

SCHEME OF TEACHING AND EXAMINATION OF III SEM B.ARCHITECTURE (CBCS SCHEME)

Sl. No.	Subject Code	Title of the Subject	Teaching Scheme in Periods per Week (50 Mts)				Examination Scheme					Credits	
			Lecture	Studio	Pract	Total	Dur (hrs)	Theory Marks	Prog. Marks	Viva Marks	Total		
1	15 ARC 3.1	Architectural Design-III	-	9	-	9	-	-	100	200	300	7	
2	15ARC 3.2	Materials and Methods in Building Construction-III	1	5	-	6	4	100	50	-	150	4	
3	15ARC 3.3	Climatology	3	-	-	3	3	100	50	-	150	3	
4	15ARC 3.4	History of Architecture - III	3	-	-	3	3	100	50	-	150	3	
5	15ENG 3.5	Building Structures-III	2	2	-	4	-	-	50	100	150	3	
6	15 ARC 3.6	Theory of Architecture II	3	-	-	3	3	100	50	-	150	3	
7	15 ARC 3.7	Computer Applications I	-	-	5	5	-	-	100	-	100	2	
8	15ARC3.8	Elective I (any one)											
		a)Architectural Photography	3				3			50		50	2
		b)Vernacular Architecture	3				3			50		50	
		c)Visual Communication	3				3			50		50	
		12 or 15	16 or 19	5 or 8	36	-	400	500	300	1200	27		
ARC= Architectural Subjects ART= Art Subjects ENG = Engineering Subjects HUM = Humanities Subjects.													
No. of Subjects/Heads = 08						No. of Theory Examinations = 04							
Progressive Marks to be awarded by the subject teacher.													
Minimum Marks for passing: Progressive Marks 50%, Theory Marks and viva marks 40% in each													

15ARC 3.1 – ARCHITECTURAL DESIGN - III
CONTACT PERIODS: 9 (STUDIO) PER WEEK
VIVA MARKS: 200
PROGRESSIVE MARKS: 100

OBJECTIVE: *To enable students to understand the processes involved in the transformation of space into place.*

OUTLINE:

The student after having familiarized with aspects like space, light, movement, scale and structure involved in formulating and articulation of spaces relating to health (Clinic), food (Restaurant), services (Bank, Post Office) and education (Primary / Nursery School) in the 2nd semester, needs to move on to tackle larger issues in 3rd Semester. The third Semester work relates to transforming “Space” into “Place”. The factors influencing this process like context, site, surroundings etc will have to be considered. Further, techniques of reading cultural and physical meaning leading to the built environment assume importance.

COURSE OF STUDY – Placemaking as an architectural goal

KEYWORDS – Need, function, activity and place

Mode of study: Place (i) Permanent (full time), (ii) Temporary (seasonal/periodic) (iii) Transient (few hours, days)

Elements promoting sense of “place” – colors, textures, shapes and forms, materials (e.g.: tents), enclosures (fences, walls, roofs, etc.), nodes (trees/platforms etc.), anthropometry and role of sensory aspects like sound, light, smell, texture etc. in creating “memory” of space

FIRST ASSIGNMENT – 3 weeks

Public spaces (bus shelter/station, streets etc.)

Semi-public spaces – college campus, institutional (hospital) etc.

Private spaces – Apartments, common spaces, lobby etc.

Any one of the above to be the assignment – to study any one set of factors promoting the idea/sense of space

NOTE: Nature of work and its mode to be explained before commencement

COURSE OF STUDY – To identify factors (contextual) influencing the design of built environment.

KEYWORDS – Physical, functional and social factors, streetscape, old areas, conflicting aspects, zoning, scale, hierarchy, compatibility, contrast.

Mode of study: (i) Physical factors (location, access, slope etc.) (ii) Functional (Dynamic, static, single/multiple) etc. (iii) Social (traditional, end users, age group etc.) (iv) Streetscape (v) zoning (based on activity, levels etc.) (vi) Scale/hierarchy/contrast (in terms of functions, structure etc.)

SECOND ASSIGNMENT – 3 weeks

Contextual configuration of above factors affecting “DESIGN” – one of the following:

- Exhibition pavilions (Open, partially covered)
- Museums (open air, partially covered)
- Yatri Niwas/Youth camp/youth hostel etc.
- Rural/urban weekly shandy /market (part open, partly enclosed) etc.

COURSE OF STUDY – To explore the meaning of built environment through physical and cultural contexts and techniques to read them.

KEYWORDS – Techniques, layered, comparative, historical, location, size, networks, visual layer, perception (scale, forms etc.), functional.

Mode of study:

- Techniques – layered, comparative, historical
- Physical layer – location, networks, size, hierarchy, temporal functions
- Perception: Density, volume, crowding, conflicting/conforming aspects
- Visual layer: scale, contrast, forms and spaces and their hierarchy
- Functional: core and auxiliary, formal/informal, incidental/intentional

THIRD ASSIGNMENT – 6 weeks

- A small/medium size resort/hotel in a given context e.g.: Nandi hills, Srirangapatna, Hampi etc.
- Residential facility cum training center in a slum.
- Museum (enclosed) in Belur, Banavasi, Udupi, Pattadakal, Gokarna etc.
- Nature cure/Health resort in Coorg/Chikamagalur, Dandeli etc.
- Application of one particular technique (preferably layered technique for its comprehensiveness).
- Analysis and ensuing strategy for the CONTEXT to be an outcome of physical and cultural parameters through the chosen technique. Any ONE of the suggested topics to be attempted.

COURSE OUTCOME

At the end of the third semester, the student through EXPOSURE and ANALYSIS is capable of converting SPACE into PLACE through functions and elements, converting and extending place into built environment through organizational factors contextually and finally enhance and carry to end the idea “contextualise”, culturally and physically to enable one to READ the context.

SHAPE OF THINGS TO COME – 4th Semester

This exposure would help the student in the next semester to create a context e.g.: Housing / neighbourhood etc. using the ‘MULTILAYERED” and SCALED UP approach to tackle several parameters simultaneously.

REFERENCES:

1. De Chiara and Callender, Times Saver Standards for Building Types, McGraw-Hill Company, 1980
2. Neufert Architect’s Data, Rudolf Herg, Crosby Lockwood and sons Ltd, 1970

15ARC 3.2 –MATERIALS AND METHODS IN BUILDING CONSTRUCTION-III

CONTACT PERIODS: 6 (1 LECTURE + 5 STUDIO) PER WEEK

THEORY MARKS : 100

PROGRESSIVE MARKS : 50

DURATION OF EXAM : 4 Hrs

***OBJECTIVE:** To acquaint the students with construction practices pertaining to RCC, floors, roofs and flooring alternatives, masonry plastering and paint finishes.*

OUTLINE:

MODULE 1

Introduction to RCC Slabs: one way, two-way slabs, cantilever slabs, sloping RCC roof, one way continuous, and two ways continuous.

1. **RCC one way slab and one-way continuous slabs :** Principles and methods of construction.
2. **RCC two way slab and two-way continuous slabs:** Principles and methods of construction.
3. **RCC cantilever slabs and sloping slab:** Principles and methods of construction.

MODULE 2

4. **Vaults & domes I:** Principles and methods of construction including techniques and details of form-work. Construction of Masonry Vaults and Domes – Concepts of Reinforced Concrete Domes and Vaults.
5. **Vaults & domes II:** Concepts and construction of Reinforced concrete domes and vaults with formwork design.

MODULE 3

6. **Introduction to Floor finishes including Toilet flooring:** Mud flooring, Murrum flooring, and Stone flooring in marble, granite, tandur/kota stone, other flooring in mosaic, terrazzo, ceramic tiles, wooden flooring and polished concrete: Laying, Fixing and Finishes.

7. **Introduction to Paving:** Cast in situ concrete including vacuum dewatered flooring, concrete tiles, interlocking blocks, clay tiles, brick and stone.

MODULE 4

8. **Introduction to internal and external masonry plastering and paint finishes:** Materials – Paints, varnishes and distempers, emulsions, cement based paints. Constituents of oil paints, characteristics of good paints, types of paints and process of painting different surfaces. Types of varnish, methods of applying varnish and French polish and melamine finish.

MODULE 5

9. **Method of plastering (Internal and External):** smooth, rough, textured, grit plaster etc. Use of various finishes viz., lime, cement, plaster of Paris, buffing etc.
10. **Introduction to wet Cladding:** wet cladding in stone, marble, etc. including toilet cladding.
11. **Alternative roofing:** Jack Arch, Madras terrace, and stone slab roof.

Note – Minimum one plate on each construction topic. Site visits to be arranged by studio teachers. Study of material applications in the form of portfolio. This is for progressive marks.

REFERENCES:

- 1) Chudley , Construction Technology, ELBS, 1993
- 2) Barry, Construction of Buildings, East West Press, 1999

15ARC 3.3 – CLIMATOLOGY

CONTACT PERIODS: 3 (LECTURE) PER WEEK

DURATION OF EXAM: 3 HRS

THEORY MARKS:100

PROGRESSIVE MARKS : 50

OBJECTIVE: *To develop the knowledge required for understanding the influence of Climate on architecture including the environmental processes which affect buildings, such as thermal, lighting, etc.*

OUTLINE:

MODULE 1

- 1. Introduction to Climate-1:** The Climate-built form interaction; some examples. Elements of climate, measurement and representations of climatic data. Classifications and Characteristics of tropical climates.
- 2. Introduction to Climate-2:** Major climatic zones of India. Site Climate: Effect of landscape elements on site/micro climate
- 3. Thermal comfort-1:** Thermal balance of the human body, Thermal Comfort Indices (Effective temperature, corrected effective temperature, bioclimatic chart, tropical summer index by CBRI Roorkee). Measuring indoor air movement: Kata-thermometer, and measuring indoor radiation: Globe thermometer.

MODULE 2

- 4. Thermal comfort-2:** Calculation of Overheated and Under heated period (based on air temperature only) for locations in Climatic zones and their optimization in terms of solar heating and Passive cooling desired.
- 5. Sun-path diagram:** Solar geometry & design for orientation and use of solar charts in climatic design.
- 6. Thermal performance of building elements:** Effect of thermo-physical properties of building materials and elements on indoor thermal environment. Convection, Radiation, concept of Sol-air temperature and Solar Gain factor.

MODULE 3

- 7. Thermal Heat gain or loss:** Steady state and periodic heat flow concepts, Conductivity, resistivity, diffusivity, thermal capacity, time lag and 'U' value. Calculation of U value for multilayered walls and Roof, Temperature Gradient, Inference of time lags from Graphs for walls and Roof. Construction techniques for improving thermal performance of walls and roofs. (Effect of density, Insulation, and Cavity).

MODULE 4

- 8. Shading devices:** Optimizing Design of Shading devices effective for overheated periods while allowing solar radiation for under heated periods for different wall orientations.
- 9. Natural ventilation:** Functions of natural ventilation, Stack effect due to thermal force and wind velocity. Air movements around buildings, Design considerations and effects of openings and external features on internal air flow and Wind shadows.

MODULE 5

- 10. Day Lighting:** Nature of natural light, its transmission, reflection, diffusion, glare. Advantages and limitations in different climatic zones, North light, Daylight factor, components of Daylight devices.
- 11. Climatic Design considerations-1:** Literature study of relevant traditional and contemporary building examples.
- 12. Climatic Design considerations-2:** Two Indian case studies and one international for each climatic zone.

REFERENCES:

- Koenigsberger, Manual of Tropical Housing & Buildings (Part-II), Orient Longman, Bombay, 1996.
- Arvind Kishan, Baker & Szokolay, Climate Responsive Architecture, Tata McGraw Hill, 2002.

15ARC 3.4 – HISTORY OF ARCHITECTURE – III

CONTACT PERIODS: 3 (LECTURE) PER WEEK

DURATION OF EXAM: 3 HRS

THEORY MARKS: 100

PROGRESSIVE MARKS: 50

***OBJECTIVE:** To provide an introduction to the culture and architecture of Islamic and Colonial periods in India and to provide an understanding of their evolution in various stylistic modes, characterized by technology, ornamentation, and planning practices.*

OUTLINE

MODULE 1

1. **Islamic Architecture** – Early phase; It's emergence in 11th century AD in India. General characteristics of Indian Islamic Style.
2. **Early Phase -I** :- Slave and Khilji phase – a) Monumental : Quawat.Ul.Islam, mosque and tomb of Iltumish , Qutb Minar , Alai Minar. b) Civic space: Enlargement of Quwaat Ul Islam Complex and Alai Darwaza.
3. **Early Phase -II** :- Tugluq , Sayyid & Lodi dynasties. – Architectural character-
a) Monumental arch : Tomb of Ghia – Suddin Tugluq, Tomb of Firoz shah Tugluq, Shish Gumbad & Mubarak shah Sayyid's tomb. b) Civic Space : Khirkhi masjid Delhi, Firoz Shah kotla – public and private space, madrassa design with Firoz shah's tomb.

MODULE 2

4. **Provincial style - I** – Jaunpur and Bengal – Architectural character
a) Monumental arch : Atala and Jami masjid Bengal – Adina masjid Pandua, Ek Lakhi Tomb b) Civic Space : Elements like entrance pylon : Jaunpur, Dakhil – Darwaza at Gaur, space within & outside of examples like Gunmount or Badasona Masjid.
5. **Provincial style - II** – Ahmedabad and Bijapur – Architectural characteristics-
a) Monumental arch: Ahmedabad, Vavs of Gujarat: Bijapur- Golgumbaz, Ibrahim Rauza, Jami masjid. B) Civic space: Ahmedabad-Sarkhej complex, Teen darwaza. Bijapur-Ibrahim Rauza, Bauli (Water tank). c) Domestic architecture.

MODULE 3

6. **Provincial style – III-** Bidar and Gulbarga-General Character. a) Monumental: Bidar- Jami masjid. Gulbarga-Jami masjid. B) Civic space: Treatment of space within mosque and enclosed space for gathering at both places. c) Domestic: Bidar- Madrassa of Mond, Gawan.
7. **Moghul Architecture-I** –Architectural Character. a) Monumental arch: Humayun’s tomb, Fatehpursikri layout, Jami masjid, Diwan-I-khas, Tomb of Salim chisti. B) Civic space- Buland darwaza, Garden(Humayun’s tomb). c) Domestic- Fatehpursikri, Birbal’s house, Jodhabai’s palace.

MODULE 4

8. **Mughal Architecture-II** - Monumental arch: Akbar’s tomb, Taj mahal, Itmaud Daula b) Civic space: Mughal Gardens, Diwan-I-am, Red Fort, Meena bazaar, Red Fort, Guesthouse (Taj mahal complex) c) Domestic: Public elements like ‘Serai’- traveler’s shelters, Nobles’ houses etc.
9. **Colonial Architecture-I** – Early phase-Establishment of forts, warehouses etc- Building typologies and general architectural character of Colonial Indian Architecture.

MODULE 5

10. **Colonial Architecture-II** – Study of Examples a) Monumental- Governor’s house, Calcutta, Town hall, Victoria Terminus(Chhatrapati Shivaji Station) Mumbai, Madras Club, Pacchiappa College Chennai, Mayo Hall, Museum, Central College Bangalore. Deputy Commissioner’s Office, Palace, Mysore, Examples from Hubli and Dharwad, Karnataka. b) Civic spaces: Parade Ground ,MG Road, Bangalore, Civic spaces around Mysore Palace c) Domestic Bungalows from Calcutta, Chennai, Bangalore and Mysore Railway Stations, Administrative Buildings etc
11. **Colonial Architecture-III** – a) Design of New Capital of Delhi- Contributions of Edward Lutyens, Herbert Baker(Rashtrapati Bhavan), Layout of New Delhi, Parliament House, North Block and South Block at Rashtrapathi Bhavan. B) Monumental: Civic space-Rajpath, Janpath, India Gate etc.

12. **Colonial Architecture-IV** – Examples from Goa-Se Cathedral, Cathedral of Bom Jesus (Monumental Architecture). Architecture from Pondicherry-Indian and French Quarters(Domestic Architecture). Brief summary of Dutch and Danish settlements.

NOTE: *The following are for progressive marks*

- 1) A Portfolio containing analysis of spaces, functions, and forms (Individual submission).
- 2) Group studies through Photographic documentation of local/ regional examples or study models of the examples.

REFERENCES:

- 1) Tadgel, C. History of Architecture in India, Phaidon Press, 1990
- 2) Brown, Percy. Indian Architecture, Islamic Period, Taraporavala and sons, 1987.

15ENG 3.5 BUILDING STRUCTURES - III

CONTACT PERIODS: 4 (2 LECTURE+2 STUDIO) PER WEEK

VIVAMARKS:100

PROGRESSIVE MARKS: 50

OBJECTIVES:

- 1) *To understand the fundamental principles and structural behaviour of concrete buildings in withstanding gravity, lateral (seismic and wind), and other environmental forces.*
- 2) *To understand the mechanics of reinforced concrete, and the ability to design and proportion structural concrete members including slabs, beams, and columns.*

OUTLINE:

- 1) **RCC Materials:** Basic Characteristics of Concrete & Reinforcing Steel Materials including specifications and testing. Basics of mix design, water-cement ratio, strength, durability, workability requirements and formwork.
- 2) **Mechanics of Reinforced Concrete:** Concept of Concrete as a brittle, composite material that is strong in compression and weak in tension. Structural behavior under load and the need for reinforcement.
- 3) **Structural Analysis and Design to satisfy Building Codes and Standards;** Introduction to National Building Code and IS456: Calculation of dead weight and live loads on structure as per IS875 (Part1&2). Determination of the general loads to be considered in the design of the structure based on the type of occupancy specified for each area. Introduction to safety factor and design philosophy.
- 4) **Concrete Structural System design:** Introduction to the Project: Design of two story RCC frame office building with dimension of 15m X 30m and 3 m storey height using different Concrete Structural Systems including a framing plan, column, beam and slab arrangements and dimensions for all the different Concrete Structural systems already introduced(Indicative).
- 5) **One way Concrete slab system:** General framing arrangement of beams, columns and slabs for 15m X 30m building by One-way concrete slab system and design of singly reinforced beams using SP 16: Design Aids for Reinforced Concrete to IS 456:1978.

- 6) **One way Concrete slab Joist System:** General framing arrangement of beams, columns and slabs for 15m X 30m building by One-way Joist System and design of singly reinforced slabs using SP 16: Design Aids for Reinforced Concrete to IS 456:1978.
- 7) **Two-way Concrete Floor and Roof Systems:** General framing arrangement of beams, columns and slabs for 15m X 30m building by Two-way Slab-Beam, and design of short columns using SP 16: Design Aids for Reinforced Concrete to IS 456:1978.
- 8) **Two-way Concrete Flat Plate System:** General framing arrangement of beams, columns and slabs for 15m X 30m building by Two-way solid Flat Plate system design, and design of Isolated footings using SP 16: Design Aids for Reinforced Concrete to IS 456:1978.
- 9) **Two-way Concrete Flat Slab System:** General framing arrangement of beams, columns and slabs for 15m X 30m building by two-way solid Flat slab system, and formwork design and detailing.
- 10) **Two-way Concrete Waffle slab Systems:** General framing arrangement of beams, columns and slabs for the 15m X 30m building by two-way (waffle) slab design.
- 11) **Reinforcement Design:** Approximate calculation of Column, Beam and Slab reinforcement.
- 12) **Reinforcement detailing and placement:** Preparation of working drawings showing the type, size and location of the reinforcement in a concrete structure.
- 13) **Design Review:** Review of design of Column, Beam and Slab, total concrete volume, reinforcement tonnage and costing.

Note: Class work on loading calculation of each Concrete Structural System including structural system elements, slab, beam, column and footing, will be assessed during the Viva examination.

REFERENCES:

1. STRUCTURES - Martin Bechthold, Daniel L Schodek, PHI Learning Private limited.
2. IS 456-2000 Plain and Reinforced Concrete - Code of Practice

15ARC 3.6 – THEORY OF ARCHITECTURE-II

PROGRESSIVE MARKS : 50

DURATION OF EXAM: 3 hrs

THEORY MARKS: 100

***OBJECTIVE:** To acquaint the students with architectural theory from antiquity to the present and to identify issues which shaped the approach to architectural design in a particular context and age.*

OUTLINE:

MODULE 1

Introduction to Theory in Antiquity: Marcus Vitruvius and his multi-volume work entitled De Architectura. Mayamata: Indian Treatise on Housing & Architecture.

Introduction to Theory in Renaissance: Leon Alberti, Andrea Palladio – Jacques Francois Blondel and Claude Perrault of French Academic Tradition.

- 1) **18th Century Theory:** Ideas of Laugier, Boullée, Ledoux
- 2) **19th Century Theory:** Concepts of Viollet Le Duc, John Ruskin, Quatramere de Quincy and Gottfried Semper

MODULE 2

- 3) **Modern Movement Theory:** Ideas of Adolf Loos, Eero Saarinen, Erich Mendelsohn, Richard Neutra, Otto Wagner, Kenzo Tange.
- 4) **Post Modern Theory-1:** Ideas on Post-Modern Classicism by Robert Venturi and Charles Jencks. Deconstruction: Fundamental beliefs and philosophy and ideas of Peter Eisenman.

MODULE 3

- 5) **Post Modern Theory-2:** Contribution to architectural thought: Ideas of Kenneth Frampton and Christopher Alexander
- 6) **Post Modern Theory-3:** Contribution to architectural thought: Ideas of Amos Rapoport, Geoffrey Broadbent-his design generation theories.

MODULE 4

- 7) **Architectural Criticism:** Definition & Sources, to examine fundamental questions of what Architectural criticism actually is, its role and function in architecture and the relationship between criticism and judgment. Specifically in terms of, thinking, discussing, and writing on architecture, social or aesthetic issues. Positive and Normative theories of Jon Lang,
- 8) **Architectural Criticism types:** Definition, Sources, Types of Criticism according to Wayne Attoe.

MODULE 5

- 9) **Design Logic:** Design generation process: Role of logic and intuition in concept generation. Step by step development of design from problem definition, site analysis to post occupancy evaluation as the last stage of design.
- 10) **Contemporary Significant Theory:** Ideas of Hassan Fathy who pioneered the use of appropriate technology for building in Egypt, especially by working to re-establish the use of mud brick (or adobe) and tradition as opposed to western building designs and layouts and Paolo Soleri's concept of "Arcology", architecture coherent with ecology. Shape of built environment to come. Floating, walking, plug-in, satellite settlements, earth sheltered etc. Works of Archigram, Paolo Soleri, Kenzo Tange, Moshe Safdie etc.

REFERENCES:

- 1) Broadbent, Geoffrey. Design in Architecture, John Wiley & Sons Ltd, 1977
- 2) Lang, Jon , Creating Architectural Theory, Van Nostrand Reinhold Co, New York 1987
- 3) " A moment in Architecture" and Other Books by Gautam Bhatia.

15ARC 3.7 – COMPUTER APPLICATIONS -I

CONTACT PERIODS: 5 (Practical) hrs/ week with 1-2 hrs of instruction and Remaining hrs of working on CAD workstation

PROGRESSIVE MARKS : 100

OBJECTIVE: *To develop and train students to use computers and digital media as tools to explore, develop, evaluate and present architectural ideas. To equip the student with a range of digital tools and techniques in 2D drafting, 3D modelling, and vector graphics.*

OUTLINE:

1. Introduction to 2D drafting software: Using latest version of relevant CAD software:

a. 2D commands, viewports, dimensions, annotations. Time problem introduction;

Classroom exercises such as measured drawing of studio (windows, doors and staircases included), architecture School (windows, doors and staircases included) etc.

b. Understanding layers, paper space Vs model space, line weights, print set up and Modelling of Walls, Doors, Windows, Stairs etc.

2. 2D drafting: Presentation of time problem; plan, sections, elevations of a floor of a single storied building of II / III semester architectural design studio project.

3. Introduction to 3d modelling: Latest version of relevant 3D modelling software – software interface, demonstration of 3D modelling commands required to convert 2D project (of 2D drafting) into 3D as a time-problem.

4. Simple 3D modelling: Presentation of time problem; drawing quickly with basic shapes in 3D, viewing models in 3D, adding detail to Models in 3D space, use of cameras, material applications. Presenting models.

5. Rendering & Visualization: Presentation of time problem, generating 3d Model and introduction to concepts of visualization using rendering engines such as V-Ray, Flamingo, 3D studio Max, or any other appropriate software.

6. Introduction to concepts of Building Information Modelling (BIM) using REVIT or other relevant BIM software.

7. Introduction to graphics editing tools:

a. Introduction to appropriate techniques to model walls, insert fenestration, curtain walls & staircases.

b. Lecture and Classroom exercise to convert into BIM project, relationship of other Industry standard file types (.dwg for AutoCAD or Trimble Sketchup input files or from any other relevant software.).

c. Lecture and Classroom exercise to further utilize rendering and visualization.

8a. Concepts of image scanning, image editing, effects and filters.

b. Classroom exercise to demonstrate use of Image editing for simple architecture design project projects. For e.g., rendering of 2D drawings, adding nature to 3D visualizations.

9. Graphics editing tools: – Presentation of any simple project to illustrate skills attained in 2D drafting, 3D modeling, graphics editing tool.

NOTE: A portfolio of exercises and assignments done in the class to be submitted for progressive marks.

REFERENCES:.

1. Website and training material of relevant Image/Graphics editing software
2. Learning resources on Building Information Management (BIM).
3. Vast amount of CAD learning resources available on the Internet.
4. Vast amount of learning resources for Graphics editing tools available on the Internet.

15ARC3.8- ELECTIVE I
CONTACT PERIODS: 3 PERWEEK
PROGRESSIVE MARKS: 50

a) ARCHITECTURAL PHOTOGRAPHY

OBJECTIVE

To impart the skills of taking aesthetically appealing and creative architectural photographs through the use of appropriate cameras/ lenses and lighting conditions.

OUTLINE

1. Introduction to architectural photography. Various types of compositions framing, silhouette photography.
2. Use of various cameras, lenses and accessories, handling of equipment.
 - a. SLR,DSLR cameras, lenses for different focal lengths for various contexts
 - b. Use of wide angle, normal, tele, zoom, macro, close up lenses.
 - c. Filters- UV, Skylight, colour filters, special effect filter.
3. Shutter speeds- slow, normal and high and their various applications.
4. Apertures- use of various apertures to suit different lighting conditions and to enhance depth of fields.
5. Selection of ISO rating to match various lighting conditions.
6. Optimizing selection of shutter speed, aperture and ISO.
7. Twilight and night photography.
8. Various uses of photography- documentation, presentations, competitions, lectures, etc.
9. Creative photography/ photo renderings, for special effects using software.
10. Play of light and shadows to achieve dramatic pictures.
11. Effects of seasons, inclusion of greenery, foliage, clouds, human scale etc.
12. Architectural photography as a profession, law on photography.

REFERENCES:

1. Schulz, Adrian. Architectural Photography: Composition, Capture, and Digital Image Processing, Rocky Nook, 2012.
2. McGrath, Norman . Photographing Buildings Inside and Out, Watson-Guptill Publications, 1993.

b) VERNACULAR ARCHITECTURE

CONTACT PERIODS: 3 PER WEEK

PROGRESSIVE MARKS: 50

OBJECTIVE:

To inculcate an appreciation of vernacular architecture; as an expression of local identity and indigenous traditions of the culture

OUTLINE:

The course would be conducted through seminars and field work.

1. Introduction to the approaches and concepts to the study of vernacular architecture, history and organisation of vernacular buildings of different regions in the Indian context; with an understanding of forms, spatial planning, cultural aspects, symbolism, colour, art, materials of construction and construction techniques. Study of factors that shape the architectural character and render the regional variations of vernacular architecture - geographic, climatic, social, economic, political and religious aspects, local materials and skills available in the region etc.
2. Methods of observation, recording, documenting and representing vernacular architecture with examples.
3. Study and documentation of vernacular architecture of selected building typologies. Rigorous documentation, accuracy in measuring, collating the recorded information and drawing them up in specified formats and scales are part of this module.
4. A critical review of the relevance and application of vernacular ideas in contemporary times. An appraisal of architects who have creatively innovated and negotiated the boundaries of 'tradition' while dynamically responding to the changing aspirations and lifestyles of the world around.

REFERENCES:

1. Carter, T., & Cromley, E. C. Invitation to Vernacular Architecture: A Guide to the Study of Ordinary Buildings and Landscapes. Knoxville: The University of Tennessee Press. 2005
2. Cooper, I. Traditional buildings of India. Thames and Hudson Ltd, London, 1998
3. Oliver, P. Encyclopaedia of Vernacular Architecture of the World, Cambridge University Press, 1997

c) VISUAL COMMUNICATION CONTACT PERIODS: 3 PER WEEK PROGRESSIVE MARKS 50

OBJECTIVE: *To impart the techniques of visual communication.*

OUTLINE:

1. Visual communication used in day to day life, print, electronic media, advertisement and in art / architecture context - differences and similarities.
2. Understanding meaning generation process in visual language.
3. Devices of visual language - space, context, scale, associate, transform, crop, frame, distort, abstract, fragment, exaggerate, and subvert, irony.
4. Pictograms and ideograms.
5. Understanding the differences between logo and symbol. Process of logo creation.
6. Hierarchy in visual content being presented.
7. Relationship between text and images and their interrelationships.
8. Cultural context of meaning generation and aesthetic principles involved.

REFERENCES:

1. Barnes, Susan B. An Introduction to Visual Communication: From Cave Art to Second Life, Peter Lang Publishing Inc, 2011
2. Bergström, Bo. Essentials of Visual Communication, Laurence King Publishing, 2009

SCHEME OF TEACHING AND EXAMINATION OF IV SEM B.ARCHITECTURE (CBCS SCHEME)

Sl. No.	Subject Code	Title of the Subject	Teaching Scheme in Periods per Week (50 Mts)				Examination Scheme					Credits
			Lecture	Studio	Pract	Total	Dur (hrs)	Theory Marks	Prog. Marks	Viva Marks	Total	
1	15ARC 4.1	Architectural Design-IV	-	9	-	9	-	-	100	200	300	7
2	15ARC 4.2	Materials and Methods in Building Construction-IV	1	5	-	6	4	100	50	-	150	4
3	15ENG 4.3	Building Services-I	3	-	-	3	3	100	50	-	150	3
4	15ARC 4.4	History of Architecture - IV	3	-	-	3	3	100	50	-	150	3
5	15ENG 4.5	Building Structures-IV	2	2	-	4	-	-	50	100	150	3
6	15ENG 4.6	Specification, Quantity and Costing of Buildings	3	-	-	3	3	100	50	-	150	3
7	15ARC 4.7	Computer Applications-II	-	-	5	5	-	-	100	-	100	2
8	15ARC 4.8	Elective II (anyone)										
		a. Environment-responsive architecture	3		3			50		50	2	
		b. Product design	3		3			50		50		
		c. Heritage documentation	3		3			50		50		
			12 or 15	16 or 19	5 or 8	36	-	400	500	300	1200	27
ARC= Architectural Subjects ART= Art Subjects ENG = Engineering Subjects HUM = Humanities Subjects.												
No. of Subjects/Heads = 08 No. of Theory Examinations = 04												
Progressive Marks to be awarded by the subject teacher.												
Minimum Marks for passing: Progressive Marks 50%, Theory Marks and viva marks 40% in each												

15ARC 4.1 – ARCHITECTURAL DESIGN - IV
CONTACT PERIODS: 9 (STUDIO) PER WEEK
VIVA MARKS: 200
PROGRESSIVE MARKS: 100

OBJECTIVES:

- 1. To understand the difference between housing as a process and a product and the role of an architect in creating the product and facilitating the process*
- 2. To understand the needs of privacy, communal spaces, efficiency of open spaces and ideas of extended living areas*
- 3. To differentiate and understand the nature of organic and planned communities.*

OUTLINE:

To understand the hierarchies of different types present in spaces relating to group living(Housing) and the complexities of integrating them into an architecturally meaningful whole.

MODE OF STUDY: Three component approach to the Design Studio:

A) TRAVEL FOR SITE VISITS: Learning from visiting various settings: urban and rural, traditional, contemporary, permanent and temporary, to introduce them first hand to students.

B) SEMINARS: Seminars are intended to expose the students to a gamut of real issues that are integral to their understanding of housing. They are expected to lead students to explore different approaches to housing.

C) PROJECTS: Studio projects will structure and model design thinking in order to reveal to students the knowledge to be learnt and various strategies for unearthing, integrating and constructing knowledge and ideas in a project. Emphasis in teaching and learning is placed on bridging the gap between the imaginative and conceptual, the material and formal. Projects should involve activities that encourage students to develop techniques for identifying and negotiating competing demands and prioritizing and ordering variables. An

essential part of the studio process should be peer reviews and reviews by practicing architects.

Assignment-1: SITE VISITS

- 1) Two short site visits to observe, discuss and document existing residential settlements, housing projects in the vicinity of colleges.
- 2) The emphasis should be on conceptual understanding rather than on accurate measured drawing.
- 3) Attention should be given to community spaces/common areas and the emergent grouping of individual dwellings.
- 4) Sketches and documentation should show observations and inferences from the studies.

Assignment-2: SEMINARS

Introduction to Contemporary Indian Issues Related to Housing:

- Indigenous building technologies
- Contemporary Building Science and Technologies for Developing Countries
- The architect as the facilitator: DISCUSSION

Assignment-3: PROJECTS

One major project and one minor/time assignment to be tackled in the semester. Project work could be done in the following four stages of activity interspersed with seminars.

1. Introduction to the initial design parameters which include choice of:
 - a. Geography/situation (context),
 - b. User Group/development model, and
 - c. Development guidelines (bylaws).

2. Approaches and strategies to address issues of community, public and private realms, edge conditions, communication and connectivity. This could result in the generation of diagrams/models, exploring attitudes to site, allocation of built and unbuilt volumes and communication and connectivity.

3. Approaches and strategies to address issues of personal and family/user group needs, comfort and security, convenience and utility and health.

4. Negotiation of the large scale (communal) and intimate (personal) approaches to the design of housing and their integration. Certainly this could also happen during the earlier stages and alternative strategies should still be explored. The solution/ submission to integrate spaces through visual and functional hierarchies.

It is recommended that site sizes should not be larger than 2000 sqm to allow for intensive study rather than repetition of typical configuration. However the Design studio faculty shall determine the extent of the site size.

MODE OF STUDY:

Housing projects can be attempted with added complexities for example, dense context, occupation based, traditional urban fabric, social status and prevalent social strata. Details from the dwelling cell to immediate shared space to communal space shall be emphasized and worked out. Socio cultural layer of the occupants shall form a strong fabric in the ultimate weave of the design. Projects shall aim at developing a sensitive attitude towards micro level human habitation and role of architecture in enhancing or curbing the quality of living.

a) Apartments for IT employees, Govt. servants, teaching faculty, Textile weavers, Luxury flats in the center of the city etc. One of these as the major project

b) Housing for the deprived or marginalized or disaster relief shelter or temporary housing. One of these as a minor project at reduced scale.

- The design shall be sensitive to the needs of disabled, aged people and children. The context for the design problems could be both rural and urban.
- One major project and one minor/ time problem to be tackled in the semester.

- Detailing of architectural features of the major project like entrance lobby, skylights and staircases has to be attempted

SHAPE OF THINGS TO COME – 5TH SEMESTER

This studio should equip a student to tackle the 5th Semester projects of urban scale, complexity, and multiple functions.

REFERENCES:

- 1) De Chiara and Callender, Times Saver Standards for Building Types, McGraw-Hill Company, 1980
- 2) Neufert Architect's Data, Rudolf Herg, Crosby Lockwood and sons Ltd, 1970

15ARC 4.2 –MATERIALS AND METHODS IN BUILDING CONSTRUCTION-IV

CONTACT PERIODS :6 (1LECTURE + 5 STUDIO) PER WEEK

PROGRESSIVE MARKS : 50

THEORY MARKS : 100

Duration of Exam – 4 Hrs

OBJECTIVE: *To acquaint the students with construction practices pertaining to RCC framing systems, and other building elements such as metal doors and windows(In Steel and Aluminium)*

OUTLINE:

MODULE 1

- 1) **Introduction to Advanced RCC roofs:** Moment framed, Flat slab and Flat plate, Filler slabs, Waffle slab.
- 2) **RCC Moment framed:** Principles and methods of construction including detailing of Reinforcement.
- 3) **RCC Flat Plate & Slab:** Principles and methods of construction including detailing of Reinforcement.

MODULE 2

- 4) **RCC filler slabs:** Principles and methods of construction. Introduction to different filler materials, Mangalore tiles, Burnt Clay Bricks, Hollow Concrete blocks, Stabilized Hollow Mud blocks, Clay pots, Coconut shells etc.
- 5) **RCC Waffle slabs:** Principles and methods of construction.

MODULE 3

- 6) **Structural steel as a building material:** Types, properties, uses and manufacturing methods.
- 7) **Steel construction:** Steel columns/beam construction; Principles and methods of construction.

MODULE 4

- 8) **Steel doors and windows:** Study of joinery details.
- 9) **Steel doors for garages and workshops:** uses and manufacturing methods.
- 10) **Collapsible gate and rolling shutters:** uses and manufacturing methods.

MODULE 5

- 11) **Aluminum as a building material:** Types, properties, uses and manufacturing methods. Detailing of aluminum partitions.
- 12) **Aluminum doors and windows:** Casement, Pivot, Sliding type: Study of joinery details.

Note – Minimum one plate on each construction topic. Site visits to be arranged by studio teachers. Study of material application in the form of portfolio.

REFERENCES:

- 1) Chudley , Construction Technology, ELBS, 1993
- 2) Barry, Construction of Buildings, East West Press, 1999

15ENG 4.3 – BUILDING SERVICES – I (WATER SUPPLY AND SANITATION)

CONTACT PERIODS: 3 (LECTURE) PER WEEK

DURATION OF EXAM: 3 HRS

THEORY MARKS: 100

PROGRESSIVE MARKS: 50

***OBJECTIVE:** To impart the knowledge and skills required for understanding the role of essential services of water supply and sanitation and their integration with architectural design.*

OUTLINE:

MODULE 1

1)Introduction to Environment and Health Aspects: History of Sanitation with respect to human civilization, Importance of Health, Hygiene Cleanliness, Waterborne, Water-related, Water based, Epidemic diseases, Conservancy to water carriage system, Urban and Rural sanitation.

2)Water Supply: Source of Water supply – Municipal, bore well, river, etc, Quantity of water for different usages like Domestic, Hot water, Flushing, Gardening, Commercial, Industrial Applications, Assessment of requirement for different uses, Quality of supply for different uses as per national and international standards, Treatment of water for different uses, filtration, softening, disinfection, Storage and pumping – gravity system, hydro-pneumatic system, Distribution of water to fixture and fittings, schematic diagrams, Swimming pool, water bodies, Efficient usage of water.

MODULE 2

3)Sewerage System: Assessment of sewage generated, Collection of sewage / wastewater from all sources, schematic diagram, Conveyance of sewage – gully trap, chamber, manhole, intercepting trap, grease traps, backflow preventer, Materials of construction of sewerage network – PVC, uPVC, HDPE, corrugated PP pipes, Objective of Sewage treatment, type of treatment, aerobic, anaerobic, Ventilation of STP, Space requirements

4)Storm water Management: Assessment, quantification of rainfall, flood control measures, Drainage system – piped drains, open drains, Recharging of storm water, Harvesting of roof top water, first flush, pretreatment, Drainage of basements, podium,

paved areas, Collection, Reuse of water within the project, reduction of the load on municipal system, landscape drainages and Rainwater harvesting.

MODULE 3

5) Plumbing: Water supply piping – hot, cold, flushing water, Piping in sunken areas, false ceiling areas, shaft sizes, Drainage – floor traps, drains, P-trap, bottle traps, Single stack, two stack, cross venting, fixture venting, Material of construction like GI, PPR, PB, CPVC, Composite pipes, Copper, Flow control Valves – Gate valve, Globe valves, butterfly valves, Pressure Reducing valves & station, Pipe supports, hangers, fixing, plumbing of small houses.

MODULE 4

6) Sanitary Fixtures, Fittings & Wellness: Soil appliances – Water closets, Bidet, urinals, Cisterns, Flush valve, Waste appliances – wash basin, sink, dishwasher, washing machine, Hot water system – Geysers, boilers, heat pump, Bath & water fixtures – Taps, mixers, single lever, quarter turn, bathtub, multi-jet bath, rain showers, health faucets, Wellness products : Sauna bath, steam bath, Jacuzzi, single and double stack system.

7) Solid Waste Management: Assessment of waste, Waste to wealth concept, Municipal waste, garden waste, organic & inorganic, Commercial waste, Medical waste & Industrial waste, Collection, segregation, treatment, disposal, Organic waste – Biomethanation, Vermicomposting, Organic waste converter.

MODULE 5

8) Introduction to Fire and Life safety: Causes of fire, reasons for loss of life due to fire, development of fire, fire classification of buildings, Fire water storage requirements, Fire control room, Code of practices, Idea of smoke detectors, Fire alarms, Wet risers, Fire escape stair case, equipment used eg: snorkel ladder, materials used to fight fire, Fire rating and Hydrants.

9) Special requirements: Solar Hot Water Generation, Central LPG Supply System, Medical Gases Supply, Storage of High Speed Diesel, Central Vacuum and Waste Collection.

Site Visits:

1. Water Treatment Plants, Sewage Treatment Plants, LPG & HSD Yards.
2. High Rise Residential Building – Plumbing (water supply, drainage)
3. Commercial Buildings like IT Campus, Hotel & Hospital for acquaintance of installation & space requirements.

NOTE: For Progressive Marks, individual submission of the following:

- a) Layout of Water supply and Sanitation with all fixtures in Kitchen, Bath and Utility for a small Residence i.e. Plan and Section, Terrace plan with Rainwater down take pipes, Sump and OHT calculation design.*
- b) Schematic diagram of similar study for a Basement floor.*
- c) Portfolio on*
 - i) Solid waste management and*
 - ii) Firefighting schematic plans*

REFERENCES:

- 1) Deshpande, RS. A Text Book of Sanitary Engineering, Vol:1, United Books, Pune, 1959.
- 2) Birdie, G. S. and Birdie J. S. Water Supply and Sanitary Engineering, Dhanpat Rai Publications, 2010

15ARC 4.4 HISTORY OF ARCHITECTURE-IV
CONTACT PERIODS: 3 (LECTURE) PER WEEK
DURATION OF EXAM: 3 HRS
PROGRESSIVE MARKS: 50
THEORY MARKS: 100

OBJECTIVE: *To develop the appropriate skills of reading, discussion and writing as well as understanding of the physical and aesthetic experience of buildings in order to appreciate the complexity of the influences bearing on architecture, as reflected in the major historical periods.*

OUTLINE:

MODULE 1

- 1) **Classical Greece Architecture-1:** Critical appreciation of works and synoptic study of architectural characteristic features from the Greek early periods.
- 2) **Classical Greece Architecture-2:** Critical appreciation of works and synoptic study of architectural characteristic features from the Greek later periods, Doric, ionic and Corinthian orders and optical correction
- 3) **Greek architecture Typologies:** Study of principles of design of Greek buildings through study of three kinds of Architecture: a) Monumental (Built to impress and Last) ex. Parthenon, Theatre at Epidauros. b) Domestic (Built to inhabit): House of Colline, House of Masks, etc. and c) Civic space: The Agora and Acropolis.

MODULE 2

- 4) **Introduction to Roman Architecture:** Critical appreciation of works and synoptic study of architectural characteristic features from the Roman periods. Study of Tuscan and composite orders.
- 5) **Roman architecture Typologies-1:** Study of principles of design of Roman buildings through study of proportion, composition, visual effects etc. in Monumental (Built to impress and last) Pantheon, Colosseum, Thermae of Caracalla, Pont du Gard, Nimes, Basilica of Trajan.

MODULE 3

- 6) **Roman architecture Typologies-2:** Study of principles of design of Roman buildings through study of Domestic (Built to inhabit)-House, villa and apartments.
- 7) **Roman architecture Typologies-3:** Study of principles of design of Roman buildings through study of Civic space with elements like triumphal arch, Column of Trajan(Septimius Severus), Roman Forum.
- 8) **Early Christian:** Evolution of architecture parallel to the evolution of religious practices. Study of principles of design of buildings through study of three kinds of Architecture: a) Monumental b) Domestic (Built to inhabit) and c) Civic space

MODULE 4

- 9) **Byzantine:** Study of principles of design of buildings through study of its Architecture: a) Monumental; Hagia Sophia b) Domestic (Built to inhabit) and c) Civic space-St.Marks Venice.
- 10) **Medieval:** Study of principles of design of buildings through study of its Architecture: a) Monumental; Pisa Cathedral, the Campanile and Baptistery, Angouleme Cathedral b) Domestic (Built to inhabit) and c) Civic space; Pisa.

MODULE 5

- 11) **Gothic:** Study of principles of design of buildings through study of its Architecture: a) Monumental; Notre Dame, Paris. b) Domestic (Built to inhabit) and c) Civic space;
- 12) **Gothic:** Study of Gothic Architecture, typical characteristics including the pointed arch, the ribbed vault and the flying buttress, aesthetic elements with examples like Chartres Cathedral: French High Gothic style.

NOTE: Progressive marks to include Submission of a Portfolio of sketches, study models relating to structure, aesthetics and building typology resulting from different functions.

REFERENCES:

- 1) Sir Bannister Fletcher ,“History of Architecture” CBS Publishers, 1992
- 2) Henri Stierlin , “Architecture of the world - Greece”, Benedict Taschen, 1993
- 3) Henri Stierlin, “Architecture of the world - The Roman Empire”, Benedict Taschen, 1993
- 4) Henri Stierlin , “Architecture of the world - Romanesque”, Benedict Taschen, 1993

15ENG 4.5 – BUILDING STRUCTURES – IV
CONTACT PERIODS: 4(2 LECTURE+2 STUDIO) PER WEEK
VIVA MARKS: 100
PROGRESSIVE MARKS: 50

OBJECTIVE:

- 1. To Gain understanding of Steel Structural Systems including composite construction and fundamental principles and structural behavior of steel buildings in withstanding gravity, lateral (seismic and wind), and other environmental forces.*
- 2. To understand the process of the design of structural steel systems and the design of simple steel structures.*

OUTLINE :

- 1) Structural Steel:** Different kinds of Steel, their Basic characteristics of Steel & Light Gauge Steel materials.
- 2) Concepts of design of Steel Structures:** Introduction to the concept of Working Stress Design and Load and Resistance Factor Design.
- 3) Steel Structural Systems:** Introduction to Rigid Portal Frames design of a one story industrial building 18M X 48m with two-bay mezzanine office floor. Project work to include a framing plan for both the industrial building and the mezzanine, an approximate design of structural frame elements, columns and beams. Introduction to available sections in structural steel used in the design of frame elements(Indicative).
- 4) Introduction to National Building Code:** IS 800: Criteria & Design to satisfy Building Codes and Standards, Dead and Live load calculations as per IS875 (Part1&2). Determine the general loads to be considered in the design of the structure, based on the type of occupancy for each area specified.
- 5) Rigid Frames design-1:** Properties of Indian standard rolled steel section and general framing arrangement of beams and columns for the one story 18M X 48m industrial building.
- 6) Rigid Frames design-2:** Design of Rigid frame including selection of frames according to the span, spacing and frame configuration using steel manuals.

7) Composite Flooring Systems: Discussion on steel-concrete composite construction using steel beams, metal decking and concrete, including the role of shear connectors' attachment to the beam for composite action.

8) Composite flooring systems design for mezzanine: Loading and Analysis (Moment diagram to be provided) and design of composite steel decking with concrete topping.

9) Rigid frame elements design-1: Steel Structural Column design using IS special publication for the design of steel structures [SP-6 (1)]

10) Rigid frame elements design-2: Steel Structural Beams and trusses design using IS special publication for the design of steel structures [SP-6 (1)]

11) Drawings and Specifications for the Rigid frame design: Structural design criteria, including loads used, calculations, drawings and detailing, and steel tonnage calculation.

12) Field Inspection of Steel Construction Site: *The project work to include documentation and a report about the observations, learning and findings at Site*

Note: Minimum one plate on loading calculation on each Structural steel topic.

REFERENCE:

- 1) Martin Bechthold, Daniel L Schodek, STRUCTURES - PHI Learning Private limited.

15ARC 4.6 – SPECIFICATION, QUANTITY AND COSTING OF BUILDINGS

CONTACT PERIODS : : 3 (LECTURE) PER WEEK

DURATION OF EXAM : 3 HRS

THEORY MARKS: 100

PROGRESSIVE MARKS:50

***OBJECTIVE:** To develop the necessary skills for establishing and writing specifications based on proposed materials for the preparation of Bill of Quantities leading to cost estimation of proposed architectural works.*

OUTLINE:

MODULE 1

- 1) **Introduction to Estimation:** Need for estimation, relationship between choice of materials, their specifications, Bill of Quantities (BOQ), project costing, project quality/cost/ time management.
- 2) **Specifications:** How to arrive at abstract and detailed specifications for various materials leading to 'items of work' used in construction?. Including influence and impact of local and national building codes on specifications.

MODULE 2

- 3) **Bill of Quantities (BOQ):** Why and how to build flexibility, resilience and redundancy in BOQ.
- 4) **Mandatory tests & Safety Measures in Specifications:** Procedures, frequency and submission of results as part of specifications and their inclusion in the BOQ for different materials document. Integrating workers' safety and material security into specifications.

MODULE 3

- 5) **Introduction to Costing:** Why do rates vary? - study of government rates (CPWD/ Karnataka PWD Schedule of Rates) and market rates. Concept of inflation and its effect on costing.eg. escalation clause, extra items, variations
- 6) **Detailed rate analysis of building:** Basic knowledge of items as per current schedule of rates (CSR) of local PWD. Percentages (based on thumb rule

calculations) of various bulk materials used in construction like cement, steel, rubble, metal, sand, brick, tiles etc.

MODULE 4

- 7) **Introduction to sequence of construction activity:** Project time/ labor /materials costing and impact of delay in project on costing.
- 8) **Term project 1:** Detailed specifications writing and estimation of Bill of Quantities (BOQ) for an RCC framed house with an attached temporary shed.
- 9) **Term project 2:** Detailed specifications writing and estimation of Bill of Quantities (BOQ) for an office interior work.

MODULE 5

- 10) **Term project 3:** Detailed specifications writing and estimation of Bill of Quantities (BOQ) for Water supply and sanitary works including overhead tanks and Sump tanks.
- 11) **Term project 4:** Detailed specifications writing and estimation of Bill of Quantities (BOQ) for a typical residential layout plan with roads, culverts, pavements, etc.
- 12) **Billing requirements:** Role of the architect in monitoring the specifications follow-up for quality control, the measurement book (MB), RA bills, interim and final checking and certification of works on site based on the BOQ and terms of contracts.

REFERENCES:

- 1) Dutta B.N ,Estimating and Costing in Civil Engineering- Theory and Practice, UBS Publishers, 1993.
- 2) Rangwala, Estimating, Costing and Valuation, Charotar Publishing House.

15ARC 4.7 – COMPUTER APPLICATIONS IN ARCHITECTURE – II

CONTACT PERIODS: 5(Practical)hrs/ week with 1-2 hrs of instruction and Remaining hrs of working on CAD workstation for submission of projects.

PROGRESSIVE MARKS : 100

***OBJECTIVE** – To develop awareness and familiarity with Advanced Computer applications in Architecture and to equip students with skills required in using digital tools to conceive, develop and present architectural ideas.*

OUTLINE:

- 1) **Introduction to advanced popular 3D modelling software**– e.g. 3DStudio Max, Maya, Rhinoceros and other appropriate software. Introduction to online resources, blogs, tutorials.
- 2) **Concepts of NURBS modelling:**(curves and surfaces), curve / surface editing, solid modelling, layer management, etc.
- 3) **Classroom exercise to demonstrate 3D modelling of transformed/modified/complex 3D objects:** for e.g. Twisted tower, deformed cube, sliced cylinder. Introduction to file conversions and interdependencies between 3D modelling software and 2D drafting software, e.g. Rhinoceros to AutoCAD, or any other relevant CAD software. Conversion of 3D model(of transformed/modified objects) to 2D drawings (e.g. plan, section, elevation)
- 4) **Conversion of Architecture/interior design project into NURBS modelling project:** For e.g. measured drawing of classroom, Architecture School, computer room etc.
- 5) **Working on 3D modelling & Visualisation software with rendering:** such as 3DS Max OR Maya or any other appropriate software.

Concepts of solid modelling: polygonal modelling, modifier, application of materials, simple timeline animations.

Techniques of 3D visualisations – Introduction to tool settings in 3D rendering engines for photo-realistic rendering. Application of materials and

Simple Timeline animations, For e.g. using V-Ray, Maxwell, Flamingo, Mental Ray or any other appropriate software, Classroom demonstration of objects, of simple Architecture design projects.

6) Working on Graphics/Vector/Image editing software: To present Architecture design studio projects –Introduction to publishing tools for creating presentations and portfolios.

Project 1 – Classroom exercise to convert architecture design project 2D drawings (of semester 3 / 4 OR any simple one to three-storeyed building) into 3D model using relevant software. Project to be rendered using an appropriate 3D visualisation software.

Project 2 – Classroom demonstration/exercise of image rendering/collage using Graphics/Image editing software (for e.g., adding context to visualisations), foreground, backgrounds etc.

Project to include presentation of final outcomes in the form of drawing panels, booklets, posters.

REFERENCES:

1. Internet resources, blogs, and learning resources on the web of popular 3D modelling software and NURBS modelling,
2. Vector/Graphics/Image editing software

15ARC 4.8- Elective II

CONTACT PERIODS: 3 PER WEEK

PROGRESSIVE MARKS : 50

a) ENVIRONMENT RESPONSIVE ARCHITECTURE

OBJECTIVE: *To develop awareness and familiarity with green design and its integration with Architectural design.*

OUTLINE:

- 1) **Introduction to Green Buildings:** Why make Buildings Green? Concept and necessity.
- 2) **Green Building Rating System:** The seven categories in the rating system : Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, Innovation in Design and Regional Priority
- 3) **Introduction to a design exercise (Project application):** Design of a small building with an objective to integrate categories of green building rating.
- 4) **Sustainable Sites:** Site Specific Design; Development Density and Community Connectivity, Alternative Transportation, Site Development, Stormwater Design and Heat Island Effect.
- 5) **Water Efficiency:** Innovative Wastewater Treatment and Reuse and Water Use Reduction and Re-use factors.
- 6) **Energy and Atmosphere:** Optimization of Energy Performance, On-site Renewable Energy, Enhanced Commissioning and Green Power. To apply the principles of Solar Passive Architecture to design of buildings.
- 7) **Materials and Resources:** Building Reuse: Maintain Existing Walls, Floors, and Roof, Construction Waste Management, Materials Reuse, Recycled Content, Regional Materials and Certified Wood.
- 8) **Indoor Environmental Quality:** Construction Indoor Air Quality Management Plan and Daylight and Views. Rating Systems: GRIHA and LEED Systems.
- 9) **Regional Priority:** To provide incentive for project teams to address geographically significant environmental local issues. Introduction to passive techniques of cooling such as evaporative cooling, earth tubing, wind scoops, roof ponds, shaded courtyards etc
- 10) Review of a design project considering various factors listed above.

REFERENCES:

1. Steemers, Koen and Steane, Mary Ann. Environmental Diversity in Architecture, Spon Press, 2004.
2. McGlynn, Sue et al., Responsive Environments, Architectural Press, 2008.

b) PRODUCT DESIGN

OBJECTIVES:

- 1) *To introduce the students to the discipline of Product Design*
- 2) *To develop basic skills required in handling simple product design projects*

OUTLINE:

Preamble:

We live in a world of objects. Objects can have meanings, carry associations or be symbols of more abstract ideas. These objects are predominantly functional in nature, some are purely symbolic / decorative in nature and there are a few which combine both the functional with the symbolic and decorative.

Great Architecture has demonstrated this fusion of the functional with the symbolic through the ages. Product design, on a smaller scale, seeks to blend the technical with the aesthetic, the utilitarian with the emotional delight; the dialogue between what people need / want vs what people will buy / discard.

1. **Product design as a noun:** the set of properties of an artifact, consisting of the discrete properties of the form (i.e., the aesthetics of the tangible good and/or service) and the function (i.e., its capabilities) together with the holistic properties of the integrated form and function
2. **Product design as a verb:** the process of creating a new product to be sold by a business to its customers. A very broad concept, it is essentially the efficient and effective generation and development of ideas through a process that leads to new products.

3. **Product design process:** from idea generation to commercialization; concept, development, detail; materiality, technicality, imageability;
4. Relationship between Design, Technology and Product
5. History of product design as a discipline, the various theories of design via study of design practices
6. Mode and method of Design Process as applicable to product ideation and development
7. Materials and manufacturing process and its influence on product ideation and development
8. influence of ergonomics on product ideation and development
9. Impact of culture i.e. the aesthetics on product ideation and development, the dialogue between people's aspirations and people's needs
10. Relationship and difference between craft based and mass manufactured products,
11. Market as a tool for product promotion
12. Indian aesthetic sense and its influence on product ideation and development
13. Influence of product design on other disciplines like automobile styling, furniture, jewellery, toys, systems design, computer interfaces, etc

Class assignments / exercises:

Short projects along with a time problem will be tackled in the class exploring the influences of design process, and ergonomics on the product ideation and development`.

The student will also study the product changes that will occur through the choices made of materials, manufacturing process, and marketing techniques.

Discussions, video presentations, seminars and case studies will cover all the other topics.

REFERENCES:

1. Alexander, Christopher ,Notes on the Synthesis of Form, Harvard University Press, 1964
2. Morris, R, The fundamentals of product design, AVA Publishing 2009.

c) HERITAGE DOCUMENTATION

OBJECTIVE: *To understand the character of a settlement, street, building, spaces, materials through a process of measured drawings and photographic documentation.*

OUTLINE:

1. Introduction to Documentation

- Need for Documentation undertaken? Tools for Documentation available, Methodology, Importance of Archival research, Old Photographs, Maps etc

2. Site work

- Secondary information on the /street/heritage
- Reconnaissance survey of the /street/heritage building;
- Mapping of the street
- Identification of selected typology of structures for detailed measured drawing
- Recording of measurements- horizontal, vertical, measuring angles, marking center lines, datum, notations, building orientation
- Legend of materials used; Structural details and joineries
- Details of various elements – openings, ornamental details
- Mapping activities in various locations
- Supporting sketches
- Information on people, surroundings, climate, Access to site

3. Preparation of Drawings

- Developing drawings from the field data – Plans at various levels, Building floor plans, Reflected ceiling plans, roof plans, all elevations, relevant sections.
- Drawings of details such as openings, ornamental details, joineries

4. Analysis:

- Analysis as tools for understanding and interpreting the measured drawings

REFERENCES:

- 1) RSP Program Monographs –CEPT University
- 2) Building Craft Lab- DICRC, CEPT University