRADITIONS – SOUTH INDIA 9**

Wooden houses, palaces and theatres & family homes (Tharavads) in Kerala, constructional details such as joinery and elements of climate control. Chettinad houses and palaces in Tamilnadu – Lime plaster work, Heritage tiles, Wooden pillars – constructional details –Principles of planning, proportion and religious practices and social customs in relation to settlement planning.

**UNIT IV COLONIAL INFLUENCES 9**

Colonial influences on the Traditional Architecture of Christian houses, Colonial architecture of Goa – concept of a Bungalow, evolution of the verandh and other colonial elements of design & style. Architecture of Bengal and Victorian villas. Chisholm and Henry Irwin and the evolution of Indo Sarcenic architecture European construction techniques in such buildings and the influence of the vernacular traditions.

**UNIT V SECULAR ARCHITECTURE 9**

Medieval period – citadels, palaces, towers, gateways, public buildings etc in the towns of Jodhpur, Jaisalmer, Jaipur, Udaipur & Gwalior. Planning principles elements of style, climate control and constructional details of the same.

**TOTAL 45**

**REFERENCES**

1. Carmen Kagal ,VISTARA- The Architecture of India ,Pub –The Festival of India, 1986.
2. V.S.Pramar Haveli – wooden houses and Mansions of Gujarat, Mapin publishing pvt ltd, Ahmedabad, 1989
3. Kulbushan Jain and Minakshi Jain –Mud Architecture of the Indian Desert Aadi centre, Ahmedabad, 1992.
4. G.H.R.Tillotsun – The Tradition of Indian Architecture continuity, controversy and change since 1850, Oxford university press, Delhi 1989.
5. Suzaneeslein and Stafford Clief, Indian style , Clarkson N.Potter inc , New York, 1999.

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<b>AR 713</b>	<b>BIO ARCHITECTURE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>1</b>	<b>0</b>	<b>2</b>

**PURPOSE**

This course enlightens the students about the evolution of Green buildings- Building material choices, concepts and construction techniques , rating systems and evaluation techniques used in Green Architecture.

**OBJECTIVES**

- Knowledge of the environment and the ecosystems and about the use of energy efficient technologies in contemporary buildings, use of natural materials and water conservation techniques.
- Rating of current buildings.

**UNIT I SUSTAINABILITY & GREEN BUILDING 9**  
Brief understanding of food & energy cycles, Principals of sustainability in Natural Ecosystems. Elements of green development- Introduction root of green architecture – green building design- benefits- rating system- LEEDS

**UNIT II SITE SELECTION & DEVELOPMENT 9**  
Sustainable design, environmental impacts of building and construction .Natural strategies to protect natural resources. Land use patterns and sustainable concepts in development of appropriate sites.  
Site development, site selection – re – use of existing buildings / sites.

**UNIT III WATER EFFICIENCY 9**  
Strategies to reduce water consumption in buildings- low flow plumbing fixtures of water efficient appliances rain water harvesting reuse of grey water for non potable uses wetlands for natural waste water treatment, use of wetlands for natural storm water and vegetated roof tops. Concept of energy efficiency and system performance, optimising building envelope configuration/ design for energy efficiency and passive solar strategies, current concepts in energy efficient design with regard to thermal comfort and lighting. Exploring (natural) renewable power source such as photo voltaics, solar hot water fuel cells etc.

**UNIT IV BIO DEGRADABLE MATERIALS AND RECYCLING 9**  
Concept of embodied energy, performance and life cycles of building materials selection of sustainable materials that reduce pollution during manufacture, installation and maintenance. Innovative use of recycled materials, recycling

waste segregation, collection and disposal use of appropriate native plant material in landscape architecture.

**UNIT V CASE STUDIES 9**  
Residences, institutional building and offices- apartments high – rise buildings and skyscrapers.  
Few examples- works of Ken Yeang, CII Centre at Hyderabad, TERI Building at Bangalore and relevant examples from India and the rest of the world.

**TOTAL 30**

**REFERENCES**

1. Anna ray – Jones, Sustainable architecture in Japan- The Green buildings of Nikken Sekkei , Wiley – academy 2000.
2. Architecture and the environment – Bio climatic building design – David Lloyd (Laurence king Publishers, London , 1998.
3. Sustainable architecture low tech houses- Charles Broto & Arian Mostedi Pub: Joseph Ma Minguet 2002.
4. Energy efficient buildings in India – Milli Majumdar. TERI publication and Ministry of non conventional energy sources, 2001
5. Ecology of the sky – Ivor Richards, The images publishing groups , 2001

<b>AR 715</b>	<b>FINANCIAL MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>1</b>	<b>0</b>	<b>2</b>

**PURPOSE**

The course aims to deliver the basic concepts of Finance Management in an Architectural perspective.

**OBJECTIVES**

- To study the investment decisions
- To estimate the cash inflow and outflow
- To study elements of profit formulation and appraising.

**UNIT – I INTRODUCTION 9**  
The Need, Scope of Financial Management, Types of Financing, Short term and Long term, Internal generation of funds, Role of an Architect in taking finance decisions.

**UNIT – II CAPITAL BUDGETING 9**  
Time value of money, cost of capital, cash flows, Capital Budgeting, Evaluations, Selection and Execution of Capital Budgeting, Limitations of Capital Budgeting

**UNIT – III CASH FLOW ANALYSIS 9**  
Investment Analysis, Planning, Organisation and Control of Capital Expenditure Traditional (Payback ARR) Discounted cash flow (NPV, PI, IRR etc.)

**UNIT – IV PROJECT FINANCING 9**  
Project Financing, Financial Institutions in the field of Housing, Infra-structure development, Participation of Private Sectors in project financing

**UNIT – V MANAGEMENT IN PROJECTS 9**  
Real estate management, Asset liability management, Role of Asset vs. Property management, Reduction of cost in the construction, Profit scheduling implementation control techniques, Financial reporting, solving management issues (case)

**TOTAL 45**

#### **REFERENCES**

1. Prasanna Chandra – Financial Management, Tata McGraw Hill, New Delhi, 2004
2. Im Pandey, Vikas Publishing Co, New Delhi, 2004
3. S.N. Maheswari, Financial Management, Sultan & Sons, Delhi, 2004
4. P.V.Kilkarni, Financial Management, Himalaya Publishing Co. Mumbai, 2004
5. James C. Van Horne, Financial Management, Tata McGraw Hill, New Delhi, 1997