15 ARC 2.1 – ARCHITECTURAL DESIGN -II

CONTACT PERIODS : 9 (Studio) per week
PROGRESSIVE MARKS : 100
TERM WORK MARKS : 200

OBJECTIVE: *To expose the students to the grammar of creating architectural space and form, including the study of variables like light, movement, transformation, scale, structure & skin.*

OUTLINE:

Nature of Space; PLACE: A "boundary", a "center" and a "spirit" PATH: A "way" and a "goal" DOMAIN: A conglomeration of paths and goals that forms a "whole" with its own "identity"

Materials Eg. Masonry (brick & stone), Steel/Glass with cladding infill, exposed Concrete

Enclosure, Ambiguity, Transparency in Plan, Section and Elevation, with concept sketches and diagrams so that presentation is self-explanatory ex. 1:50 plans, sections, and elevations.

Emphasis on work in studio by hand drawing and study model with lift off roof.

The One Room House

Lecture cum discussion on the Poetics of Space like light, movement, transformation, scale, structure and skin (case study based): keywords for discussion: contemplative / severe / dramatic / minimalist / natural / organic / contemporary / traditional.

Understanding the role of physical (terrain, climate, materials, etc.) and cultural factors (open, closed, transition spaces) that inform architecture.

Projects shall be explored with the help of models and sketches.

Any One Room enclosure could be taken to explore the implication of light, movement, transformation, scale, structure and skin.

Emphasis on freeing the expression of the poetic self, rather than on meeting external standards, and student development of self-explanatory presentations.

Case study assignment (done in groups of four students per group): One from library/internet research and one from actual experience.

Project presented in the form of a portfolio.

Emphasis on studio work/participation and Hand drawings.

Formulate a process of testing the various elements of space making learnt earlier in the semester through a project on an actual site. The project examples could be: A House for myself, Guest House, Farm house, Villa, Container house, Courtyard house, Tree house, etc.

Note:
The portfolio cov*ering all the assignments shall be presented for term work.*

REFERENCES:

1. Time Saver Standards for Architectural Design Data" by John Hanock
2. Architectural Graphic Standards" by Ramsay and Sleeper
3. Indian Anthropometric Dimensions for Ergonomic Design Practice by Debkumar Chakrabarti

15ARC 2.2: MATERIALS AND METHODS IN BUILDING CONSTRUCTION-II

CONTACT PERIODS: 6 Hours (1 hr Lecture +5 hrs studio) per week
THEORY MARKS: 100
PROGRESSIVE MARKS : 50
DURATION OF EXAM : 4 HRS

OBJECTIVE: *To introduce Building materials especially RCC and building elements, and their intrinsic relationship to basic Building systems, which includes roofing for medium spans, Concrete columns, Concrete foundations and staircases.*

OUTLINE:

MODULE: 1

1) **Introduction to Timber :** Timber, various parts, their purposes and method of construction. Use of tiling for roofing.

2) **Timber Roof** – Lean to roof, Collared Roof, King post roof, Queen Post Roof; Detailed Drawing of one roof system.

3) **Introduction to Steel Roof** – Steel trussed roof, their purposes and method of construction. Use of GI sheets and aluminum sheets for roofing.

MODULE: 2

4) **Introduction to Cement and Steel as a Building material**: Cement – Types of cement, their applications, laboratory and field tests. Properties and architectural uses of reinforced steel. Reinforced Cement Concrete as a building material: Concrete Ingredients, grades of concrete, admixtures, properties of concrete, production of concrete, mix, proportioning (Site visit to a Ready-mix concrete (RMC) batching plant)

MODULE: 3

5) **Reinforced Cement Concrete as a building material**: Form work, placing, and compaction, curing of concrete, sampling and testing of concrete. Construction joints, expansion joints, finishes in concrete, chemical admixtures. (Site visit to concreting construction site).

6) **RCC** Foundations (Isolated footing) and Columns (Square and Round) Raft foundations, Grillage foundations and combined footing.

MODULE: 4

7) **Introduction to Staircase**: Anthropometry of stairs, types of Staircases and construction methods of staircase in – Masonry, timber, RCC, Steel and Composite.

8) **Timber Stairs**: Single and Double Stringer stairs: Means and methods of Construction.

9) **RCC Stairs**: Waist slab, folded plate, Stringer stairs, precast stairs: Means and methods of Construction.

MODULE: 5

10) **Steel Stairs**: Stringer stairs, Folded Type, Spiral stairs, Fire escape stairs: Means and methods of Construction.

11) **Composite Stairs**: Brick/stone, Steel/Timber, Concrete/wood, steel/ glass: Means and methods of Construction.

Note: Minimum one plate on each topic, site visits to be arranged by studio teacher. All the plates on construction and portfolio on material application shall be presented for progressive marks.

REFERENCE:

1) "Building Construction" by W.B. Mackay
2) "Construction Technology" by Chudley
3) "Construction of Buildings" by Barry

15ARC2.3: ARCHITECTURAL GRAPHICS-II

CONTACT PERIODS: 4 (Studio) per week
TERM WORK MARKS: 100
PROGRESSIVE MARKS : 50

OBJECTIVE*: Development of visual representation and conceptual communication in the field of spatial design through 3D drawing techniques with applicable renderings that include shades and shadows.*

OUTLINE:

1. **3D Projections:** 3D representation in exploded axonometric projection of built elements and built forms.
2. **Development of surfaces:** Advanced topics with application to built forms, Suggested examples: Domes, curved roofs, etc.
3. **Section of solids, true shapes of sections**
4. **Inter-penetration of geometric solids:** Combination of different forms.
   examples: Cylinder with cube or regular polygons, dome with a cube, etc.
5. **Perspective drawings:** History of perspective drawings with examples from international and Indian context. Principles of perspective drawings and examples of the visual effects of three dimensional objects when seen in perspective.
6. **Studies in perspective drawing:** Picture plane, station point, vanishing point, eye level, ground level, their variation and their resultant effects. Examples of simple geometric objects.
7. **One-point perspective drawings:** Perspective drawings of simple built form with simple built elements –Suggested example: Interior view of a single room and built elements in incremental steps. Technical steps with the object falling within the cone of vision, object going out of the cone of vision, and objects and elements closer. Analysis of the differences with previous technical images.
   Perspective drawings of everyday objects like chair and table without many design features. Generate multiple perspective drawings by altering the VP and PP, and by keeping SP fixed for the same examples.
8. **2-point perspective drawings:** Perspective drawings of simple geometrical objects and their combinations. Examples: Perspective drawings of built forms with built elements.
   Perspective drawings of simple everyday objects. Generate multiple views of the same objects.
9. **Principles of shade and shadows:** Principles of drawing shade and shadow
   Exercises exploring the principles of drawing shade and shadow in perspective drawings – drafting shade and shadows to examples from the perspective drawings.
10. **Free-hand perspectives:** Exercises in free-hand techniques for generating perspective drawings with multiple views on site with simple rendering. Introduce simple street elements and simple trees for the buildings generated in the perspective drawing classes.

REFERENCES:

1. *Geometrical Drawing for Arts Students* by IH Morris
2. *Perspective* by SH Mullik
3. *Architectural Graphics* by D.K Ching
4. *Rendering with pen and ink* by Robert Gill

15ARC 2.4: HISTORY OF ARCHITECTURE - II

CONTACT PERIODS: 4 (Lecture) per week
THEORY MARKS: 100
PROGRESSIVE MARKS : 50
DURATION OF EXAM : 3 HRS

OBJECTIVE*: To provide an understanding of the evolution of Hindu Architecture in India in its various stylistic modes, characterized by technology, ornamentation and planning practices.*

OUTLINE:

MODULE: 1

1. **Introduction to Classical (Buddhist)**: Mahayana phase, stupa and rock cut cave Architecture.
2. **Buddhist Examples:** Study of principles of design of buildings through study of three kinds of Architecture: a) Monumental; Great Stupa at Sanchi, Chaitya at Karli, Viharas at Ajanta, and Toranas at Sanchi b) Domestic (Built to inhabit) and c) Civic space.
3. **Introduction to Jain Architecture:** 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: 2

4. **Evolution of Hindu temple**: Indo Aryan and Dravidian – Early temples at Udaigiri, Tigawa and Sanchi.
5. **Evolution of Hindu temple**: Dravidian Experiments at Aihole (Durga temple and LadKhan temple), Deogarh, Bhitargaon and Badami.
6. **Beginnings of Dravidian architecture:** Pallavas, rathas at Mamallapuram, Shore temple, Kailsanatha and Vaikuntaperumal temples at Kancheepuram.

MODULE: 3

7. **The Cholas contribution:** Study of principles of design of buildings through study of three kinds of Architecture: a) Monumental; Brihadeshwara temple at Thanjavur and Gangaikonda Cholapuram b) Domestic (Built to inhabit) and c) Civic space;
8. **The Pandyan & Madurai Dynasties contribution:** Study of principles of design of buildings through study of three kinds of Architecture: a) Monumental; Gopurams Madurai (Meenakshi temple) and Srirangam. b) Domestic (Built to inhabit) and c) Civic space;

MODULE: 4

9. **The Hoysala contribution:** Study of principles of design of buildings through study of three kinds of Architecture: a) Monumental; Eg: Channakesava temple, Belur, Hoysalesvara temple, Halebid, Kesava temple, Somnathpur b) Domestic (Built to inhabit) and c) Civic space;
10. **Indo Aryan Mode**: the beginnings in Orissa – the Lingaraja at Bhubaneshwar.

MODULE: 5

11. **Hindu architecture at Rajputana & Khajuraho group:** (Temple of Surya, Orisa, Marwar) and Gujarat (Temple of Surya, Modhera). The Khajuraho group: Khandariya Mahadev, Jain temples – Chaumukh temple at Ranpur

12. **Later Dravidian period:** The Vijayanagar and– Noted temples at Hampi (Vitthala temple and Hazara Rama temple),

NOTE: Site visit and documentation of a Temple may be made for part assessment of the progressive marks.

REFERENCES:

1) "Indian Architecture, Buddhist and Hindu Period" by Brown, Percy
2) "Architecture of India – Buddhist and Hindu" by Grover Satish

15 ENG 2.5: BUILDING STRUCTURES-II

CONTACT PERIODS: 3 (Lecture) per week
THEORY MARKS: 100
PROGRESSIVE MARKS : 50
DURATION OF EXAM : 3 HRS

OBJECTIVE: *Introduction to transmissibility of forces & reactions and to basic structural system of beams and columns.*

OUTLINE:

Module 1

1) **Geometric properties:** Centroid, Centroidal axes and Moments of Inertia for regular sections by Parallel Axis Theorem.
2) **Beams and support reactions:** Beams and supporting conditions - Types of supports – Implications for computational and structural performance.
3) **Bending and Shear force in beams:** Method of balancing moments and free-body diagrams.

Module 2

4) **Bending Moment and Shear Force Diagrams:** Concept of Shear force and Bending Moment diagrams. BMD and SFD for simple beams subjected to loads.
   BMD and SFD for intermediate beams 2span, 3span and 4span beams (bending moment diagrams to be provided).
5) **Bending and Shear Stress in beams:** Theory of simple bending - Concept of bending and shear stress distribution at a cross section due to bending moment and shear for Rectangular, I and T sections.

Module 3

6) **General formula:** Moment of Inertia, Section Modulus, Bending and Shear Stress.
7) **Deflection:** Determination of deflection for simply supported, fixed, continuous and Cantilever beams subjected to loads using standard formulas.

Module 4

8) **Columns and Struts:** Introduction to Short and long columns.
9) **Theory of Columns:** Buckling; effective length, critical load, slenderness ratio; Euler formula; "Kern" and rule of inner third.

Module 5

10) **Steel Columns:** Axial stress and combined axial and bending stress design and analysis of steel columns.

11) **RCC columns:** Definition of short column as per IS 456 and design of short RCC columns (composite action, load taken by steel and load taken by concrete respectively).

REFERENCES:

1) STRUCTURES - Martin Bechthold, Daniel L Schodek, and PHI Learning Private limited, Sixth Edition
2) Structure in Architecture, the building of buildings, by Mario Salvadori
3) Structure and Design, by G. G. Schierle
4) Strength of Materials – R K Bansal, Laxmi Publications, New Delhi, 3rd ed'
5) Applied Mechanics & Strength of Materials – I B Prasad

15ARC 2.6: THEORY OF ARCHITECTURE-I

CONTACT PERIODS: 3 (Lecture) per week
THEORY MARKS : 100
PROGRESSIVE MARKS : 50
DURATION OF EXAM : 3 HRS

OBJECTIVE: *To acquaint the students with the basic aesthetic principles involved in architectural design and the grammar of architectural aesthetics.*

OUTLINE:

MODULE 1

1. **Definition of Art and role of Art in Society:** Role and meaning of art, various types of arts-fine arts, performing arts, commercial arts, industrial arts, folk arts, abstract art, visual arts, spatial arts, temporal arts, pop art etc., relationship of architecture with other arts like Painting and Sculpture.
2. **Principles of Aesthetics and Architectural Composition -1 –** Unity, Balance, Proportion, Scale in Architectural composition. Illustrations and its application to the practice of design with historical as well as contemporary buildings.

MODULE 2

1. **Principles of Aesthetics and Architectural Composition -2:** Contrast, harmony, accentuation, restraint in Architectural composition. Illustrations and its application to the practice of design in historical as well as contemporary building.
2. **Principles of Aesthetics and Architectural Composition -3:** Repose, vitality, strength in Architectural composition. Illustrations and its application to the practice of design in historical as well as contemporary building.

MODULE 3

3. **Organizing principles of Aesthetics and Architectural Composition -1:** Symmetry, asymmetry, hierarchy, datum, axis, rhythm in Aesthetics and Architectural Composition and its application to the practice of design.
4. **Spatial organizations of Masses in Architecture -1:** Centralized and clustered; Illustrations of centralized and clustered massing in spatial organizations of masses in Architecture and its application to the practice of design with both historical as well as contemporary buildings.

MODULE 4

5. **Spatial organizations of Masses in Architecture -2:** linear, radial, grid organization. Illustrations of linear, radial, grid organization in spatial organizations of masses in Architecture and its application to the practice of design with both historical as well as contemporary buildings.

6. **Ornamentation in Architecture:** Historical perspective of the use of ornament in buildings and use of ornament as a decoration to embellish parts of a building. Use and need of ornament in architectural design – different types of ornamentation in buildings.

7. **Ornamentation in Architecture Criticism**–Argument against ornamentation. Ideas of architect Adolf Loos (Ornament and Crime); Ornaments as economically inefficient and morally degenerate, reduction of ornament or lack of decoration as the sign of an advanced society.

MODULE 5

8. **Materials, Materiality and Tectonics:** Aesthetic and structural potentials in Architecture of materials like brick, timber, stone, concrete, glass.

9. **Style in Architecture:** Basis for classification of styles including chronology of styles arrangement according to order that changes over time. Evolution of styles; reflecting the emergence of new ideas as reaction to earlier styles as a result of changing of fashions, beliefs, technology etc.

10. **Perceptions in Architecture:** Experience of architecture in basic psychological and physiological terms. Way in which human minds and bodies respond to space, light, texture, color, and other architectural elements.

REFERENCES:

1. Form, Space and Order" by Francis DK Ching
2. Design Fundamentals in Architecture" by Parmar VS
3. Theory of Architecture by Paul Alan Johnson
4. Creating Architectural Theory by John Lang

15 ENG 2.7: SITE SURVEYING & ANALYSIS

CONTACT PERIODS: 4 (2 Lecture + 2 Practical) per week
THEORY MARKS : 100
PROGRESSIVE MARKS : 50
DURATION OF EXAM : 3HRS

OBJECTIVE*: To develop the knowledge and skills related to surveying and levelling principles and practice and carrying out surveys of land of medium complexity and preparation of survey plans.*

OUTLINE

MODULE 1

1) **Introduction to Surveying** – Definition, classification, principles of surveying, character of work, shrunk scale.
2) **Survey Theory-1:** Chain Survey: Instruments used, Types of chain, Instruments for ranging.

MODULE 2

3) **Survey Theory-2:** Chain Survey: Setting out angles, erecting perpendiculars. Plane table survey – Plane table and accessories.
4) **Survey Theory-3:** Introduction to Levelling; Definition, classification, booking and reduction of levels, longer levelling, errors.

MODULE 3

5) **Contouring**: Characteristics of contours, direct and indirect methods of contouring, interpolation, and uses of contours.
6) **Introduction to contemporary survey Instruments (Theodolite and Total station)**: Theodolite; instrument for measuring angles in the horizontal and vertical planes. Total station; electronic theodolite integrated with an electronic distance measurement to measure slope distances.

MODULE 4

7) **Observations of a Site (Up to 1 acre):** Survey without instruments using geometry and one's own body. To learn to read the terrain by intuition and by measure, including photography as a surveying method.
8) **Analysis of a Site (Up to 1 acre)**: On site factors; Analysis of natural factors, topography, hydrology, soils, landforms, vegetation, climate, microclimate.; influence of water bodies

MODULE 5

9) **Studying survey drawings:** Learning to read a land survey drawing; type of land survey drawing, Scale and North direction in drawing, legend or list of the symbols used on drawings, counter indications on a drawing, grid references for measurements etc.
10) **Field Work-1**: Setting out works such as center lines of a building(working drawings of a small residence to be provided)

REFERENCES:

1) Surveying Vol I by DR PC Punmia
2) Surveying and Levelling (Part-1) by Kanetkar TP and Kulkarni SV

15 ART 2.8: BASIC DESIGN & ART APPRECIATION

CONTACT PERIODS : 3 (Studio) per week
PROGRESSIVE MARKS : 50

OBJECTIVE*: To explore the relationship between materiality & space, between building, the environment and culture and to initiate an understanding of abstraction and analysis of space and form.*

OUTLINE:

1. **Mapping-1:** Conceiving one's own map – from home to studio/of the campus/of a Neighborhood. Explore issues of movement, navigation, circulation, direction and discovery through exercises.

2. **Mapping-2:** Drawing and Reading of maps – Explore issues of representation, scale, starting point, orientation, landmarks, imagery. Use of different methods of rendering.

3. **Patterns-1:** Study of pattern-making in nature, (Such as trees, leaves, crystals, shells etc.) Observation & representation of 2-dimensional patterns in various visual media.eg. Charcoal/pencil/crayon/oils etc.

4. **Patterns-2:** Study of pattern-making in technology. (Such as geodesics, nanotech, fractals etc.) Observation & representation of 2- & 3-dimensional patterns in various media. eg. wire/soap bubble/ photographs/ digital models etc.

5. **Patterns-3**: Use of patterns to synthesize and create form. Use of both physical and material patterns as well as patterns of transformation and Integration. Appreciation of the difference between architecture and pattern.

6. **Structure-1**: Understanding gravity, and the different ways we resist it. Study of Material & structure in nature, and how design brings them together. Sketch analysis of Structure and form in an example taken from Patterns-1.

7. **Structure-2:** Hands-on Design exercise – creation of a simple design in which form is distinct from structure. Eg. Portal frames, tensile structures

8. **Structure-3:** Hands-on Design exercise – creation of a simple design in which form is integral with structure. Eg. Shells, massive forms, pneumatics

9. **Scale-1:** Dimensional understanding of the human body; in static and dynamic modes. Measured drawing of space needed for basic postures & movements.

10. **Scale-2:** Study of the relationship between human body and the built environment understanding usage and comfort. Eg. Bazaar, doctor's clinic, train carriage etc.

11. **Orientation & Climate:** Understanding of the significance of the Cardinal directions, and the role played by Sunlight, Wind and Rain in determining design response

12. **Culture & Design:** Understanding social attitudes to Built-form: extroverted/introverted, formal/informal, typical/individual, simple/labyrinthine, contiguous/isolated etc.

13. **Documentation:** Sketch/photographic documentation of a neighborhood or settlement street pattern, house form & community spaces a) Analysis-1: Sketched analysis of built form in

terms of patterns, structure and scale b) Analysis-2: Sketched analysis of built form in terms of orientation & climate c) Analysis-3: Sketched analysis of built form in terms of culture & society.

REFERENCES:

1)'The Concise Townscape' by Gordon Cullen
2)'The Image of the City' by Kevin Lynch
3)'Architecture: Form, Space & Order' by Francis Ching
4)"Cradle to Cradle: remaking the way we make things'" by Michael Braungart, William McDonaugh
5)'The Timeless way of Building' by Christopher Alexander 6)"Human Centered Design Toolkit' by IDEO