Third Semester B.Arch.

3S-A-1

Architectural Design III

This semester shall continue with further complexity in aesthetic qualities with increased emphasis on context and functionality.

Objectives:

- The focus at this stage will be on detailing of various architectural elements in the context of functions, construction techniques, characteristics of material and its implications on architectural form.
- Introduction to organizational, spatial strategies, circulation within and around the built form.
- Conceptual and Contextual exploration with respect to climate, culture, etc.

Sessional Work: Built and un-built spaces for multiple activities.

References:

- C.M. Deasy -Design for Human Affairs.
- Anthony Sealey, Introduction to Climatology.

3S-A-2

Allied Design Studio III

The course content will be developed by the individual colleges as per their choice of allied design scheme.

3S-A-3

Building Construction and Materials III

Objectives: To strengthen student's knowledge about reinforced cement concrete and its applications in buildings. To equip students about the methods of designing various structural members using reinforced cement concrete.

Unit I: Introduction to building materials:
Mild Steel and Reinforcement Bar, Stainless Steel, Aluminum, Copper, Titanium, w.r.t to composition, general know-how with respect to physical, chemical and structural properties their utilities and criteria for selection.

Unit II: Concept of vertical connector- Stairs, Design principles / considerations, proportions. Types on basis of Geometry, material and structural systems used. Stairs in Timber, Mild Steel and Stone. Railing types for stairs etc.

Unit III: Concept of spanning and its application in formation of Floors. Traditional Methods of Flooring such as Timber Floors, Jack Arch Floors, Composite Floors.

Unit IV: Principles of Framed Structures - Reinforced Cement Concrete, Complete Drawing work with typical details of R.C.C. Footings, Columns, Lintels, Chajjas, Beams, Canopies, Slabs, Cantilever Beams and Slabs, Fins etc.

Unit V: Study of form work, shuttering, for above components of R.C.C.

References

- Murthy, V. N. S. Soil Mechanics & Foundation Engineering. Sai Kripa Technical Consultants.
- Punmia, B. C. (2005). Soil Mechanics and Foundation Engineering. Delhi: Laxmi publications.
- Punmia, B. C. (2006). R C C Designs. Delhi: Laxmi Publications.
- Punmia, B. C. (2007). Limit State Design of Reinforced Concrete. Delhi: Laxmi Publications
- Barry, R. (1999). The Construction of Buildings Vol.II. 5th Ed. New Delhi: East-West Press.
- McKay, W. B. (2005). Building Construction Metric Vol.1–IV, 4th Ed. Mumbai: Orient Longman.

3S-A-4

Architectural Graphics III

Objectives: To enable the students to communicate an architectural idea / proposal in a legible and effective manner through perspective projections, use of shades and shadows, and various architectural presentation and rendering techniques.

Perspective:

Unit I: Introduction to picture planes, standpoint, eye level etc. Types of perspective views such as one point, two point, three point, worm’s eye view, Bird's eye view, normal view, etc.

Unit II: Methods of drawing perspective views such as conventional method, measuring point method, shortcut and approximation in perspective drawing, problems based on simple architectural built forms in different materials rendered with appropriate colours.

Unit III: Bird's eye view showing a building or any object with surrounding landscape, buildings etc.

Unit IV: Perspective of interior of buildings suitably rendered.

Sciography:

Unit V: Introduction to sciography, principle of conventional angle of light and its rays acting as projectors to cast shadow of simple plane lamina e.g. square, circle, hexagon etc.

Unit VI: Digital 3d modeling to understand light and its rays acting as a projector to cast shadow on simple building forms; also shadow cast partly on horizontal and vertical planes.

References:

- Holmes John M. : Applied Perspective.
- Themes and Hudson: Perspective for Architects.
- Shankar Mulik: Perspective and Sciography.

3S-A-5

Structural Design & Systems III

Objectives: The course would enable students to understand various principles of strength of materials like various kinds of simple, shear & bending stresses in beams & arches. It gives a fair understanding of behavior of different types of arches in architecture.

Unit I: Overview of the Structural System in Architecture.
To Study the behavior of fixed, two hinged & three hinged arches.
Stability of Structural elements of Dam structure & Retaining wall,
The concept of Flinched beam.
With suitable examples from historical and contemporary architecture.

Unit II:
a) Shear Stresses:
Concept and application of Shear stresses and its distribution in Rectangular, Circular, Triangular, I, L & T section
(Numerical on I& T section only)

b) Bending stresses: Circular bending:
Concept and application.

Unit III: **Direct and bending stresses:**
Concept and application.

Unit IV: Column and Struts:
Euler's and Rankine's theory – concept and application.

Unit V: Analysis of Three hinged Circular Arches
Determination of Normal thrust , horizontal thrust, radial shear force & Bending moment .

Sessional work: Sketches/ Notes/ Tutorials &Presentations

Desirable: Site visits to develop better understanding
To prepare relevant study models,
Laboratory exposure wherever possible.

References:

- Bansal, R. K.(2011). A Textbook Of Strength Of Materials Si Units. New Delhi: Laxmi Publications (P) Ltd.
- Rajput, R.K.(2012). Strength Of Material (Mechanics And Solids) S.I. Units. New Delhi: S.Chand And Co Ltd
- Subramanian, R. (2010). Strength Of Materials. New Delhi: Oxford University Press.
- Reddy, K. Vijaya Kumar; Kumar J. Suresh.(2011). Singers Engineering Mechanics Statics And Dynamics (SI Units). Hydrabad: B.S Publications.
- Ramamrutham , S. : Narayanan, R.(2008). Engineering Mechanics. New Delhi:Dhanpat Rai Publications Ltd
- Shah, H.J. ;Junnarkar, S.B.(2012). Mechanics of Structures. Anand: Charotar Publishing House Pvt. Ltd.
- Khurmi, R. S.(2006). A Textbook of Strength of Material (SI Units). New Delhi: S.Chand And Co Ltd.

3S-A-6

History of Architecture II

Objectives: To provide an understanding of religious typologies in India based on individual philosophies, material and construction techniques.

Interpretation of Spatial Configurations, form or art and the proportioning systems derived from religious symbolism in each belief system.

Unit I: Buddhist Architecture: Rise of Buddhism and role of Emperor Ashok, Spread of Buddhism to South East Asia. Buddhist building typologies, Chaiyas, Viharas, Stupas, Stambha etc. Influence of Silk road on transmission of Buddhism and Architectural language and it's transformation.

Unit II: Jain Architecture: Understanding Importance of material and construction technique in Jain temple architecture.

Unit III: North Indian temple architecture: Classification of North Indian Temples. Examples from Orrisa, Khajuraho, Gujarat and Rajasthan.

Unit IV: Hemadpanthi **Temples Architecture of Central India**. Amruteshwar Temple, Ratangad, Tulja Bhawani Temple, Tuljapur, Trimbakeshwar Temple, Nashik, Bhuleshwar temple, Pune , Bhimashankar Temple, Pune.

Unit V: South Indian temple architecture: Classification of South Indian Temples under various dynasties; Pallava, Chalukyan, Chola, Chera, Vijaynagar and Pandya

Unit VI: Indo-Islamic Architecture during Qutub, Khilji, Tughlaq, Sayyid, and Lodi sultanates.

Exercises: Design of exercises to understand, analyze, interpret, synthesize the historical studies to develop understanding of architecture

The course should culminate in a term paper, documentation or design interpretation and transformation.

References:

- Brown, P. (2010). Indian Architecture: Buddhist and Hindu period. Mumbai: D. B. Taraporevala Sons and Co.
- Fletcher, B. (1996). A History of Architecture on the Comparative Method. 20th Ed. London: B.T. Batsford Ltd.
- Grover, S. (2003). Buddhist and Hindu Architecture in India. 2nd Ed. New Delhi: CBS Publishers.

3S-A-7

Computer Application III

Objectives: To learn drafting skills and design testing methods with the help of computer software

Unit I: Auto CAD and equivalent software –drafting commands on Auto CAD, Appropriate graphical representation with the software as per requirements of architectural drawings.

Unit II: Introduction to simulation and simulation software as a tool to test the response of designed building in given situation. Introduction to Simulation softwares used for building services, climate, acoustics and illumination, construction, structures etc.

3S-A-8

Climatology

Objectives: Understanding fundamentals of climatology and its relation to human thermal comfort, and buildings.

Unit I: Introduction to climatology, climate and weather, importance of climatology in architecture, global climatic factors.

Unit II: Elements of climate such as temperature, wind, humidity, precipitation, solar radiation and various instruments, graphical representations to record climatic data.

Unit III: Scales of climate, global climatic zones, micro-climate.

Unit IV: Climate analysis tools, Mahoney tables ET/CET nomograms, bio-climatic charts, temperature isopleths, horizon and celestial coordinate system, solar geometry, shading device calculations, heliodon solaroscope.

Unit V: Thermal comfort factors, thermal comfort indices, heat exchange process of buildings, building heat gain calculations.

Unit VI: Natural ventilation in and around the building, ventilation systems.

Sessional works: Sketches, tutorials, use of climatology lab instruments, tests and experimentations

References:

- Climate responsive architecture, *Arvind Krishnam.*
- Manual of tropical housing and building, *O H Koenigsbereger.*
- Solar data book*, Roorkee.*

Elective III

Scale and Proportion/ Anthropometrics and Ergonomics/ Rural Architecture/ Traditional Arts and Crafts/ Biomimicry/ Institutional Project 3

Note: Following are the suggestive contents; institutes have freedom to formulate the content as per their school of thought

Scale and Proportion

Key Words: Harmonious relation, Ability to perceive, order, Hierarchy,

Objectives: To improve on certain qualities like Judgment, visual understanding, perfection, proportioning system, Compositional Skill.

Sub Topics:

1. Elements of Design Scale and proportion.
2. Understanding dimensional relationship.
3. Proportioning system.
4. Scale.
5. Importance of different scale(Visual scale, Hierarchical scale, Distorted scale).
6. Vitruvius Theory.

Sessional Work: Assignment, Studios

References :

- Nikos A Salingaros, (2010) twelve lectures on Architecture.
- Building Structures Illustrated: Patterns, Systems, and Design 2nd Edition, Francis D. K. Ching.

Anthropometrics and Ergonomics

Key Words: Comfort, Human needs, factor, socially sensible output

Objectives: To understand the Statics and measurement of Human body, user experience, properties of human capabilities, System performance.

Sub Topics:

1. Introduction to human functions.
2. Ergonomics and design.
3. Disability, Ageing and Inclusive design.
4. Environmental Ergonomics.
5. Health effects of environmental stresses.

Sessional Work: Assignment, Hands-on practices, Model making

References :

1. Chaira, J. D. and Callender, J. H. (1987). Time Savers Standards for Building Types. Singapore: McGraw-Hill.
2. Crosbie, M. J. and Watson, D. (2005). Time Savers Standards for Architectural Design: Technical data for Professional Practice. 8th Ed. The McGraw-Hill Company.

Rural Architecture

Key Words: Indigenous material, Social Structure, Technology Adaption, Social Network, Kinship, Culture, Tradition, Climate, Craftsmanship, Gender, Occupation, Rituals and beliefs, Religion and festival.

Objectives:

- To develop Construction Techniques and planning strategies.
- Understanding of Informal and functional spaces design.
- To understand Climatic responsive design and the use of natural resources.

Sub Topics:

1. Social Structure.
2. Daily life and recreation.
3. Built Spaces- Understanding material and construction techniques.
4. Custom and rituals.
5. Art and artifacts.

Sessional Work: Workshop, Site visit, Assignment, Documentation

References :

1. Edward, S. and Maisel, J. (2004). Universal Design. New York: Taylor & Francis.
2. Preiser, W. (2001). Towards universal design evaluation. New York: McGraw-Hill.
3. Seidle, J. (1996). Barrier-free design. 1st Ed. New York: Routledge.
4. Story, M. F., Mueller, J. L. and Mace, R. L. (1998). The universal design file: Designing for people of all ages and abilities. North Carolina : North Carolina State University Press.
5. Jain, K. and Jain, M. (1992). Mud Architecture of the Indian Desert. Ahmadabad: Aadi Centre.
6. Muthiah, S., Meyappan, M., Ramswamy, V. and Muthuraman, V. (2000). The Chettiar Heritage. Chennai: Chettiar Heritage.

Traditional Arts and Crafts

Key Words: Diversifying culture, heritage, Rituals and beliefs, Religion and festival, Language and custom, food habits, Dressing, History(Early civilisation) or mythology, Heritage

Objectives:

- To develop Techniques and material explorations.
- To generation of creativity, Properties and behavior of material.
- Elements of particular art and craft form.

Sub Topics:

1. History of Traditional Arts in India.
2. History of Craft in India.
3. Various Forms of Art and craft based on region.
4. Methods and processes involved in Different forms of Art and craft.
5. Study of material and instruments requires for particular craft and Art Scope and Limitation.

Sessional Work: Workshop, Site visit, Assignment, Documentation

References :

- The Rich Heritage of Jammu And Kashmir Studies In Art, Architecture, History And Culture of the Region, Somnath Wakhlu Foreword By Karan Singh.
- Handmade in India: Crafts of India, Ranjan Aditi.

Biomimicry

Key Words: Nature, Adaptation, Relationship, Efficiency

Objectives:

- To develop understanding of bio mimicry in Architecture.
- TO develop understanding that simulate and co-opt processes occurs in nature.
- To understand the way biological systems solves the problem.

Sub Topics:
1. Introduction to Biomimicry.
2. The levels of mimicking in nature.
3. What is biomimetic design.
4. Examples of Biomimetics.

Sessional Work: Assignments, Model making

References :
- Biomimicry in Architecture by Michael Pawlyn.
- Biomimicry as a Metaphor for Perfect Integration in Sustainability by Asha Nilani Liyanage.
- Architecture Follows Nature-Biomimetic Principles for Innovative Design (Biomimetics) by Ilaria Mazzoleni.

Institutional Project 3

Institutional project aims at encouraging institutions to explore different areas.

Institution would have freedom to explore into multidisciplinary activities which would explore into other creative discipline and multidisciplinary activities.

This would help student of architecture to have insight into different spectrums of people, place, culture, society, technology etc.

Institution has entire freedom to detail out the assignments to be conducted under this elective.