

# **CURRICULUM AND SYLLABUS**

**(applicable to students admitted from 2023-2024 onwards)**

**For**

## **Bachelor of Architecture (B.Arch.) Programme**



**NATIONAL INSTITUTE OF TECHNOLOGY  
TIRUCHIRAPPALLI – 620 015  
TAMIL NADU, INDIA  
2023**

# CURRICULUM

## SEMESTER I

Code	Course of Study	L	T	P	C
AR101	Environmental Science	3	0	0	3
AR103	History of Architecture - I	3	0	0	3
AR105	Theory of Architecture	3	0	0	3
AR107	Architectural Graphics - I	1	0	4	3
AR109	Communicative English	2	0	2	3
AR111	Basic and Architectural Design - I	0	0	9	7
AR113	Visual Arts - I	0	0	5	3
	NCC, NSS, NSO				
	<b>Total</b>	<b>12</b>	<b>0</b>	<b>20</b>	<b>25</b>

## SEMESTER II

Code	Course of Study	L	T	P	C
AR102	Computer Applications in Architecture - I	1	2	0	3
AR104	History of Architecture - II	3	0	0	3
AR106	Mechanics of Solids	2	1	0	3
AR108	Architectural Graphics - II	1	0	4	3
AR110	Building Construction and Materials - I	1	0	4	3
AR112	Architectural Design - II	0	0	9	7
AR114	Visual Arts - II	0	0	5	3
	NCC, NSS, NSO				
	<b>Total</b>	<b>8</b>	<b>3</b>	<b>22</b>	<b>25</b>

### SEMESTER III

Code	Course of Study	L	T	P	C
AR201	Computer Applications in Architecture - II	1	2	0	3
AR203	History of Architecture - III	3	0	0	3
AR205	Structural Analysis	2	1	0	3
AR207	Building Construction and Materials - II	1	0	4	3
AR209	Surveying and Site Planning	2	0	2	3
AR211	Architectural Design - III	0	0	8	8
AR213	Model Making	0	0	4	2
	<b>Total</b>	<b>9</b>	<b>3</b>	<b>19</b>	<b>25</b>

### SEMESTER IV

Code	Course of Study	L	T	P	C
AR202	Climate Responsive Architecture	3	0	0	3
AR204	Concrete Technology	3	0	0	3
AR206	Contemporary Architecture	3	0	0	3
AR208	Water Supply and Drainage	3	0	0	3
AR210	Building Construction and Materials - III	1	0	4	3
AR212	Architectural Design - IV	0	0	8	8
AR214	Strength of Materials Laboratory	0	0	4	2
	<b>Total</b>	<b>13</b>	<b>0</b>	<b>17</b>	<b>25</b>

### SEMESTER V

Code	Course of Study	L	T	P	C
AR301	Architectural Acoustics	3	0	0	3
AR303	Design of R.C.C. Structures	2	1	0	3
AR305	Lighting and Electrical Services	3	0	0	3
AR307	Building Construction and Materials -IV	1	0	4	3
AR309	Interior Design	2	0	2	3
AR311	Architectural Design - V	0	0	8	8
	Elective -I	0	0	4	2
	<b>Total</b>	<b>11</b>	<b>1</b>	<b>18</b>	<b>25</b>

### SEMESTER VI

Code	Course of Study	L	T	P	C
AR302	Air-conditioning and Mechanical Services	3	0	0	3
AR304	Estimation and Specification	2	1	0	3
AR306	Landscape Architecture	3	0	0	3
AR308	Building Construction and Materials -V	1	0	4	3
AR310	Architectural Design - VI	0	0	8	8
AR312	Architectural Working Drawings	0	0	4	2
	Elective -II	3	0	0	3
	<b>Total</b>	<b>12</b>	<b>1</b>	<b>16</b>	<b>25</b>

### SEMESTER VII

Code	Course of Study	L	T	P	C
AR401	Building Structural System	2	1	0	3
AR403	Energy Efficient Buildings	3	0	0	3
AR405	Disaster Resistant Building Design and Management	2	0	0	2
AR407	Urban Design	3	0	0	3
AR409	Building Construction and Materials -VI	1	0	4	3
AR411	Architectural Design -VII	0	0	8	8
	Elective-III	3	0	0	3
	<b>Total</b>	<b>14</b>	<b>1</b>	<b>12</b>	<b>25</b>

### SEMESTER VIII

Code	Course of Study	L	T	P	C
AR402	Professional training (one semester)	0	0	0	15
	<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>15</b>

**SEMESTER IX**

<b>Code</b>	<b>Course of Study</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
AR501	Building Bye-Laws and Codes of Practice	3	0	0	3
AR503	Environment and Behavior	3	0	0	3
AR505	Urban Planning	3	0	0	3
AR507	Architectural Design - VIII	0	0	8	8
AR509	Dissertation – I	0	0	4	2
	Elective - IV	3	0	0	3
	Elective - V	3	0	0	3
	<b>Total</b>	<b>15</b>	<b>0</b>	<b>12</b>	<b>25</b>

**SEMESTER X**

<b>Code</b>	<b>Course of Study</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
AR502	Building Economics and Construction Management	2	1	0	3
AR504	Professional Practice	3	0	0	3
AR506	Dissertation -II	0	0	16	16
	Elective - VI	3	0	0	3
	<b>Total</b>	<b>8</b>	<b>1</b>	<b>16</b>	<b>25</b>

## LIST OF ELECTIVES

Sl. No.	Sem	Elective	Code	Electives	L	T	P	C
1.	V	I	AR351	Advanced Computer Applications	0	0	4	2
2.			AR353	Graphic Design	0	0	4	2
3.			AR355	Photography, Art and Visual Communication	0	0	4	2
4.			AR357	Seminar on Contemporary Architecture	0	0	4	2
5.			AR359	Global / Other Department Elective	2	0	0	2
6.	VI	II	AR352	Vernacular Architecture	1	0	3	3
7.			AR354	Barrier Free Environment	3	0	0	3
8.			AR356	Facilities Programming	3	0	0	3
9.			-	Global / Other Department Elective	3	0	0	3
10.	VII	III	AR451	Product Design	1	0	3	3
11.			AR453	Environmental Control and Design Workshop	1	0	3	3
12.			AR455	Landscape Design	0	0	5	3
13.			-	Global / Other Department Elective	3	0	0	3
14.	IX	IV	AR551	Sustainable Architecture	3	0	0	3
15.			AR553	Cost efficient Construction Techniques	3	0	0	3
16.			AR555	Industrial Architecture	3	0	0	3
17.	IX	V	AR557	Building Automation and Management Systems	3	0	0	3
18.			AR559	Construction Technology	3	0	0	3
19.			AR561	Environmental Planning	3	0	0	3
20.	X	VI	AR552	Housing	3	0	0	3
21.			AR554	Architectural Conservation	3	0	0	3
22.			AR556	Architectural Journalism	3	0	0	3

# SYLLABUS

## SEMESTER – I

### AR101 ENVIRONMENTAL SCIENCE

Natural resources and associated problems. Role of and function of an ecosystem. Energy flow in the ecosystem. Introduction, types, characteristic features, conservation of natural resources. Equitable use of resources for sustainable lifestyles. Concept, Structure, structure and function of various ecosystems.

**Biodiversity:** Genetic, species and ecosystem diversity. Bio geographical classification of India. Value of biodiversity: Biodiversity at global, national and local levels. Hot spots of biodiversity. Threats to biodiversity: Endangered and endemic species of India. Conservation of biodiversity.

**Environmental Pollution:** Definition, Causes, Effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, and nuclear pollution. Role of an individual in prevention of pollution. Disaster management: Floods, earthquake, cyclone and landslides.

Social Issues: Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people. Environmental ethics. Climate changes and global warming. Environmental protection Act. Public awareness.

Human Population: Population growth, Population explosion, Environment and human health. Human rights. Value education. HIV/AIDS, Women and Child Welfare. Role of information Technology in Environment and human health.

### REFERENCES

1. MillerT. G Jr., Environmental Sciences, Wadsworth Pub Co. (TB)
2. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, MT.2001, Environmental Encyclopedia, JaicoPubl. House, Mumbai, 1196p.

## **AR103 HISTORY OF ARCHITECTURE – I**

Introduction to Ancient World Architecture - A brief outline of the Neolithic revolution and its impact on built forms – brief study of a few ancient settlements – Jericho, Catal Huyuk, Hassuna, Koln-Lindenthal & Skara Brae. Egyptian Architecture - Evolution of Pyramids & cult temples.

Early Mesopotamian Architecture Eg. Ziggurat of Ur, Ur. Mayan Architecture Eg. Step Pyramid Complex, Tikal. Assyrian Architecture Eg. Palace of Sargon, Khorsabad. Persian Architecture Eg. Palace at Persepolis. A comparative study of all the styles of the ancient world.

Greek Architecture, Important construction techniques, Visual refinement (Optical correction), The Greek Orders, Brief description of the urban spaces, temples & other public buildings, Greek houses etc. Eg: Agora, Acropolis, Parthenon, Erechtheion & Theatre at Epidaurus - all in Athens.

Roman Architecture: A brief account of materials, structural systems adopted and construction techniques - The Roman Orders - a short description of Roman urban spaces, temples, thermae, basilicas, theatres, Pantheon amphitheatres, circuses & houses.

Early Christian Architecture: Evolution of church form, surface treatment and materials of construction. Eg.: St. Peters, Rome. Byzantine Architecture: Technique adopted to construct domes over rooms which are square in plan. General structural systems, surface treatment and materials of construction.

### **REFERENCES**

1. Sir Banister Fletcher, "A History of Architecture", Butterworth Heinmann 19th Edition, 1987.
2. "History of World Architecture (series): Vols. Titled Ancient Architecture, Primitive architecture, Greek architecture, Roman architecture & Byzantine architecture", 1980.



## **AR105 THEORY OF ARCHITECTURE**

An Introduction to Architecture. Scope of architecture. Context of built environment/ architecture in the fulfillment of human needs: functional, aesthetic and psychological, and the Architect's role in creation of the built environment. Architectural context and its influence on the built form- site, climate, material, culture. Vitruvian principles of architecture. Concept of beauty and varying dimensions- Philosophical, psychological, subjective & objective variations, social, regional & temporal variations. Basic principles of visual perception.

Elements of architecture- Basic elements: Point, line, plane & volume. Qualities of shape, color, texture, scale, proportion; qualities of surfaces, edges and openings; Form, space and their organizational pattern, relationships, hierarchy. Ordering principles.

Experiencing Architecture: Circulation- approach and entry, path configuration and access, sequence of spaces. Multi-sensory dimension of architectural design- Light, view, touch, hearing and smell.

Relationship of form and function in architecture. Evolution of styles in architecture. Elaboration on "function" in architecture- Pragmatic function, circulatory function, symbolic function, psychological function, cultural and contextual function etc. Importance of incorporation of empathy in design.

Introduction to Architectural design methodology and processes- Architectural programming- user requirements, needs, aspirations, socio cultural factors, economic factors, legal restraints, user activity spatial analysis; Site analysis; concept development; schematic design; working drawings; site execution. Liaison with other experts- Structural, services, construction, management etc.

### **REFERENCES**

1. Francis D.K. Ching, "Architecture-Form, Space and Order", Van Nostrand Reinhold Company, New York, 2007.
2. Simon Unwin, "Analysing Architecture", Routledge, London, 2003.
3. Yatin Pandya,"Elements of Space making", Mapin 2007.
4. Theo JM van der Voordt, Herman BR van Wegen., "Architecture in Use: An Introduction to the Programming, Design and Evaluation of Buildings", Architectural Press, Oxford, Burlington, 2005.

## **AR107 ARCHITECTURAL GRAPHICS - I**

Essentials and Principles of Architectural Graphics: Lines, Lettering, Dimensioning and application of simple Geometric Construction. Introduction to Scales, Representative Factor, Plain Scale, Diagonal Scale and Comparative Scale and its use in Architectural Drawings.

Introduction to Orthographic Projection: The Four Quadrants and the types of projection. Third Angle and First Angle Projection. Projection of Points, Lines and Planes. Orthographic Projection of Solids with emphasis on the First Angle method. Introduction to Projection on the Profile Plane/ Auxiliary Projection. Simple and Complex Solids, Shifting of the Object and Moving of the Plane. Sections of Solids and True Shape of the Section. Intersection/ Interpenetration of Solids.

Development of Surfaces: Parallel line and Radial line Development. Isometric Drawing and Projection: Difference between Isometric View and an Isometric Projection. Construction of Isometric scale- Methods. Simple and Complex Solids.

Learning to observe, measure and draw to scale the plans, elevations of simple objects such as Furniture and small Buildings.

### **REFERENCES**

1. K.L.Narayana & P. Kanniah, "Engineering Graphics - 1<sup>st</sup> angle projection", Tata McGraw Hill publishing company, NewYork,1992.
2. Prof. Vee Ess, "Step by Step Engineering Drawing (1<sup>st</sup> angle projection)", V.K.Publishers, Bangalore, 1990.
3. George A. Dinsmore, "Analytical Graphics", Van Nostrand Company Inc., Canada,1968.
4. Thomas E French, Charles J. Vierck & Robert J. Foster, "Graphic Science & Design", International Edition, McGraw Hill Co., NewYork,1986.

## **AR109 COMMUNICATIVE ENGLISH**

Skimming, scanning, inferring, predicting and responding to content - Guessing the meaning of words from contexts - Note making and vocabulary extension.

Listening and understanding recorded, structured talks and classroom lectures - Comprehending the matter - understanding the links between different parts of speech - practice in note taking.

Features of an effective Speech-Practice in speaking fluently - Dialogue practice-simple social exchanges - short extempore talks.

Effective sentences-cohesive paragraphs - clear and concise writing - Introduction to technical writing -Definition, Description, Instruction - Summary Writing practice. Use of library - Role of Bibliography, Table of contents, Index etc. - use of Dictionary.

## **REFERENCES**

1. Eric H. Glendinning & Beverly Holmstrom, "Study reading - a course in reading Skills for academic purposes", Cambridge University Press, 1992.
2. John Kirkman, "Good style - writing for science and technology", E&FN Spon, an Imprint of Chapman & Hall, 1992.

## **AR111 BASIC & ARCHITECTURAL DESIGN - I**

Exercises in Points & Lines. Organization of a large number of identical geometric shapes to obtain symmetrical and asymmetrical patterns. Family of shapes: developing various shapes from a given geometric shape - working out composition with such developed shapes.

Organizing a large number of identical geometric shapes to express a given theme. Combining different geometric shapes and making a unit of bigger/larger shape and using many such units and expressing a design/pattern. To give emphasis in the expression of design - introducing value & color.

To achieve focus and center of interest in design using different textural elements. Development of geometric pattern by division, subtraction, and addition or overlapping & to express them with the use of colors. Expressing a given theme in a geometric pattern.

Models/Sculptures to understand the evolution of three dimensional forms from two dimensional shapes. Additive model with similar forms and dissimilar forms made out of various mediums/materials. Subtractive model out of a given geometric form.

Models with linear members such as match sticks, reeds, etc. to understand geometric form and structure. Posters with a given theme. Collage with a given theme.

## REFERENCES

1. Marjore Elliott Bevin, "Design through Discovery", Holt Rinehart and Winton, NewYork, 1977.
2. George A Covington& Bruce Hannah," Access by Design", Van Nostrand Reinhold, 1996.
3. Owen Cappelman & Michael Jack Jordon, "Foundations in Architecture: An Anotated Anthology of Beginning Design Project", Van Nostrand Reinhold New York, 1993.
4. Charles Wallschlaggerm & Cynthia Busic-Snyder, "Basic Visual Concepts and Principles for Artists, Architects and Designers", McGraw Hill, New York 1992.

## AR113 VISUAL ARTS – I

Line, shapes, form, space, colour, value & texture - exercises given to meet the elements of art.

Balance, unity, pattern, emphasis, movement, rhythm & contrast are introduced and exercises to explain this conditions.

Free hand drawing exercises to be introduced to develop visual perception & thinking by drawing still life objects, furniture, equipment.

Outdoor exercises like sketching - buildings, streets, rows of buildings and human figures.

Exercises in different mediums for drawing/sketching - to provide sufficient training and practice in using various qualities of pencils, pen & ink. (Pencil, Charcoal, Lumograph Pencil). Understanding of anatomy for anthropometric studies.

## REFERENCES

1. Wayne Enstice, Melody Peters, "Drawing space, Form, Expression", Prentice hall, Englewood Cliffs, New Jersey, 1990.
2. Palmer John, "Drawing & Sketching", Brock Hampton Press,London,1993.

## **SEMESTER – II**

### **AR102 COMPUTER APPLICATIONS IN ARCHITECTURE –I**

Introduction to CAD, Intro to AutoCAD/ Precision Drawing & Drawing Aids/ Geometric Shapes

Setting up & controlling the AutoCAD drawing environment – Creating & Editing Commands. Organizing a drawing with layers

Advanced geometry editing – Creating & using Blocks – Inquiry Tools – AutoCAD Design Center. Internet and collaboration, Blocks, Drafting symbols, Attributes, Extracting data

Attributes – understanding object linking and embedding – Importing objects into AutoCAD using OLE working with OLE objects, Text annotation – Creating & Customizing Hatch patterns – Productive Dimensioning – Defining Text & Dimension Styles

Printing & plotting - creating a slide presentation – Drawing utilities – importing / exporting files.

#### **REFERENCES**

1. Mastering AutoCAD 2015 and AutoCAD LT 2015: by George Omura& Brian C. Benton (Jul 2014)
2. The Sketch Up Workflow for Architecture: Modeling Buildings, Visualizing Design, and Creating Construction Documents with Sketch Up Pro and Layout – by Michael Brightman, John Wiley & Sons, (May 2013)

### **AR104 HISTORY OF ARCHITECTURE-II**

Outline of ancient Indian architecture: the Indus valley civilization - city planning, one typical residence, granary, great bath; Evolution of early Aryan architectural forms - impact on architecture of later days; Outline of Buddhist architecture: the Hinayana and Mahayana phases; Evolution of the form of the Hindu temple – Gupta and early Chalukyan temples.

South Indian Hindu architecture: Pallava Architecture - Rock-cut Rathas & Mandapas, Shore temple, Mahabalipuram, Kailasanathar temple & Vaikunthaperumal temple,

Kanchipuram; Chola Architecture: Eg.: Brihadeswara temple, Thanjavur; Pandya & Madura Styles - Evolution of the Gopuram, City planning: Eg. Meenakshi temple, Madurai & Temple at Srirangam; Hoysala Style: Eg. Temple at Belur; a comparative study of all the South Indian styles.

Hindu architecture of other Regions: Orissa Style - Eg.: Lingaraja temple, Bhubaneswar; Indo-Aryan Style Eg.: Khandharia Mahadev temple, Khajuraho; Gujarat Style: (Hindu & Jain) Eg.: Dhilwara temple, Mt. Abu; a comparative study of the Dravidian and Indo-Aryan styles; a comparative study of the Buddhist and Hindu styles.

Indo Islamic architecture –advent and earlier phase: advent of Islamic architecture in India – background, characteristic elements, typical buildings – mosques, tombs etc.; Imperial era: Slave kings - Eg.: Qutub mosque, Qutubminar, Tomb of Nasir - ud - din Mohammed shah, Khilji dynasty - Eg.: Alai Darwaya, Tughlaq Dynasty - Eg. Tomb of Ghiyas - ud - din Tughlaq, Kirki mosque, Delhi. Sayyid and Lodi Dynasty - Development of Octagonal & Square tombs, Eg.: Mothi - Ki - Masjid.

Provincial styles: Jaunpur Eg. Jami Masjid of Jaunpur; Malwa - royal complex at Mandu; Gujarat - earlier period – Eg. Mosque at Broach, Jami Masjid at Ahmedabad, middle period - Eg. Mosque at Champanir, Teen Darwaza, evolution of Tombs, later period - Eg. Siddisayad mosque, Shah Alam Rauza, Adalaj - step well, Rani Rupavatis Mosque; Outline idea of Bijapur style; Mughal architecture: Babur Eg. Humayuns Tomb – Delhi, Akbar - Eg. Agra fort, Fathepursikri - site planning, Jodhabais palace, Birbal palace, Diwan-e- khas, Salim Chisti's Tomb & Buland Darwaza; Jahangir - Eg. Akbar's mausoleum at Sikandra, Shah - Jahan - Eg. Red fort, Jami Masjid at Delhi, Taj - Mahal - Agra.

## REFERENCES

1. Brown, Percy. "Indian Architecture: Buddhist & Hindu periods", Taraporewala & Sons, 1978.
2. "History of World Architecture series", Oriental/Faber & Faber Ltd., London, 1980.
3. Brown, Percy, "Indian Architecture (Islamic period)", DB Taraporewala Sons & Co, Mumbai, 1983.

## **AR106 MECHANICS OF SOLIDS**

Elasticity - stress & strain - Types of stresses - elastic limit - Hookes law - modulus of elasticity (young's modulus)- deformation of a body due to force acting on it - stresses in composite bars - relation between elastic constants. Introduction to strain energy.

Centroid - center of gravity of simple figures - C.G. by geometrical considerations - solid bodies - C.G. with cut out holes - moment of inertia - theorems of M.I. of parallel & perpendicular axes - M.I. of a circular section, hollow section - M.I. of composite sections - modulus of section.

Beams & support conditions - types of supports, shear force and bending moment diagrams for simply supported beams, cantilevers, and overhanging beams with concentrated, uniformly distributed and uniformly varying loads.

Theory of simple bending - stress distribution at a cross section due to bending moment and shear force moment of resistance - bending stresses in sections.

Statically determinate plane trusses, perfect and Imperfect frames - Deficient & Redundant frames - analytical methods for finding out the forces - method of joints.

### **REFERENCES**

1. S.S.Bhavikatti, "Strength of Materials", VIKAS Publishing House Pvt. Ltd., Chennai, 1997.
2. Vazirani & Ratwani, "Analysis of Structures", Khanna Publishers, New Delhi, 1996.
3. Khurumi, "Strength of Materials & Mechanics of Structures", Standard Publishing co. Ltd., New Delhi, 1996.
4. Srinath, "Advanced Mechanics of Solids", Tata McGraw Hill Co., New Delhi, 1996.

## **AR108 ARCHITECTURAL GRAPHICS –II**

Exercises to draw axonometric views. Introduction to Sciography, Shadow of points, lines and shapes. Shades and shadows of simple 2D – Planes. Shades and shadows of cube, pyramid, prism, cone, cylindrical forms and combination of these forms. Shades and Shadows of Complex built forms, Building Plans and Elevations. Use of Sciography in Site Plans with real examples.

Perspective projection concepts, Types of Perspective views, Picture plane, vanishing points, station point, horizon, cone of vision, line of vision, etc. Perspective Projection of simple & complex geometrical forms.

Perspective projection of interior views of buildings using two point and one point perspective views. Shades and shadows on the perspective view of interior of buildings.

Perspective projection of exterior views of buildings using two point and one point perspective views. Perspective Construction using the short cut technique/approximate method. Shades and shadows on the perspective view of exterior of buildings.

Rendering of building exterior & interior perspective views using various techniques and medium.

## **REFERENCES**

1. Mulik, Shankar, "A Text Book of perspective & Sciography", Allied Publishers Ltd., Mumbai, 1994.
2. Mc Goodwin, Henry, "Architectural Shades and Shadows", The American Institute of Architectural Press, Washington, D.C., 1989.
3. Russell D. Light, "On Perspective", Butterworth-Heinemann, Oxford, 1995.

## **AR110 BUILDING CONSTRUCTION & MATERIALS - I**

The properties and uses of materials for simple construction such as mud, bamboo, timber, brick, stone, cement, lime, mortars, thatch tiles, asbestos, galvanised, iron and reinforced concrete.

Principles of construction of simple foundation for load bearing wall in stone and brick. Plinth fillings, steps.

Standard terms in brick and stone masonry. English, Flemish and Rat trap bond, types of stone walls, Composite wall and piers.

Principles of construction of various types of arches, lintels and brick jollies.



Paneled door in timber, flush doors, Joints in frame, styles, rails, panels, fixture and fastenings.

## **REFERENCES**

1. Arora, S.P. & Bindra, S. P. "A Text Book of Building Construction", DhanpatRai & Sons, New Delhi, 1994.
2. Jha, J. & Sinha, S. K., "Building Construction", Khanna Publishers, New Delhi, 1977.

## **AR112 ARCHITECTURAL DESIGN – II**

Exercises to understand the relationship between form and function. Study and analysis of a few common household articles and utility sculptures.

Exercises on the study and application of anthropometrics information. Detail study of a single room with activity space analysis, circulation pattern and furniture layout.

Detail study of a small building with activity space analysis, circulation pattern and furniture layout

Reorganization of an existing space / room for a given activity (which is different from the existing use).

Design of spaces meant for single or multiple function. Developing designs for designs for simple buildings.

## **REFERENCES**

1. Maitland Graves, "The art of color and design", McGrawHill Inc., 2nd Edition, 1951.
2. De. Chiara and Callender, "Time Saver Standards for Building Types", McGraw Hill Co., Newyork, 1973.

## **AR114 VISUAL ARTS - II**

Hue, Intensity & Value - other qualities of colours - Primary, Secondary & Complementary colours. Shades & Tints - Warm & Cool Colours.

The various functions of colour in creating Designs. Use of various colour harmonies in Design / Art.

Water colours - Transparent, Opaque (Tempera/Poster Colours), Pastels, Colour Pencils and Oils and their uses in expression of a composition / design.

All exercises to be conducted so as to develop observation and skill of expressing graphically - for understanding objects three dimensionally and to have effective visual thinking.

Rendering - Rendering techniques for architectural drawings - building perspectives, interior & exteriors in various mediums like pencil, ink, pastels, water colours - opaque and transparent. Various graphical media presentations like photography

## **REFERENCES**

1. "Learn to Paint and Draw", Victoria House Publishing Ltd., Bath, UK, 1981.
  2. Goodman Sue & Porter Tom., "Designer Primer", Butter worth Architecture, London, 1988.
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## **SEMESTER- III**

### **AR201 COMPUTER APPLICATIONS IN ARCHITECTURE –II**

Introduction to Architectural Views & Drafting Views, 3D modeling with AutoCAD (Surfaces, Solids) 3D Modeling with SketchUp , Understanding 3D coordinate system - Using View ports – 3D drawing & Editing commands – Interactive Viewing in 3D.

Introduction to rendering in 3D – Rendering process – Enhancing digital images from CAD application using Adobe Photoshop, Paint Shop Pro & other graphic programs In-depth work with SketchUp: Massing models, editing tools, texturing/ Import/export, creating animations, working with Google Earth and 3D Warehouse/ Design to fabrication with SketchUp (3D printing, CNC,...).

3D BIM modeling with Parametric Software- ArchiCAD/Revit: Walls, floors, doors, windows, stairs etc./ Revit families: Using components, creating new types and new families

How to work with BIM content: Plans, interactive models (3D for the web), schedules, materials Using Revit and SketchUp models for analysis: Spatial analysis, Solar analysis, energy performance etc.

### **REFERENCES**

1. Mastering AutoCAD 2015 and AutoCAD LT 2015: by George Omura & Brian C. Benton (Jul 2014)
2. Mastering Autodesk Revit Architecture 2014: – by James Vandezande, Eddy Krygiel & Phil Read, Sybex; First edition (June 2013)
3. Rendering in SketchUp: From Modeling to Presentation for Architecture, Landscape Architecture and Interior Design by Daniel Tal ,John Wiley & Sons (April 2013)
4. The SketchUp Workflow for Architecture: Modeling Buildings, Visualizing Design, and Creating Construction Documents with SketchUp Pro and LayOut – by Michael Brightman, John Wiley & Sons, (May 2013)

### **AR203 HISTORY OF ARCHITECTURE – III**

Italian Romanesque Architecture: Architectural characteristics of the churches of Northern Italy, Central Italy and South Italy. eg. Pisa Cathedral - (Central Italy). French Romanesque - eg. Abbey - Aux - Hommes at Caen. British Romanesque - eg. Durham's Cathedral.

Introduction to Gothic architecture, its evolution of structural systems, arches, vaults and cross vault, decoration, characteristic of French architecture. eg. Notre - Dame, Paris.

Understanding the general influences and characteristics of British & Italian gothic architecture and its structural developments and decorative motives. Characteristics of British gothic Architecture. Characteristics of Italian gothic Architecture - eg. Milan Cathedral.

Birth of Renaissance and its impact Architectural style of Early Renaissance: Characteristics and works of Brunelleschi. High Renaissance and Mannerism: Study of the works of Bramante and Michelangelo. Baroque and Rococo: Architectural style of Palladio & Bernini, Basilica, Vicenza

French Renaissance: Characteristics and style of French Renaissance example The Louvre, Paris. British Renaissance: Tudor, Elizabethan and Jacobean Styles: Characteristics and work of Inigo Jones. Christopher Wren's contribution towards Renaissance Architecture with St. Paul's, London as an example.

## REFERENCES

1. SIR Banister Fletcher's, "A History of Architecture", Butterworth Heinemann 19th Edition, 1987.
2. Cyril Mango, "Byzantine Architecture", Harry N. Abrams Inc. Publishers, New York, 1976.

## AR205 STRUCTURAL ANALYSIS

Slope, curvature of the bending beam - relation between slope, deflection & radius of curvatures, simple problems to find out slope and deflection for different loads on beams - Double integration method, Macaulay's method, moment area method, Conjugate beam method.

Propped cantilever beams - Reaction of prop. - Propped cantilever beams with different types of loads - sinking of the prop. Fixed beams - bending moment diagram for fixed beams - continuous beams - moment distribution method - sinking of the supports.

Moving loads and influence lines for statically determinate structures - Types of loads - combination of loads - Influence lines – Introduction.

Theory of arches - classification of arches - Analysis of three hinged arches - Bending moment diagram for given loads - Normal thrust and radial shear - Introduction to cables - Types - Bending moments & force analysis.

Theory of columns - Types of end conditions of columns - Equivalent length of a column - Axial loads, combined bending & axial loads, Indian Standard Code recommendations - Euler's formula for long columns - Rankine's formula - Practical applications.

## **REFERENCES**

1. Punmia, B.C., "Structural Analysis", Standard Publishers Distributors, New Delhi, 1995.
2. Bari S. A. "Elements of Structural Analysis", S. Chand & Company Ltd., New Delhi, 1997.

## **AR207 BUILDING CONSTRUCTION AND MATERIALS - II**

Study the properties and characteristics of different materials used for roof of coverings R.C.C. and composite roof slab flooring materials timber and glass.

Joinery and detailing of various types of wooden doors fully glazed, partially glazed, sliding and folding door, etc. fully glazed window in timber fixing of glass, fixtures and fastenings.

Developmental reference to traditional trusses, different forms, lean-to, double lean-to collar, couple roof, fixing of Mangalore tiles, A.C. & G.I. sheets and gutters.

Flat roof construction in R.C.C. and composite materials, steel trusses and details of roof coverings and gutters.

Principles of flooring and terracing – floors – brick, stone, concrete and timber floors with timber floors with floor finishes.

## **REFERENCES**

1. Arora, S.P. & Bindra, S. P., "A Text Book of Building Construction", Dhanpat Rai & Sons, New Delhi, 1994.

2. Jha, J. & Sinha, S.K., "Building Construction", Khanna Publishers, New Delhi, 1997.

### **AR209 SURVEYING & SITE PLANNING**

Definition of plot, site, land and region. Units of measurements. Reconnaissance and need for surveying – chain survey, compass survey, plane table & theodolite surveys. Contouring – Contour interval – Characteristics, uses of contours.

Importance of site analysis – factors involved. Accessibility, size and shape of sites. Confirming and non-conforming uses. Climate and topography, infrastructures available, sources of water supply and means of disposal system, architectural and visual aspects. Preparation of site analysis diagram.

Lie of the land, contours, watershed, surface drainage, ayacuts and irrigation lands.

Water, vegetation, soils, climate, land forms. Sewage disposal, irrigation systems and ecology. Preparation of maps of matrix analysis, composite analysis, locality plans, topographical analysis.

Man-made structures, sensuous qualities, cultural data, images and data correlation. Vegetation, plant associations, types and distribution. Preparation of ecological profile of an area.

Note: Practical sessions shall be conducted on surveying.

### **REFERENCES**

1. John Ormsbee Simonds, "Landscape Architecture: A manual of Site Planning and Design", McGraw Hill, 1961.
2. Kevin Lynch, "Site Planning", MIT Press, Cambridge, MA. 1957.
3. Joseph De Chiarra and Lee Coppleman, "Planning Design Criteria", Van Nostrand Reinhold Co., New York, 1988.
4. Thomas H. Russ, "Site Planning and Design Hand Book", Pearson Education, 2002.
5. Diane Y. Carstens, "Site Planning and Design for the Elderly", Van Nostrand Reinhold, New York, 1993.
6. B.C. Punmia, 'Surveying and Levelling', Vol I and Vol II, Laxmi Publications pvt Ltd

### **AR211 ARCHITECTURAL DESIGN – III**

Developing designs for simple buildings like a small residence and medium sized buildings like community hall, health centre etc., in rural setting using locally available materials and appropriate construction techniques.

The designs should reflect the application of knowledge gained from courses on materials, structures & building construction and Theory of Architecture. Students should be able to communicate their ideas and design effectively with appropriate medium.

#### **REFERENCES**

1. Maitland Graves, "The Art of Color and Design", McGraw Hill Inc., 2nd Edition, 1951.
2. Edward. D. Mills, "Planning the Architects Hand Book -Butterworth, London, 1985.

### **AR213 MODEL MAKING**

Materials for Model Making: Paper, Handmade paper / Handmade board, Cardboard, Mount boards, Balsa wood, soft wood, Plywood, cork sheets, plaster of paris, Perspex sheets, expanded polystyrene (Thermacole), Plastic sheets, etc.

Exercises in straight and curved cutting and preparation of simple geometrical objects. Exercises in preparing block models of groups of buildings including roads and landscaped open spaces.

Exercises in preparing detailed models of buildings from given set of drawings.

The subject teacher shall co-ordinate with the Architectural Design Studio in-charge while working out / Setting out the various exercises in model making.

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## **SEMESTER- IV**

### **AR202 CLIMATE RESPONSIVE ARCHITECTURE**

Climate & Weather. Scales of climate - macro-climate, meso-climate and micro climate. Climatic variables: temperature, humidity, precipitation, cooler radiation, wind, etc. Tropical Climate. Climatic Zones of India & their characteristics.

Geometry of solar movement. Altitude & azimuth angles. Sun path diagram/Solar chart. Horizontal and vertical shadow angles. Use of shadow angle protractor. Design of shading devices. Performance evaluation of shading devices.

Air flow/wind movement around and through buildings. Natural ventilation. Mahoney Tables and their application. Climatic design recommendations for various climatic zones in India.

Thermal comfort. Indices of thermal comfort - Tropical Summer Index & Effective Temperature. Thermal effects in buildings. Basic concepts of heat transfer in buildings, units & terminology.

#### **REFERENCES**

1. Koenigsberger, et al., "Manual of Tropical Housing & Building: Part I - Climatic Design", Orient Longman, Chennai , 1984.
2. Evans, Martin, "Housing, Climate and Comfort", The Architectural Press, London, 1980.
3. Konya, Alan, "Design Primer for Hot Climates", The Architectural Press, London, 1984.

### **AR204 CONCRETE TECHNOLOGY**

Introduction - classification of concrete mixes - Grades of concrete - Advantages and disadvantages of concrete. Concrete Making Materials - Cement-Method of Manufacturing of Cement - properties and specific uses of various types of cement. Test on cement - fineness - setting time - consistency - soundness - compressive strength.

General classification of aggregate - properties of aggregate - shape, texture, porosity and absorption, soundness- test on aggregates. Grading of Aggregates. Water - Quality of Water for mixing and curing - use of sea water for mixing concrete.



Basic consideration - factors influencing mix proportion - Mix Design by ACI method and I.S. code method - Design of high strength concrete - test on concrete. Information on Admixtures Plasticizers.

Introduction - Batching of materials - Mixing of Concrete materials - Transportation of concrete - Placing of concrete - curing of Concrete. Properties of Concrete - Introduction - strength of Concrete - stress and strain characteristics of concrete. Thermal properties of concrete - Micro cracking of concrete- RMC.

Introduction - lightweight concrete - Fiber reinforced concrete - Polymer composites concrete - Air entraining concrete - Ferro cement - sulphur concrete - Mass concrete - Guniting. Quality control in Concrete - Sampling and testing of concrete - Factors causing variations in the quality of concrete.

## **REFERENCES**

1. Shetty. M.S., Concrete Technology, S. Chand and Co, 1984.
2. Gambhir, M.L., Concrete Technology, Tata McGraw Hill, 1996.

## **AR206 CONTEMPORARY ARCHITECTURE**

Post- Renaissance architecture of Europe in general and England in particular. Industrial revolution and its impact on architecture and urban settlement in particular. Arts and crafts and Art – Nouveau movements and their impact on architecture. The principles and works of Mackintosh and Antonio Gaudi. Developments in Germany: Deutshers work bund, principles and works of Peter Behrens, German expressionism and the works of Walter Gropius and Erich Mendelsohn. The Bauhaus Institute and its impact. Russian Architecture after revolution (1917 – 1934).

The futurism of Antonio Saint Elia, Outline idea of cubism and its impact on architecture, De stijil movement of Netherlands. Critics of modern movement: Roberty Ventury, Christopher Alexander, Aldo Rossi and Jane Jacob. Emergence of later trends in modern architecture.

Rapid Urban growth in Europe and USA. The emergence of International style of architecture. Principles and works of Frank Lloyd Wright.

Principles and works of Mies Van der Rohe, Louis Khan, Paul Rudolf and Kenzo Tange. The factors that contributed to their style of Architecture and their impact. Brutalism, Archigram, Metabolism in architecture, Deconstruction in architecture and the emergence of rationalistic architecture.

The styles and trends of architecture brought by Britishers to India and their evolution. The impact of Hindu and Indo-Saranic style on the British architecture in India. The characteristics of British colonial architecture with examples from the works of Edwin Lutyen. The impact of International style of architecture in India, Early public buildings such as Vigyan Bhawan Supreme Court building etc. The works of Le Corbusier and Louis Kahn in India with examples. Their impact on architecture of fifties and sixties. The trend in Indian architecture after 1970 Principles and works of the following architects: Balakrishna Doshi, Charles Correa, Anant Raje and Laurie Baker with suitable examples.

Building Material in contemporary architecture style. Energy in modern buildings. Disaster management in contemporary buildings. Contemporary Indian Architecture trends in India – Buildings, Urban Design projects, Landscape Projects, Housing and others.

## REFERENCES

1. Nikolaus Pevsner, "Sources of modern architecture and design", Thames and Hudson, 1989.
2. William J.R., Curtis, "Modern architecture since 1900", Prentice hall, New Jersey USA, 1983
3. Vikram Bhatt & Servier Peter, "Contemporary Indian Architecture after the masters," Mopin Publishing Ltd., Ahmedabad, 1996.
4. Jenles Charles, "Architecture Today", Academy edition, London, 1988.
5. A Critical History of Contemporary Architecture: 1960-2010, edited by Dr Elie G Haddad, Asst Prof David Rifkind, Ms Sarah Deyong.
6. A Concise History of Modern Architecture in India by Jon T. Lang.
7. New Architecture and Urbanism: Development of Indian Traditions, Deependra Prasad, Saswati Chetia Cambridge Scholars Publishing, 08-Jan-2010

8. Editor in Chief: Adolf K Placsek, Macmillan, "Encyclopedia of Architecture (Vol I to IV)", Free press, Newyork, 1990.
9. Manfern Tofuri & Frances Dal Co. "Modern Architecture -I & II (World architecture series), Faber and Faber /elector, New York, 1989.
10. 10 Editor - in Chief: Adolf K. Placsek, Macmillan, "Encyclopedia of Architecture Vol I to IV" Free Press, New York 1990.
11. Kulterman Udo, "Architecture of the 20th Century", Van Nostrand Reinhold, London, 1993.
12. The complete architecture of Balkrishna Doshi: rethinking modernism for the developing world, James Steele, Balkrishna V. Doshi Super Book House, 1998.
13. Contemporary Architecture and City Form: The South Asian Paradigm, Farooq Ameen, Marg Publications, 01-Jan-1997.
14. World Architecture: A Cross-Cultural History Richard Ingersoll, Spiro Kost of OUP USA.

### **AR208 WATER SUPPLY AND DRAINAGE**

Surface and underground sources of water supply, rate of demand, water requirement for various buildings, suitability of water for domestic and trade purposes, methods of distribution systems of supply of water, methods of layout of distribution pipes.

House service connections, systems of supply, storage tanks, water services to multistory buildings, design of pipelines, Materials etc., systems of hot water supply.

Sanitary appliances, Basic requirements of Drainage and Sanitation, Selection and Installation of Sanitary Appliances, Sanitary pipe work within the premises, Drainage system for multi storied buildings.

Individual disposal systems- cess pool, Septic tank etc., Public Drainage system – Types of system, Materials, details of Construction etc., Refuse disposal:- Refuse bins, Refuse chutes etc.

Storm water drainage: Roof drainage – Pitched roofs, flat roofs, Surface Water drainage, storm water drains. Rain water harvesting:- Rainwater harvesting techniques, methods of recharging ground water, construction details.

## REFERENCES

1. Wise, A.F.E. and Swaffield, J.A., "Water Sanitary Services for Buildings", Longman Scientific and Technical, Harlow, 1995.
2. Greeno, Roger, "Building Services Technology and Design", Longman Scientific and Technical, Harlow, 1997.
3. Chatterjee, A.K., "Water Supply and Sanitary Engineering", Khanna Publishers, New Delhi, 1986.
4. Birdie, G. S., and Birdie, J. S., Water Supply and Sanitary Engineering, Dhanpat Rai and Sons, New Delhi, 2007.
5. Garg, S. K., Environmental Engineering, Vol. II, Khanna Publications, New Delhi, 2009.
6. Duggal, K. N., Elements of Environmental Engineering, S Chand and Co. Ltd., New Delhi, 2008.

## AR210 BUILDING CONSTRUCTION AND MATERIALS –III

The use and properties of glass, timber products, laminates, paints, terracotta, terrazzo, ceramic and glazed tiles. Use of alternative details and specifications pertaining to the application/fixing of the same under various circumstances.

Basic rule of relationship and design of riser and tread. Different types of stair way design. Construction details of concrete stairs of composite construction. Design of handrail and balusters using different materials. Various methods of fixing them.

Definition of partition and the role of partitions in buildings. Different types of partitions, and their properties. Joinery details and constructional techniques involved in timber partitions, single and double skinned partitions, partially glazed partitions.

Wall finishes - external facing and veneers - stone facing, wall facing, wall tiling, and cement concrete facing - methods of construction and details pertaining to the same. Introduction to fixing devices in walls, ceilings and floors of solid construction.

## REFERENCES

1. Arora, S.P. & Bindra, S.P., "A Text Book of Building Construction", Dhanpat Rai & sons, New Delhi, 1994.
2. Jha, J. & Sinha, S.K., "Building Construction", Khanna Publishers, New Delhi, 1977.

## **AR212 ARCHITECTURAL DESIGN – IV**

Projects – Developing designs and details for buildings, which are multi-room, single use, small span, and multiple bay such as market, clinic, elementary school, art gallery and bank.

In addition to the design of a single or a small group of buildings, the students should be able to take into consideration the context in which the buildings are located and design the outdoor spaces appropriately.

Understanding design forces, significance of various factors like privacy, convenience, comfort, circulation pattern, furniture arrangement, texture, colour etc. in the built environment.

The design should reflect the application of knowledge gained from courses on materials, structures, construction and theory of architecture.

### **REFERENCES**

1. Edward. D., Mills, "Planning the Architects Hand Book - Butterworth, London, 1985.
2. De. Chiara and Callender, Time Saver Standards for Building types, McGraw - Hill Co., N.Y., 1973.

## **AR214 STRENGTH OF MATERIALS LAB.**

Laboratory exercises to be carried out by the students include:

Tension test on steel using UTM - Compression tests on concrete using slump cone.  
Tests on aggregates for bulking and crushing strength, fineness tests - Tests on bricks and blocks crushing strength and water absorption quality - Deflection tests on beams  
- Water purity tests

## **SEMESTER V**

### **AR301 ARCHITECTURAL ACOUSTICS**

Acoustical / Sonic Environment and acoustical comfort. Sound, Nature of sound. Behavior of sound in enclosed spaces. Concept of Geometric Acoustics. Reflection of sound and their applications. Absorption of sound. Sound absorption coefficient. Reverberation & Reverberation Time Calculation.

Sound absorbing materials - Porous materials, Panel / Membrane absorbers & Cavity / Helmholtz Resonators. Absorption coefficients of indigenous acoustical materials. Space/Functional absorbers. Mounting conditions and its impact on sound absorption.

Acoustical design of Auditoriums - adequate loudness, uniform distribution of sound energy, optimum reverberation time & elimination of acoustical defects. Methods of raking the auditorium floor and the balcony. Acoustical Design of seminar rooms, Conference halls, Cinema Theatres etc.

Outdoor & indoor noise, airborne noise & structure borne noise / impact noise, community noise, & industrial noise. Transmission of noise & transmission Loss. Maximum acceptable noise levels. Means of noise control & sound insulation. Sources of industrial noise.

Sources of outdoor noise - Traffic noise - air traffic, rail traffic, road traffic and sea shore & inland water traffic. Planning & Design against Outdoor Noise - for air traffic, road traffic and rail traffic.

### **REFERENCES**

1. Marshall Long, "Architectural Acoustics", Second Edition, Academic Press, Waltham, USA, 2014
2. William J. Cavanaugh, Gregory C. Tocci, Joseph A. Wilkes, Architectural Acoustics: Principles and Practice, 2nd Edition, Wiley, New York, 2009.

### **AR303 DESIGN OF R.C.C. STRUCTURES**

Permissible stresses - limit states - characteristic strength and load - partial safety factor - deflection - modification factors.

Design principles of limit state methods - design of singly reinforced, doubly reinforced, T & L beams by LSD method with IS code specifications - design for shear.

One way and two way slabs for different edge conditions - continuous slabs - IS code specifications.

Columns - reduction factors - compression members and slender columns - Design of columns - columns with helical reinforcement IS code specifications. Staircases - types - design as per IS code specifications.

Footings - design of isolated footings - square, rectangular and circular footings - strip footings - combined footings.

## **REFERENCES**

1. Ramamrutham, S. "Design of Reinforced Concrete Structures", Dhanpat Rai & Sons, New Delhi, 1996.
2. Sinha, N.C. & Roy, S.K., "Reinforced Concrete Structures", S. Chand & Company Ltd., New Delhi, 1983.
3. Ashok. K. Jain, "Reinforced concrete structures", New Chand & Bros Roorkee, 1992.
4. .H.J. Shah, "Reinforced concrete - Vol I", Charotar Publishing House, Annand, 1994,

## **AR305 LIGHTING AND ELECTRICAL SERVICES**

Light - Electromagnetic radiation, Visual task requirements, Units of Light, Light, Vision and Buildings, Standards of Lighting and Visual comfort.

The sky as a source of light, Daylight factor, Lighting - Windows, Room proportions and other building elements, Daylight penetration, Calculation of daylight factor.

Artificial lighting - requirements. Types of electrical lamps. Electrical fittings/equipment used in buildings. Design of general lighting schemes. Study of lighting systems used in different types of buildings. Preparation of lighting layout for different types of spaces/buildings. Supplementary artificial lighting for buildings.

Principles of electrical installation in buildings. Distribution, Circuits and elements of building wiring systems. Safety methods and measures to be adopted, study of relevant I.S. Codes.

Electrical load estimation, branch circuit design and electrical wiring design for different types of buildings.

## **REFERENCES**

1. Pritchard, D.C., "Lighting", Longman Scientific & Technical, Harlow, 1995.
2. Hopkinson, R.G., "Architectural Physics - Lighting", London, 1963.
3. Benjamin Evans, "Daylight in Architecture", McGraw-Hill Book Company, Newyork, 1981.
4. Medan Mehta James Johnson, Jorge Rocafort, "Architectural Acoustics: Principles and Design", Prentice-Hall, New York, 1998.

## **AR307 BUILDING CONSTRUCTION & MATERIALS - IV**

Understanding the concepts of foundations, its principles & construction of different types of foundations, materials of construction & details of R.C.C. Footings, Raft foundations, Pile foundations.

Purpose and functions of joints in Building construction, types of joints that occur in Buildings. Expansion joints in Brick walls and R.C.C. framed structures and its construction details and materials involved in the construction. Study of relevant IS codes.

Principles of temporary works such as shuttering, centering and scaffolding, Form work, Centering and scaffolding materials used for these temporary structures - timber & steel, literature survey on temporary structures.

Study of casement windows, steel casement windows side hung, its components, study of relevant IS codes specifications, steel ventilators - Top hung - Staggered.

Methods of fixing the steel window, Ventilator frames to walls, fixing of glass, fixtures & fastenings study of different types of putty & glass.

## **REFERENCES**

1. Arora, S. P. & Bindra, S. P., "A Text Book of Building Construction", Dhanpat Rai & Sons, New Delhi, 1994.
2. Jha, J. & Sinha, S.K., "Building Construction", Khanna Publishers, New Delhi, 1977.



## **AR309 INTERIOR DESIGN**

Designing the size and form of interior spaces using user - activity analysis and anthropometrics. The effect of enclosure, fenestration, colour and lighting on perception of space. Application of scale, proportion to enhance the quality of space. Psychological effect of space.

Design for comfort - climatic comfort, natural and artificial lighting, air conditioning and acoustics, Services - air conditioning ducts, electrical wiring, water supply and removal of waste water. Elements of furnishing and surface treatment their need and scope.

Applied decoration - colour, texture, plane and fixtures. Emphasizing space through change of levels and structural form. Modulation of interior spaces with art objects. Space modulation through artificial and natural lighting. Emphasis of focal points and unity in Interior Design.

Role of furniture, evolution of furniture style, economic factors of furniture design and materials - its characteristics and application. Functional classification of space. Barrier free design.

Decorative materials for ceiling, walls, floors. Drapery and upholstery for openings and furniture respectively and matching them with overall colour scheme and composition. Sources and collection of information. Elements of Indoor plants and Interior Landscape and use of water.

### **REFERENCES**

1. Ching, Francis, "Interior Design Illustrated", Van nostrand Reinhold, London, 1987.
2. Helsel, M. B., "Interior Designer's Drapery Sketch File", Watson Guptill Publishing Co., 1969.

## **AR311 ARCHITECTURAL DESIGN – V**

Projects emphasizing detailed studies and drawings of one or more of the following aspects - space analysis, climatic consideration, services and environmental issues, and site planning.

Analytical work on various issues specific to the project introduced will be carried out

for the development of link / connection between studio work and lecture courses. A high standard of graphical representation and verbal skills are expected from the students to present their design ideas.

Projects to include buildings with single or multi - use, multi-span & multiple activities such as Library, Institutional buildings (eg. High School), Shopping Center, Nursing Home & Apartments etc.

Display of competence in the application of knowledge gained from the following will be an essential requirement for all the design projects:

Materials, Construction & Structures, Theory of Architecture, Environmental /Architectural Science & Behavioural science.

## **REFERENCES**

1. Edward. D., Mills, "Planning the Architects Hand Book - Butterworth, London, 1985.
2. .De Chiara and Callender, Time Saver Standards for Building types, McGraw - Hill Co., N.Y., 1973.

## **SEMESTER – VI**

### **AR302 AIR CONDITIONING AND MECHANICAL SERVICES**

Air conditioning - introduction. Comfort conditions within built environment. Basic refrigeration systems. Refrigeration system components. Vapour compression cycle. Concept of cooling load. Introduction to calculation of cooling load. Concept of zoning.

Unit type equipment: (i) room A.C. & (ii) split A.C.: Package Units: (i) fully self-contained (factory made) & (ii) split type units: Central DX Plants and Central Chilled Water Plants. Schematic details of various systems. Comparison of various systems. Space data of A.C. equipment rooms.

Lifts: types of lifts - Dimension of lifts. Traffic analysis, calculation of round trip time and selection of lifts. Hoist way/shaft/well, machine room & pit. Arrangement of lifts. Escalators - characteristics, dimensions and arrangements of escalators.

Causes of fire, Mechanism of fire spread in buildings, classification of fire. Grades of fire hazard – Personal hazard, internal hazard & exposure hazard classification of building based on occupancy. High temperature effects and combustibility of building materials and structure. Fire resistance of buildings.

Passive and Active fire precautions: Site planning, Heat sensitive detectors, Fire alarm system, and means of escape. Firefighting installations: hose reel, internal hydrant system, CO<sub>2</sub> system, wet risers, etc.

#### **REFERENCES**

1. Jain. V.K., "Design and Installation of Services in Building complexes & High Rise Buildings", Khanna Tech. Publishers, New Delhi, 1986.
2. .Croome,.D.J.,.&.Roberts,.B.M.,."Air-conditioning.and Ventilation of Buildings", Prgamon Press, Oxford, 1981.

### **AR304 ESTIMATION & SPECIFICATION**

Introduction, Main items of work, Importance of specification, Types of specifications - General and detailed specifications - Method of preparation of specifications.

Introduction, Types of Estimate, Detailed Estimate - Units of Measurements, Details of measurement and calculation of quantities of various items of work, Methods of Building Estimate - separate or individual wall method, Centre line method.

Analysis of rates for main items of work in buildings, considering current market rates for building materials, labour wages, plants and tools, transportation, handling, storage and contractor's profit.

Preparation of Detailed estimate (Details of Measurements and Calculation of quantities & abstract of -Estimated cost) for different types of buildings including R.C.C. framed buildings.

## **REFERENCES**

1. Dutta, B.N., "Estimating & Costing in Civil Engineering Theory & Practice]", UBS Publishers' Distributors Ltd., New Delhi, 1995.
2. Rangawala, K.S., & Rangawala, K.K., "Elements of Estimating & Costing", Charotar Publishing House, Anand, 1984.

## **AR306 LANDSCAPE ARCHITECTURE**

Introduction to Landscape Architecture. Introduction to major and minor landscape elements, natural and man-made elements. Land – as heritage, as resource, Land use implications. Water – Planning approach, as Resource, as Feature, Water related site design, Plants – in nature, Introduced plantations, Planned & planted landscape.

Structures – Composition, Structures in landscape, Defined open space. Habitations – Dwelling-nature relationships, Human needs & habitat.

Community – The group imperative, Form order, New Directions City – Cityscape, Possibilities, New urbanity.

Landscape design – Visual arts as ordering mechanism, Circulation as ordering mechanism, spatial development, Architecture & site development.

Study of modern gardens & landscapes. Modification of site topography, Grading & drainage.

Japanese gardens: History, development, features, elements and types of Japanese gardens.

Mughal gardens: History, influences, typical features and elements of Mughal gardens.

## REFERENCES

1. Landscape Architecture - A Manual of Site Planning & Design - John O Simonds, McGraw Hill Book Co., New York, 1983.
2. Motloch, J. L., "Introduction to Landscape Design", Van Nostrand Reinhold Publishing Co., New York, 1991.
3. Kassler, E.B., "Modern Gardens and the Landscape", Museum of Modern Art, New York, 1984.
4. Landphair H. C., "Landscape Architecture Construction", Elsevier, 1979
5. Bring, M, "Japanese Gardens: Design & Meaning", McGraw Hill Book Co., New York, 1981.

## AR308 BUILDING CONSTRUCTION & MATERIALS - V

Properties of aluminium and its uses in buildings, aluminium extrusions, aluminium doors and windows fixing details using extruded sections. Fixing details of neoprene rubber beading, glass panels, fixtures and fastenings.

Study of various types of Aluminum partitions, its extrusions & details of components for partitions, Different types of aluminum panels for partitions, cladding component for various structures, aluminum grill modules, roofing of industrial buildings.

Suspended ceilings and false ceiling using aluminum sections, construction details for providing thermal insulation and insulation of cold storages and study of insulation materials like glass wool, insulating boards, gypsum boards, plaster of paris, and various kinds of perforated boards.

Concrete shell roofs of various types and folded plates construction techniques, - its strength and durability. Study on different forms & shapes of shell structures - its construction details and materials.

Fixing details of sound absorbing materials, its properties and uses, Study of relevant IS codes, Study of damp - proofing materials like Bitumen felts, etc. Relevant construction chemicals for W.P.C. & O.P.C. Study of construction chemical products.

## REFERENCES

1. Arora, S. P. & Bindra, S. P, "A Text Book of Building Construction", Dhanpat Rai & Sons, New Delhi, 1994
2. Jha, J. & Sinha, S.K., "Building Construction", Khanna Publishers, New Delhi, 1977.

### AR310 ARCHITECTURAL DESIGN – VI

Projects – Projects will emphasis on physical context and the exploration of an architectural vocabulary for given situations.

Technology to be integrated in the design process. To consider aspects such as external detailing, interior design, use of materials and arrive at a coherent language for the building. Special study offers an opportunity to students to research, organise and produce an extended piece of written and graphical work.

Projects to include buildings or building complexes with single or multi - use public activities, Multistoreyed type in sub - urban/urban settlement such as Courts, College, commercial complex, Hospitals etc.

Display of competence in the application of knowledge gained from the following will be an essential requirement for all the design projects:

Materials, Construction, Structures, Theory of Architecture, Environmental science / Architectural Science & Behavioural Science.

## REFERENCES

1. Edward. D., Mills, "Planning the Architects Hand Book - Butterworth, London, 1985.
2. De. Chiara and Callender, Time Saver Standards for Building types, McGraw - Hill Co., N.Y., 1973.

### AR312 ARCHITECTURAL WORKING DRAWINGS

Preparation of working drawings (plans, elevations, sections and other detailed drawings) to suitable scales.

Atleast two working drawing sets preferably one for a small residential building and one for multistoried building, based on the design done by students shall be prepared.

The list of detailed drawings to be prepared shall include Centre line plan, Foundation plan, Structural grid plan (in case of framed structures), Basement floor plan, Ground floor plan, Typical floor plan, All elevations, All sections, Terrace floor plan, Toilet Layout and Sanitation drawings showing fixtures etc., Electrical layout plan, Typical wall profiles sections, Doors and windows details, Detailed drawings of special rooms like kitchens, toilets, staircase etc.

**REFERENCES:**

1. William J. O'Connell (1985), *Graphic Communications in Architecture: Standard Format for Architectural Working Drawings*, Stipes Publishing; 2nd revised edition
2. Osamu A. Wakita, Richard M. Linde, Nagy R. Bakhoun (2011), *The Professional Practice of Architectural Working Drawings*, 4th Edition, John Wiley & Sons; 4th Revised edition
3. Fred A. Stitt (1998), *Working Drawing Manual*, McGraw-Hill Education

## **SEMESTER – VII**

### **AR401 BUILDING STRUCTURAL SYSTEMS**

Bulk active structures - beams, columns and slabs; Vector active structures - plane trusses and space trusses; Form active structures - cable structures (tensile structures) & arches (compression structures); Surface active structures - shells, domes and vaults and Vertical structure systems - systems for vertical load transmission (Bay System, Free Span System, Cantilever System & Composite System) and systems for lateral load transmission (Shear Wall, Coupled Shear Wall, Interconnected Shear Wall, Core Wall, Framed Tube & Tube in Tube)

#### **REFERENCES:**

1. Harbhajan Singh and Sunanda Kapoor "Structure Systems in Architecture", Abhishek Publication, Chandigarh, 2008.
2. Heino Engel, "Structure Systems", Third Edition, Hatje Cantz Publishers, 2007
3. Ahmet Hadrovic, "Structural Systems in Architecture", Book Surge Publishing, 2009.

### **AR403 ENERGY EFFICIENT BUILDINGS**

The energy crisis and the need for energy efficiency. Passive heating concepts. Passive cooling concepts. Passive heating & cooling concepts.

Natural ventilation in buildings as a low energy cooling strategy. Classification and functions of ventilation. Factors to be considered for integrating Natural Ventilation in Building Design. Wind speed-technique of terrain and height correction. Calculation of Air Flow through Openings (due to Wind Pressure) and calculation of probable wind speed indoors as recommended by Bureau of Indian Standards. Wind speeds and thermal comfort

Factors that affect energy use in buildings - functional factors, environmental factors, envelope factors, air-conditioning systems factors, energy source factors and electrical systems factors. Introduction to the Energy Conservation Building Code (ECBC)

Introduction to Energy Management of Buildings and Energy Audit of Buildings. The aims and main aspects of Energy Management of Buildings. Energy Audit &



conducting the Energy Audit. Energy Management Matrix. Monitoring and Targetting.

Modification of microclimate through landscape elements for energy conservation. Energy conservation through site selection, siting & orientation. Energy conservation through integration of building and site, site planning & site design.

## **REFERENCES**

1. Wayne Forster and Dean Hawkes, "Energy Efficient Buildings: Architecture, Engineering, and Environment" W.W. Norton Company Inc. 2002.
2. Mili Majumdar, "Energy-Efficient Buildings in India", The Energy and Resources Institute (TERI), 2009.
3. Satyajit Ghosh and Abhinav Dhaka, "Green Structures: Energy Efficient Buildings, CRS Press (Taylor & Francis Group), 2015.
4. Bureau of Energy Efficiency, India. Energy Conservation Building Code, 2006.
5. Bureau of Energy Efficiency, India. Design Guidelines for Energy Efficient Multi-Storey Buildings, 2014.

## **AR405 DISASTER RESISTANT BUILDING DESIGN & MANAGEMENT**

Hazard, Disaster, Risk, Vulnerability. Disaster – an over view; Disaster – the Indian Perspective; Typology of disasters and increased understanding.

Natural hazards and Disasters -Earthquake, cyclone, floods, droughts, landslides, lightning. –Causes, hazardous effects, mitigation measures. Man induced hazards & disasters:- soil erosion-causes, conservation measures; nuclear explosion-environmental problems, corrective measures; fire mitigation measures; terrorism.

Preparedness and mitigation - Preparing hazard zone maps, Predictability/ forecasting & warning, Community preparedness, design against the disasters, retrofitting, Population reduction in vulnerable areas, Awareness, Capacity building.

Disaster Management; Community health and casualty management; Disaster Management – role of various agencies; Relief measures; Post disaster- Recovery, Reconstruction and Rehabilitation. Remote- sensing and GIS applications in real time disaster monitoring.

## References

1. Goel.S.L, 'Encyclopaedia of Disaster Management'
2. Government of India, (2004), 'Disaster Management in India' – A Status Report, Ministry of Home Affairs (Disaster Management Division), New Delhi.
3. Zebrowski, Ernest Jr, (1997)-, 'Perils of a Results Planet: Scientific Perspectives on Natural Disasters', Cambridge University Press, Cambridge.
4. Guha-Sapir D., Hargitt, D and Hoyois P. (2004), 'Thirty Years of Natural Disasters: 1974- 2003', The Numbers, UCL Presses, De Lou vain.
5. Ministry of Home Affairs (MHA), (2004)-, 'National Programme for Capacity Building of Architects in Earthquake Risk Management (NPCBAERM)', National Disaster Management Division (Government of India), New Delhi.
6. Hewitt, K (1983), 'Interpretation of a Calamity', Allen &Unwin Inc., London.
7. Heide, Auf der E (1989)-, 'Disaster Response: Principles of Preparation and Coordination', C.V.Mosby, Baltimore.
8. Amarnath Chakrabarti, Devdas Menon, Amlan K. Sengupta, 'Handbook on Seismic retrofit of buildings'

## AR407 URBAN DESIGN

Need for urban design. The scope and objectives of urban design. The relationship between Architecture, Urban Design and City Planning. Brief history of urban design.

Urban land use population density and transportation and their relationship between urban build and urban environment. The causes and consequences of chaotic and disorderly urban environment of today with special emphasise to CBD.

Visualisation of image of the city and its elements. Perception of urban environment: Kevin Lynch's Principles.

Understanding the organisation and articulation of urban spaces. Urban spaces and urban activities. Elements of townscape.

Techniques of urban design. Urban renewal - the scope, need and procedure. Urban conservation.

## **REFERENCES**

1. Lynch, Kevin, "The Image of the City", MIT Press, Cambridge, Mass, 1960.
2. Krier, Rob, "Urban Space", Academy Editions, London, 1967.

### **AR409 BUILDING CONSTRUCTION & MATERIALS - VI**

Modular Co-ordination Module - basic module - multimodules - horizontal & vertical multi modules and submodules. Modular space grid. Modular dimensioning and modular drawing.

Preferred sizes for horizontal and vertical coordinating and controlling dimensions. Controlling dimensions for widths of building components & controlling zones. Controlling dimensions for heights of building components & controlling zones. Storey heights & room heights.

Space structures. Skeleton frame works (space frames) - single layer grids (two way, three way & four way) and double layer grids (lattice grids & true space grids). Offset grids and differential grids.

Study of prefabricated commercially available systems - Space Deck System, Triodetic System, Mero System & Nodus System. Geodesic Domes.

Introduction to System Building / Method Building. Closed System & Open System. Analysis of building elements / components for introduction of prefabrication in India context. Classification of prefabricated components.

## **REFERENCES**

1. Makowski, "Analysis, Design and Construction of Double - Layer Grids", Applied Science, London, 1981.
2. Heki, K., (ed.), "Shells, Membranes and Space Frames", Elsevier, New York, 1986.

### **AR411 ARCHITECTURAL DESIGN -VII**

Projects introduced should provide opportunities to understand and learn how to solve the built environmental needs for multi-faceted public activities in an urban context. Examples of projects include air port, bus terminal, railway station, cinema complex, exhibition hall, indoor sports complex and campus planning. Design

problems involving high density and / or large scale housing.

Complete set of Working Drawings are to be prepared for one of the Architectural Design Projects.

Display of competence in the application of knowledge gained from the following will be an essential requirement for all the design projects:

Materials & Structures, Theory of Architecture, Environmental Science and Behavioural Science.

## **REFERENCES**

1. Edward. D., Mills, "Planning the Architects Hand Book - Butterworth, London, 1985.
2. De. Chiara and Callender, Time Saver Standards for Building types, McGraw - Hill Co., N.Y., 1973.

## **SEMESTER – VIII**

### **AR402 PROFESSIONAL TRAINING**

The students are required to undergo Practical Training in a qualified, registered and competent Architect's Office. Students will be trained in the various practical aspects of Architecture, Construction & Professional practice.

Maintenance of personal diary, recording important observations, architectural detail, technical data, site visit particulars, presentation of drawings and reports done during the training period are the essential submission requirements. Marks will be awarded on the basis of student's monthly progress reports, work diary, drawings & reports done during the training period and the Architect's certificate.

## SEMESTER – IX

### **AR501 BUILDING BYE-LAWS AND CODES OF PRACTICE**

Meaning and significance of key terms with appropriate examples: Act, Rules, Regulations and Bye-laws. Overview of Bureau on Indian Standards (BIS) and its role in publishing standards relevant to architecture and construction in terms of specifications, codes of practice and handbooks.

National Building Code (NBC) of India 2005 and its significance. Salient features of the various parts of NBC - integrated approach, definitions, administration, development control rules and general building requirements.

Features of NBC covering fire & life safety, building materials, structural design, constructional practices & safety, building services, plumbing services and landscaping, signs & outdoor display structures.

Building Bye - Laws & Regulations. Examples of building bye-laws covering aspects such as setbacks, plot coverage, floor area ratio (FAR), height restrictions, parking norms and minimum standards for habitable spaces. Exposure to the contents of the various forms an architect is required to submit to the statutory authorities.

Overview of Municipal Acts, Corporation Acts, Consumer Act & their implications. Introduction to Heritage Act and its importance.

#### **References**

1. National Building Code of India 2005
2. Krishnamurthy, K.V. and Ravindra S.V. Professional Practice, (Eastern Economy Edition), Prentice Hall India, New Delhi, 2014.
3. Summaries of Indian Standards for building materials
4. Handbook on Functional Requirements of Buildings (Other than Industrial Buildings)
5. Handbook on Functional requirements of Industrial Buildings (Lighting & Ventilation)
6. Handbook on Building Construction Practices
7. Handbook on Methods of Measurement of Building Works

## **AR503 ENVIRONMENT AND BEHAVIOUR**

Introduction to the discipline environmental psychology, its importance in the field of architecture, understanding the principles of psychology, the roots and Edges of environmental psychology- Theories and approaches in Environmental Psychology.

Process of creativity, Visual and creative thinking. Types of thinking. Memory and built environment- theories on different types of memories, articulation of masses and spaces, sense and sensation modalities- language of architecture and its role in creativity.

Concept of perception, visual perception, theories on environmental perception- environmental perception and design. Concepts of cognition. Environmental cognition and design. Environment and human response in relation to different environmental variables.

Concept of personal spaces, personal space and human behavior. Personal space and environmental design. Concept of territoriality , territoriality and human behavior & territoriality and environmental design.

Residential environment- Concept of Home. Neighborhood concept & Neighborhood satisfaction. Place attachment theory, Work place environment and behavior. Application of the knowledge in design of a residence, community neighborhood and other built environments.

### **REFERENCES:**

1. Morgan, T., & Clifford, "Introduction to Psychology", Tata McGraw-Hill Publications New York, 1983.
2. Gifford, Robert. Environmental Psychology: Principles and Practice, Optimal books, 2002.

## **AR505 URBAN PLANNING**

Urban Areas – characteristics, categories of a town, Classification of settlement based on form, use, scale etc., densities of a town.

Planning process. Various stages of the planning process with relevant examples. Surveys in planning, Physical characteristics, utilities, population, employment and industry, Housing, commercial and transportation, land use.

Plans: Regional plan, Master plan, Zonal development plan, Structure plan and Transportation plan. Regional plan types and delineation of regions. Land use plan, local development plans and their components.

Contemporary Concepts in Town Planning: Role and contribution of the following towards contemporary town planning thought - Patrick Geddes, Patric Abercrombie, Daniel Burnham, Soria Y Mata, Frederick Olmstead, Henry Wright, Ebenezer Howard, Clarence Perry, Clarence Stein, CA Doxiadis, Le Corbusier, Frank Lloyd Wright.

Urban renewal - Necessity and Advantages of urban renewal- various steps in urban renewal programme. Development control: Issues, Aims, Form, and Contents. Planning Standards.

## **REFERENCES**

1. Burn, Stanly & Williams, Jack, "Cities of the world – World Regional Urban development", Harper & Row, New Delhi, 1983.
2. Keeble, Lewis, "Principles of Town and Country Planning", The Estates Gazette Ltd., London, 1972.
3. John Ratcliffe, An Introduction to Town and Country Planning, Hutchinson 1981
4. Arthur B. Gallion and Simon Eisner, The Urban Pattern – City planning and Design, Van Nostrand Reinhold company
5. N.V.Modak, V.N.Ambedkar, Town and country planning and Housing, orient longman, 1971

## **AR507 ARCHITECTURAL DESIGN –VIII**

Design problems at urban or metropolitan scales and environment, multi-use complexes including functions such as residential, public services, industrial, commercial, transportation, cultural and civic.

The focus should essentially be on an urban design exercise with emphasis on design to suit the surrounding environment in relation to both traffic and planning control.

Application in design: The design output should clearly indicate the application of theory of architecture, materials & structural systems, environmental sciences and behavioural sciences.



## REFERENCES

1. Edward. D., Mills, "Planning the Architects Hand Book," - utterworth, London, 1985.
2. De. Chiara and Callender, "Time Saver Standards for Building types", McGraw - Hill Co., N.Y., 1973.

### **AR509 DISSERTATION – I (Seminar)**

Dissertation is seen as a culmination of the development of the student's knowledge, attitudes and skills over the course of studies of Architecture.

Student is expected to develop a subject of his or her own choice and to demonstrate the ability to use effectively the tools of independent investigations and judgement to evolve design criteria. The application of these may be original design or research oriented work.

In Dissertation - I the initial project proposal and the literature review of the project chosen for Dissertation shall be carried out. Students can choose the topic of special study relevant for the chosen project. Independent detailed study and documentation of chosen topic shall be carried out. Submission of report with oral and visual presentation.

## **SEMESTER – X**

### **AR502 BUILDING ECONOMICS & CONSTRUCTION MANAGEMENT**

Cost price and value. Factors controlling the cost of urban real properties, Valuation, Depreciation, Rent and its implications. Economic life of buildings.

Project management functions, planning process. Project work breakdown, Modelling and analyzing networks and work scheduling process. Bar charts and Mile stone charts.

Network analysis fundamentals, CPM Network analysis procedure. PERT - Network, Time estimates, Probability Distribution, Critical Path, Slack and Probability of achieving completion date.

Project cost analysis - Cost versus time, Contracting the Network etc., Resource Allocation - Resource Smoothing and Resource Levelling.

Updating the network based on the project progress. Computer applications in construction management – using MS Projects software for project planning, scheduling and control.

#### **REFERENCES:**

1. Stevens, James D., "Techniques for Construction Network Scheduling", McGraw - Hill Publishing Company, New York, 1990.
2. Mukhopadhyay, S. P., "Project Management for Architects and Civil Engineers", Firma KLM Pvt. Ltd., Calcutta, 1981.
3. Srinath, L. S., "PERT and CPM - Principles and Applications", Affiliated East - West Press Pvt. Ltd., New Delhi, 1989.
4. M. Mohsin, Project Planning and Control, Vikas Publishers, New Delhi, 1983
5. Gurcharan Singh, "Building, Planning, Designing and Scheduling", Standard Publications, 2009.

### **AR504 PROFESSIONAL PRACTICE**

Architects ACT 1972 and its implications. Council of Architecture and its role. The Indian Institute of Architects and its role. Code of Professional conduct as laid down by Council of Architecture. Purpose of architectural competitions. Council of

Architecture's Guidelines on Architectural Competitions. Types and classifications of competitions.

Comprehensive Architectural services. Conditions of Agreement. Scope of work and schedule of services - as per the Council of Architecture. Standard Terms for Urban

Design work – Scope of work, Schedule of services – Preliminary evaluation stage, Concept design stage, detailed design stage and Implementation stage.

Tender - its meaning & significance. Invitation to tender – Private invitation, Public Notice and Negotiation. Tender Notice and its characteristics. Opening of Tender. Acceptance of Tender. Types of Tender. Characteristics, advantages & disadvantages of various types of tenders.

Social Role / Social Responsibilities of Architects, Architect and Office- Office and its management, Architects duties to his employees under labour welfare provisions. Duties and Liabilities of an Architect. Legal responsibilities of architects towards Statutory Bodies.

General Conditions of the Contract as put forward by the Indian Institute of Architects. Prime cost. Materials & workmanship, Inspection. Defects. Damages for non-completion, Virtual completion and defects liability period, Determination by the owner and determination by the contractor.

#### **REFERENCES:**

1. Documents published by the Council of Architecture in their website <http://www.coa.gov.in>
2. Krishnamurthy, K.V. and Ravindra S.V. Professional Practice, (Eastern Economy Edition), Prentice Hall India, New Delhi, 2014.
3. Indian Institute of Architects, "Handbook on Professional Practice", Architects Publishing Corporation of India, Mumbai.

#### **AR506 DISSERTATION -II**

Dissertation is seen as a culmination of the development of the student's knowledge, attitudes and skills over the course of studies of Architecture.

Student is expected to develop a subject of his or her own choice and to demonstrate the ability to use effectively the tools of independent investigations and judgment to evolve design criteria. The application of these may be original design or research oriented work.

In Dissertation – II, the candidate shall carry out the detailed Architectural design of the project incorporating structural concept, services and application of chosen special study. The final submission shall include detailed architectural presentation drawings including rendered 3D views3D, physical models and report with copies of drawings.

## **ELECTIVES**

### **AR351 ADVANCED COMPUTER APPLICATIONS**

Introduction to 3Dstudio Max / Max user interface / Modeling / Applying Materials to geometry / Creating lights / Photo realistic Rendering / Simple Animations / Exporting files from Auto CAD to 3D studio Max

Introduction to Rhino / Precision Modelling/ Draw with absolute, relative rectangular, and polar co-ordinates/ Distance and angle constraints / Viewports and construction planes / Model in 3-D space/ Elevator mode/ Rectangle command and its options

Point selection with object snaps / Analysis commands: length, distance, angle, radius / Draw circles and arcs/ Draw ellipses and polygon curves / Rhino render and render colour/ Model free-form curves/ Create helix and spiral curves

Intermediate Edit and Surfacing Commands / Introduction to NURBS modelling concepts and terminology /Free-form curves / Control point editing of curves and surfaces /Rebuild curves and surfaces /Use the nudge modelling aid /Create deformable shapes /Blend between two surfaces /Symmetry Tool/ Lighting and rendering /Make 2D drawings from 3D Objects /Page Layouts

Advanced Surfacing and Solids Model with solids and solid text. Use Boolean tools to shape your model. Extrude, loft, and revolve curves into surfaces. Use sweeps to create additional surfaces. Use advanced surfacing techniques like blend, match, and surface from network of curves. Create model primitives and solid text / Model with pipe and extrude /Extrude and loft surfaces / Revolve curves into surfaces

### **REFERENCES**

1. Rhino NURBS 3D Modeling by McNeel& Associates, New Riders; Pap/Cdr edition (Aug 1999)
2. Learning to use Rhino - Tutorials Collection – web reference: <https://www.rhino3d.com/learn>
3. Mastering Autodesk 3ds Max 2013, by Jeffrey Harper, Sybex; First edition (Sept 2012)

## **AR353 GRAPHIC DESIGN**

Fundamentals of Graphic Design: Introduction to Graphic Design – its history, career options, works of prominent designers & the graphic design process. Overview of design basics – colour, harmony, rhythm, balance, proportion etc. Visual perception & graphical thinking.

Tools of Graphic Expression. Styles of expression—an overview; Illustrations - developing manual presentation skills Computer graphics - overview of current packages, their potentials & applications

Designing for printing. Lettering & Typography Design of books, posters, promotional materials, stationery etc..

Developing trade marks & Corporate logos. Evolving a comprehensive corporate identity program; Developing environmental graphics / signage; Brand promotion – including packaging design & ad-making for both the print & electronic media Multimedia design - E books / interactive CD Roms; animation design; Web design

### **REFERENCES**

1. White, Alex W, "The Elements of Graphic design", Allworth Press, 2011
2. Lupton, Ellen, "Thinking with type", Princeton architectural press, 2004.
3. Wheeler, Alina, "Designing brand identity", Jon Wiley and sons, 2012
4. Rand, Paul, "A designer's art", Yale University press, 2001.

## **AR355 PHOTOGRAPHY, ART AND VISUAL COMMUNICATION**

Pencil and charcoal sketching, mixed media rendering, water color compositions and primary use of acrylic / oil colours; alternative media work such as glass painting, earthen pot painting.

Advanced aspects of visual cognition, psychological responses of humans; Art, design, architecture and cinema appreciation; Image doctoring and manipulation using computer software for graphics and animation (Photoshop and Flash).

Study of the fundamentals of still photography and the camera – Lens types, Aperture and exposure, shutter speed, depth of field, focus, light conditions, light compensation; Comparative assessment of traditional SLR and digital photography.

Basic movie camera shooting, traditional analog and digital methods, conversion of analog to digital, memory manipulation and software compatibility exercises; Elementary film editing – video and audio clips, merging, morphing, transitions (with Adobe Premiere).

## REFERENCES

1. Adithya Kuber et al., Jasubhai Digital Media Fast Track to digital Photography, Maulic Pub. 2005.
2. Ambrose G. and Harris P., The Fundamentals of Graphic Design, AVA Publishing SA, 2009.
3. Joseph Ciaglia, Barbara London et. Al., Absolute Beginner's Guide to Digital Photography, Que Publishing, 2004.
4. Julie A. K., Shoot like a pro! Digital photography techniques, McGraw-Hill / Osborne.
5. Lnada R., Graphic Design Solutions, Wadsworth, New York, 2003.
6. Matthew Banberg, New Image Frontiers: Defining the Future of Photography, Course Technology, a part of Cengage Learning, 2012.

## AR357 SEMINAR ON CONTEMPORARY ARCHITECTURE

Prerequisite: Students should have successfully completed the theory subject on Contemporary Architecture. In this subject it is envisaged that greater theoretical understanding is obtained about the professional works on Contemporary Architects. In this subject students are encouraged

- a) To study the works of contemporary architects through an evaluative and/or theoretical framework,
- b) To understand the works of contemporary architects in contemporary vocabulary used by well-known writers of Architecture projects,
- c) To describe and interpret the works through a written essay thereby invoking the students' abilities in critical/analytical reading, writing of essays, and carryout basic research about contemporary architecture,

d) To present their understanding through seminars and discussions.

The faculty are expected to encourage/help the students discover their innate abilities and inculcate reading, writing, discussion, debate and presentation skills about contemporary architectural practice.

### **AR352 VERNACULAR ARCHITECTURE**

Vernacular architecture - introduction - factors contributed to its evolution with examples. The advantages of studying it and possible application today.

Vernacular architecture – around the world -factors that contributed to their evolution. Few examples

Vernacular architecture in India - Factors that contributed to its evolution. Few examples

Vernacular architecture of Tamil Nadu - factors that contributed to its evolution. Few examples; Settlement planning strategies, Regional and occupation wise variation.

Influence on modern architecture, examples from the works of Frank Lloyd Wright, Green Broken & Hasan Fathy, Geoffery Bawa. Possible applications of vernacular architectural techniques today.

### **REFERENCES**

1. Oliver, Paul, "Encyclopedia of vernacular Architecture of the world (3 Vol. Set)", Cambridge University Press, U.K., 1997.
2. Tipnis, Aishwarya, "Vernacular traditions: contemporary architecture", TERI publications, India, 2012.

### **AR354 BARRIER FREE ENVIRONMENT**

Barrier Free Design – need & concerns; Definition and dimensions of Barrier – physical, psychological and social. Types of Disability; Approaches towards Disability a Medical Model and Social Model.

Universal Design - principles and aspects; Study of Human - environment interaction system.



History of development of barrier free initiatives taken across the globe. Norms and standards for barrier free design.

Design elements within buildings, site planning, parking, approach to plinth levels, corridors, entrance and exit, windows, stairways, lifts, toilets, signage, guiding and warning systems, floor materials.

Design elements outside the building – kerb at footpath, road crossing, public toilet, bust stop, toilet booth, and signage.

Provision in residential building, auditorium, parks, restaurants, railway station. Constitutional and statutory provisions to implement barrier free design; barrier free transportation; barrier free tourism; access audit and design solution to one building.

## **REFERENCES**

1. Accessibility for disabled – A design manual for a barrier free environment by united nation [available online] <http://www.un.org/esa/socdev/enable/designm/index.html>.
2. Bednar M. J., Barrier free Environments.
3. Harkness S., Building without Barriers for the Disable.
4. Manual on Barrier free Environment, CPWD.
5. The persons with disabilities (Equal opportunities, protection of rights and full participation) act. 1995.

## **AR356 FACILITIES PLANNING**

Flexibility and facilities planning; Optimal space planning and cost minimization through facility layout; Knowledge based facility planning and decision support system; Application of artificial intelligence; Graph theoretic approach to multi-floor building design; Facility layout algorithm using graphics; Simulation in facility planning and efficiency analysis; Computerized space management; Computer methods in facility layout; Computer graphics and facility layout generation; Database management systems for multifunctional building project; Integrated approach to specialized building design; Multi-criteria approach in building design; Project engineering management of specialized or large scale buildings

## **AR451 PRODUCT DESIGN**

An brief introduction to Product Designing – Various elements – History of Product Design – Definition of Product Design, understanding of Product Design - Purpose of Product Design – Role of Product Designers.

Definition of human factors, Application of human factors data. Human activities, their nature and effects. Man-machine system and physical environment. Human performance and system reliability. Information input and processing. Human control systems. Applied anthropometry – Human response to climate.

Aspects of Product Design: Visual, Auditory, Tactual, Olfactory human mechanisms, Physical space and arrangement. Visual display, process of seeing, visual discrimination, quantitative and qualitative visual display, Alphanumeric and related displays, Visual codes and symbols.

Product Design: Form, Colour, Symbols, User specific criteria, Material, Technology and recyclability, Packaging. Multiple Utility oriented approach to Product Design.

Design of Household elements, tools and devices, Design of furniture, Design of Industrial Products. Element design for the physically and mentally disabled people.

### **REFERENCES**

1. Time Saver Standards for Interior Design
2. Andrew Alpern, Handbook of Speciality Elements in Architecture, McGrawhill Co., USA, 1982.
3. Francis D.K.Ching, Interior Design Illustrated, VNR Publications, New York, 1987.
4. An invitation to Design, Helen Marie Evans.

## **AR453 ENVIRONMENTAL CONTROL AND DESIGN WORKSHOP**

To consolidate the theoretical inputs of subjects Climatically Responsive Architecture and Architectural Acoustics through application of the principles learnt from the subjects.

To expose the students to the Climatic, Lighting and Acoustic problems and issues in the Built Environment.

To effectively link the above mentioned subjects to the prevailing Climatic, Lighting and Acoustic issues in the Practice of Architectural Design.

The course intends to take up a small hypothetical or live project and attempts to work out solutions to the same. It may involve one or two project/s from Climatic or Lighting or Acoustic issues from the field.

The projects may also take up previous design problems of the students and consciously apply climatic principles to improve the quality of design.

### **AR455 LANDSCAPE DESIGN**

Design exercise where outdoor spaces will be designed and details of various elements & components of the design will be worked out.

Study oriented work will be given which will involve study of the use of outdoor spaces by different user groups, landscape elements, street furniture, etc.

### **REFERENCE**

1. Simonds, J. O., "Earthscape: A Manual of Environmental planning", McGraw Hill Book Co., New York, 1978.
2. Motloch, J. L., "Introduction to Landscape Design", Van Nostrand Reinhold Publishing Co., New York, 1991..

### **AR551 SUSTAINABLE ARCHITECTURE**

Concepts of sustainability : Energy and Global environment, Energy use and Climate change – Its impact, Types of Energy systems, Concept of Sustainability - Principles of conservation -synergy with nature, Bioregionalism - community basis shelter technology within bioregional patterns and scales, Ethical- environmental degradation.

Sustainable planning & Design: Sustainable Development -Sustainable approach to site planning and design - site inventories- relationships between site factors - development impacts from one area of the site on the other areas - Model ecosystem of the site, environmental monitoring and testing during construction- phasing of

development - limits of change - Design facility within social and environmental thresholds.

Sustainable Building Materials and Construction: Properties, Uses and Examples of  
-Primary, secondary and Tertiary Sustainable Materials, Principles to improve the energy efficiency - siting and vernacular design, shade, ventilation, earth shelter, thermal inertia and air lock entrances. Techniques of sustainable construction - technologies, methods of effectiveness, and design synthesis – alternative materials and construction methods: solar water heating panels; photovoltaic electricity generation; use of local materials and on site growth of food, fuel and building materials.

Recycling and Reuse: Pre building, Building, Post building stages - Architectural Reuse, Waste prevention, Construction and Demolition recycling- Conservation of natural and building resources Energy and material savings – types of wastes - Elimination of waste and minimize pollution- various Decomposing methods – Innovative reuse of various wastes Case Studies and Rating systems: Sustainable Development Case Studies: illustrated examples of the planning, development, and construction.

Green architecture and various international and national rating systems for sustainability- EAM (UK), CASBEE (Japan), LEED (US), Green Star (Australia), etc.  
– Indian systems – TERI GRIHA rating, LEED India rating, IGBC

## **REFERENCES**

1. Dominique Gauzin – Muller "Sustainable Architecture and Urbanism: Concepts, Technologies and examples", Birkhauser, 2002.
2. Slessor, Eco-Tech: "Sustainable Architecture and High Technology", Thames and Hudson 1997.
3. Ken Yeang, "Ecodesign : A manual for Ecological Design", Wiley Academy, 2006.
4. Arian Mostaedi , "Sustainable Architecture : Low tech houses", CarlesBroto, 2002.
5. Sandra F.Mendler & Willian Odell, "HOK Guidebook to Sustainable Design", John willey and sons, 2000.
6. Richard Hyder, "Environmental brief: Pathways for green design", Taylor and Francis, 2007.

7. Brenda Vale and Robert Vale, "Green Architecture: Design for a sustainable future", Thames and Hudson 1996.
8. Fuller Moore, "Environmental control systems Heating, Cooling, Lighting". McGraw Hill, Newyork.
9. Caring A.Langston, Grace K.C.Ding, "Sustainable practices in built environment", second edition, Butterworth-Heinmann Linacre House Jordanhill Oxford.
10. R.N.Trivedi, "Environmental Sciences", Anmol Publications Pvt Ltd, New Delhi

### **AR553 COST EFFICIENT CONSTRUCTION TECHNIQUES**

Cost effective techniques: Need, Planning aspects, construction aspects, maintenance and longevity aspects.

Choice of materials in Indian conditions, indigenous building materials, organic and inorganic building materials, alternative building materials, use of industrial and agricultural wastes - Survey of such materials development by research organizations like CBRI, SERC etc.

Significance of construction technology: Relevance of improving of traditional technology, relevance of innovative technology/alternate technology, survey of such technologies by various research institutes.

Critical analysis (in terms of initial investment, maintenance cost and longevity of buildings) of the local adaptation of the innovative technologies by various agencies.

### **REFERENCES**

1. G.C. Mathew, 'Low cost housing in development countries'
2. Publication of CBRI, SERC, RRL, NBO, COSTFORD.

### **AR555 INDUSTRIAL ARCHITECTURE**

Role of architects in the design of modern industrial buildings. A basic knowledge of industries in respect of type and category. Planning considerations in the development of master plan including site selection and site layout. Design for loading / unloading area.

Design considerations in development of industrial buildings considering: Flexibility; Adaptability; Structural selection; Integration of structure and services; Industrial lighting, Internal circulation and material handling.

Working environment for industrial workers - Work space and ergonomics; Use of color; Illumination; Light and Glare; Noise and vibration; Temperature, Humidity and Ventilation; Visual environment and landscaping.

Health, welfare and childcare in Industrial Premises. Safety security and warning controls.

Consideration facilities like Rest room, Locker room, Sanitary, Changing room, Cafeteria, Recreational etc.

## **REFERENCES**

1. Adam J., Hausmann K., and Juttner F., A Design Manual – Industrial Buildings.
2. Blum M. L., and Naylor J. C., Industrial Psychology, CBS, Delhi.
3. Drury J., Factories – Planning, Design and Modernization.
4. Hansen D., Indoor Air Quality Issues.
5. Munce, J. F., Industrial Architecture – an Analysis of International Building Practice, F. W. Dodge Corporation, New York.
6. Philips A., The Best in Industrial Architecture.
7. Reid K., Industrial Buildings; The Architectural Record of a Decade; F. W. Dodge Corporation, New York.
8. Sinha, R. K. and Heart, S., Cleaner Production – Greening of Industries for Sustainable Development.

## **AR557 BUILDING AUTOMATION AND MANAGEMENT SYSTEMS**

Concept and application of automation and management system; design issues related building automation and its effect on functional efficiency; components of building automation system; HVAC electrical, lighting security, fire-fighting, communication etc.; integrated approach in design, maintenance and management system; current trend and innovation in building automation systems; impact of information technology; concept of artificial intelligence; knowledge base

and decision support systems and building automation and management system; application of expert system in building automation; stages in development of expert system, expert system application in architecture; computerizing building management information.

## **REFERENCES**

1. Atkins B., Intelligent Building, Springer, 2007.
2. Atkins B., Total Facilities Management, Springer, 2009.
3. Carlson R. A. and Giandomenico R. A., Understand Building Automation System, Amazon, 2010.
4. Merz H., Building Automation, Springer, 2012.
5. Wang S., Intelligent Building and Building Automation, Taylor & Francis, (4<sup>th</sup> Ed.), 2009.

## **AR559 CONSTRUCTION TECHNOLOGY**

Planning - pre-stressed, concrete constructions pre-cast concrete and pre-fabrication system - Modular coordination.

Modern Construction Materials - Manufacture, storage, transportation and erection of pre-cast component forms, moulds and scaffoldings in construction - safety in erection and dismantling of constructions.

Construction equipment's: Tractors, bulldozers, shovels draglines, cableways and belt conveyors, batching plants - Transit mixers and agitator trucks used for ready mix concrete pumps, Guniting equipment's - Air compressors - welding equipment - cranes and other lifting devices Choice of construction equipment for different types of works.

Planning and scheduling for high rise building: Scheduling- Simulation – Typical Floor Construction Cycle – Appropriate working schedule.

Overview of construction management topics including estimating, cost control, quality control, safety, productivity, value engineering, claims, and legal issues.

## REFERENCES

1. R. Chudley, Construction Technology, Pearson, 2005.
2. R. Barry, The Construction of Buildings, The English Language Book Society and Crosby Lockwood, Staples, London, 1976.
3. Construction Planning equipment and Methods by RL Peuriboy Tata McGraw Hill, 1979
4. Modern Construction and Management. Frank Harris John Wiley and Sons, 1983.

## AR561 ENVIRONMENTAL PLANNING

Resources: Man, biosphere, ecosystems, resource identification and its implications for development -soil, water, land, plants, animals, renewable energy and nonrenewable energy. Preparation and analysis of resource inventories.

Environmental Impact Assessment: Methodologies and techniques

Environmental Legislation: Significance of law and its relationship to development, evolution of planning legislation. National environmental policy.

Planning Techniques: Essence of good planning, integration of environmental assessment and planning options, Priorities and strategies for development on urban, coastal and hilly ecosystems.

Evaluation Techniques: Cost benefit analysis, planning balance sheet and goal achievement matrix.

## REFERENCES

1. Earth scape - A Manual of Environmental Planning and Design, John Ormsbee Simond, Van Nostrand Reinhold Company 1978
2. Richard P. Dober – Environmental Design – VNR company - New York, 1969
3. Albert J. Rutledge – Anatomy of a park – McGraw Hill book Co., - USA 1971
4. Harvey M. Rubenstein – A guide to Site and Environmental planning, 3rd vol. – John Wiley & sons – New York, 1987.



## **AR552 HOUSING**

Qualitative and quantitative needs in the field of housing at the global level. Problem in the field of housing in developing countries (Third world countries) with special emphasis to India.

The peculiarities of urban housing land for urban housing - problems and possible solutions. The relationship between place of work and home.

Assessing the housing deficit of a region projecting the number of houses to be constructed therein, the future plan period, in order to remove deficit. Public sector and private sector housing, the need for housing policy and the role of HUDCO and State Housing Boards.

Slums - Definitions, Causes and consequences. Attempts made to solve the problem of slums.

Low - cost housing: Ways and means of controlling the cost of houses. A few low cost construction techniques and material tried out in India and in developing countries. Current income and economically weaker sections.

### **REFERENCES**

1. Abrams, Charles, "Housing in the Modern World", Faber, London, 1964.
2. Allen, W.A., Happold, E., Word, A.M., & Courtney (Ed.) "A Global strategy for Housing in the third millennium E & FN Spon, London, 1992.

## **AR554 ARCHITECTURAL CONSERVATION**

Understanding Heritage. Types of Heritage. Heritage conservation- Need, Debate and purpose. Defining Conservation, Preservation and Adaptive reuse. Distinction between Architectural and Urban Conservation. International agencies like ICCROM, UNESCO and their role in Conservation.

Museum conservation – monument conservation and the role of Archeological Survey of India – role of INTACH – Central and state government policies and legislations – inventories and projects- select case studies of sites such as Hampi, Golconda, Mahabalipuram - craft Issues of conservation.

Listing of monuments- documentation of historic structures- assessing architectural character – historic structure report- guidelines for preservation, rehabilitation and adaptive re-use of historic structures- Case studies of Palaces in Rajasthan, Chettinad and Swamimalai dwellings, seismic retrofit and disabled access/ services additions to historic buildings-heritage site management .

Over view of urban history of India and Tamil Nadu, understanding the character and issues of historic cities, historic districts and heritage precincts.

Conservation as a planning tool, financial incentives and planning tools such as Transferable Development Right (TDR), urban conservation and heritage tourism, case studies of sites like for Cochin, Pondicherry French town, conservation project management.

## **REFERENCES**

1. Donald Apple yard, "The Conservation of European Cities", M.I.T. Press, Massachusetts, 1979.
2. James M. Fitch, " Historic Preservation: Curatorial Management of the Built World" University Press of Virginia; Reprint edition, 1990
3. Robert E. Stipe, A Richer Heritage: Historic Preservation in the Twenty-First Century", Univ. of North Caroling press, 2003.
4. Conservation Manual, Bernard Fielden; INTACH Publication, 1989.
5. A.G. K. Menon ed. "Conservation of Immovable Sites", INTACH Publication, N.Delhi., 1988

## **AR556 ARCHITECTURAL JOURNALISM**

Introduction to journalism, key concepts and objectives of Journalism – Specialized journalism: with emphasis on architectural journalism - Journalism skills: research, reporting, writing, editing, photography, columnists, public relationships, criticism.

Interviewing techniques, Argument and debate as a technique in the investigation of social problems; evidence, proof, refutation, persuasion; training in argumentative speaking.

Introduction to software needed in journalism and photography, video coverage,

walk-through of buildings, production of contemporary architectural journalism. Understanding the individual demands in the context of newspapers, radio, film, and television.

Role of the Editor - Editing of Articles, Features and other stories - Editing for online newspaper and magazines - Text preparation, Mode of presentation, Standards and Guidelines for documentation, Code of ethics, Basic knowledge on Press laws, Press Council of India, Multimedia/online journalism and digital developments.

Regional, National and International discussion forums, Discussions on topics needed in an architectural journal and current issues - types of journals, works of key architectural journalists. Analysis of recent historical and contemporary examples of written and journalistic criticism of architecture, including selected writings by Indian and overseas critics; discursive techniques, analysis of major critical themes, thematic categories in architectural writing.

## REFERENCES

1. Edward Jay Friedlander and John Lee, "Feature Writing for Newspapers and Magazines", 4th edition, Longman, 2000.
2. Fuller, David & Waugh, Patricia eds., "The Arts and Sciences of Criticism", Oxford: Oxford University Press, 1999
3. Foust, James, Online Journalism, "Principles and Practices of News for the Web", Holcomb Hathaway Publishers, Scottsdale, AZ, 2005
4. M. Harris, "Professional Architectural Photography", Focal Press, 2001.
5. M. Harris, "Professional Interior Photography", Focal Press, 2002
6. Huckerby, Martin., The Net for Journalists: A Practical Guide to the Internet for Journalists in Developing Countries. UNESCO/Thomson Foundation/ Common wealth Broadcasting Association, 2005.
7. Ward, S. J. A. "Philosophical Foundations of Global Journalism Ethics." Journal of Mass Media Ethics., Vol. 20, No. 1, 3-21, 2005
8. M . Heinrich, "Basics Architectural photography", BirkhauserVerlag AG, 2008. 4. Gerry Kopelow, "Architectural Photography: the professional way", 2007