Fifth Semester B.Arch.

5S-A-1

Architectural Design V

Objectives: The focus will be on exploration and application of various structural systems, building byelaws and building with multiple users.

The design process to deal with following aspects:

- Building byelaws and site surrounding.
- Structural system and exploration in material.
- Services in multistoried buildings

Sessional Work: Design of multiple dwelling units, apartment blocks, hostels or other multistoried buildings.

5S-A-2

Allied Design Studio V

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

5S-A-3

Building Construction and Materials V

Objectives: To familiarize the students with the design principles and considerations of advanced RCC structures.

Need for building repair and maintenance, cause and effect of building deterioration and defects, and material, methods, and techniques of maintenance, repair and restoration are covered in the course.

Unit I: Advance RCC foundation, Types such as Strip Foundation, combined footings, Eccentric Footing. Foundation system for a floating column on a cantilever beam. Types of Raft foundations.

General study of Steel Grillage foundation, Machine Foundation, Cellular Foundation, Cassion Foundations.

Design Principles and Considerations for Pile Foundation, its types. Piles in Timber, Steel and R.C.C. both precast and *Cast-in-situ*, Under rimmed piles, pile caps.

Unit II: Design Principles and considerations of Advanced R.C.C. Structures - such as Grid / Coffered Slabs - Various types - Study of reinforcement detailing i) at crossing of beams ii) Grid beams with peripheral beams and columns.

Flat slabs, Flat-plate slabs - all types. Lift slab method of construction.

Unit III: Study of various defects in building - causes and remedies / precautions. Brief study about various Non-Destructive Tests - Concepts, purposes, such as Rebound Test, Penetration Test and Pull out Techniques, Surface Hardness Test.

Study of Building Structure Rehabilitation. Principles / Concepts, Causes / reasons. Various methods such as Grouting, Guniting, Jacketing - construction principles, techniques.

Unit IV: Study of Construction Chemicals / Admixtures, Need, purpose, types. A General study - with emphasis on commonly used chemicals / admixtures, repair solutions.

Water proofing aspect of building for different elements, avoiding dampness.

Unit V: Additions and Alteration in Existing Building. Introduction, Purpose / necessity - Design and Structural principles, techniques of modifications / alternations, precautions, essential studies, data and information required, its collection and analysis. Design, detailing and construction drawings providing solutions for various building elements.

Shoring, underpinning and scaffolding for building work.

References:

- Guha, P. K. (2011). Maintenance and Repairs of Buildings. New Delhi: New Central Book Agency.
- Chandler, I. (1992). Repair and Renovation of Modern Buildings. McGraw-Hill.
- Nayak, B. S. (2013). A Manual of Maintenance Engineering. New Delhi: Khanna Publishers.
- Mitchel “Advanced building construction.”
- V S Foster “advanced building construction.”
- M.S.Shetty. Concrete Technology (Theory & Practice).Publisher: S.Chand & Company Ltd.
- Hand Book on Cracks on buildings (causes & Prevention) Published Govt. of India.

5S-A-4

Working Drawing I

Objectives:

The objective of this subject is to train the students for the preparation of:

1. Submission drawing as per the local building bye laws.
2. Working drawings required for carrying out actual construction *work.* The graphics of the drawings will be with specific reference to the code of practice for Architectural and Structural drawings as laid down in B.I.S. No.962 of 1960. The

course of this subject shall be completed in two semesters i.e. Semester-5 and Semester-6. The course to be completed shall be as follows:

Unit I: Study of building bye-laws, building regulations, requirements of parts of Buildings etc. as per the National Building Code.

Unit II: Understanding the concept of Ground coverage, Built-up area, FSI/ FAR etc:

Unit III: Preparations of submission drawings for a single storied residence with approximate 75 Sq.Mt. built-up area.
Unit IV: Preparation of working drawings for the same building. The set of drawings to be prepared shall include Foundation / centre line plan (considering Load Bearing as well as R.C.C. Frame structure type), Floor Plan, Lintel level plan, Terrace Plan showing roof drainage arrangement. Sections, All elevations, Details of stair, Doors and windows, Flooring pattern, Kitchen, Architectural features etc. (Set of min. 10 drawings of imperial size prepared to facilitate the execution of building)

Unit V: Business graphics, multimedia presentations of the above work.

Sessional Work: Plates on above topics.

References:

- National Building Code (NBC).
- Latest Local Building Bye-Laws.
- Osamu, A. W., Linde, R. M. and Bakhoum, N. R. (2011). The professional practice of architectural working drawings. 4th Ed. Hoboken: John Wiley & Sons.

5S-A-5

Structural Design & Systems V

Objectives: In continuation of previous semester this course focuses on limit state method for the design of various types of slab, column and footing. Also it delivers the knowledge of basic requirements of earthquake resistant structures.

Unit I: Overview of the Structural System in Architecture.
Study of roof covering like flat slab, vaults and domes, folded plates, Shell roofs & Stair cases,
With suitable examples from historical and contemporary architecture
Study of IS 875 Part I, Part II and Part III and Study of IS 456 -2000.

Unit-II: Basic Concepts and design of different types of slab
Design of one way & two way slabs.
Conceptual study of continuous slab & cantilevered slab showing the reinforcement details.

Unit III: Design of RCC section in compression (Column)
Short column, Limitations of long columns and column subjected to uniaxial bending (by using Interaction curve chart)

Unit IV: Design of Isolated Footing.
Design of RCC Isolated Rectangular & square footing.

Unit V: Basic requirement of Earthquake resistant structures.
Study related to Plan irregularity & Vertical irregularity (Study of IS 1893Part I -2016)

Sessional work: Sketches/ Notes/ Tutorials & Presentations

Desirable: Site visits to develop better understanding regarding the reinforcement details and casting of various structural elements.
To prepare relevant study models on above.
Laboratory exposure wherever possible.

References:

- Bhavikatti, S. S. (2008). Design of RCC Structural Elements. Newade International Publishers.
- Punmia, B. C. (2007). Limit State Design of Reinforced Concrete. Delhi: Laxmi Publications.
- Ramamrutham , S. (2004).Limit State Design of Concrete structures New Delhi: Tata McGraw Hill Education
- Ramachandra, S. (2004). Limit State Design of Concrete Structures. Scientific publishers.
- Varghese, P.C. (2011). Limit state Design of Reinforced Concrete. PHI Learning.
- Design Aid SP 16.
- I S 456-2000.
- I S 1893 Part I -2016.
- I S 875-1987 (Part I, Part II, Part III)

5S-A-6

Contemporary Architecture

Objectives: To provide an understanding and appreciation of Contemporary trends in Indian and Western Architecture in terms of Ideas and directions through the works of outstanding architects.

Post-Independence Architecture in India:
- Le Corbusier in Chandigarh and Ahmedabad
- Louis Kahn's contributions
- Ideas and works of B V Doshi
- Ideologies of Charles Correa
- Raj Rewal, Achyut Kanvinde, Uttam Jain

Works of Contemporary Architects: Architects and their ideologies and philosophies towards architecture –
- Sanjay Mohe,
- Sanjay Puri,
- Brinda Somaya, Anupama Kundoo, Chitra Vishwanathan

- Manit Rastogi, Jaisim, B.S.Bhooshan etc.

Critical Regionalism: Philosophy and works of
- Laurie Baker,
- Hassan Fathy,
- Geoffrey Bawa
- Nari Gandhi

Architectural response to regional climate, culture, local materials, crafts and technology.

Non Indian

- Ideas and works of Richard Meier
- Mie Van der Rohe
- Peter Eisenmen
- Charles Moore
- Frank Gehry
- Zaha Hadid
- Rem Koolhas
- Santiago Calatrava
- Shigeu Ban

I.M.Pei
Moshe Safdie
Ean Nouvel
Bernard Tschumi
Norman Foster
Daniel Leibskind
Kazuyo Sejima
Renzo Piano
Tadao Ando

References:

- Kenneth Framption : Modem Architecture -A Critical History
- Monographs of Modem Architects
- Henri Sterlin: Encyclopedias of World Architecture
- Singh, M. and Mukherjee, R. New Delhi- Making of a Capital. New Delhi: Roli Books
- Mehrotra, R. (2011). Architecture in India Since 1990. Pictor.
- Lang, J., Desai, M. and Desai, M. (2000). Architecture and independence: The search for identity – India 1880 to 1980. New Delhi : Oxford University Press

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5S-A-7

Building Services II

Objectives: This part of the building services deals with various systems and components of complex Sewage collection and its Disposal, hot water supply in high-rise buildings, Electrical services, refuse disposal systems and methods of storm water handling. The students shall be made aware of Architectural design consideration regarding space allocation and design of building elements to anchor these services so as to achieve balance of functional efficiency and building aesthetics.

Unit I: Sewage collection and disposal for large campuses, complexes, and high-rise buildings etc, STP system- comprehensive study of conventional sewage treatment plant, understanding, its principles, systems of treatment, sequence, possible space requirements, location criteria, application, merits and de-merits.

Unit II: Hot water supply in high-rise buildings, solar water heaters and their systematic layouts, various methods/ systems of hot water supply, their thermal insulation and schematic pipe line network in a building. (for domestic application- small residence and for high rise buildings)

Unit III: Brief introduction to Electricity generation and distribution from Plant to Substation. Various wiring systems, electric fittings and appliances, Electrical Control and safety devices such as Switches, Fuse, Circuit breakers, Earthing- conventional and modern techniques, lightning conductor, etc. Calculation and distribution of loads. Detailed layout of electrical services in a single tenement residence or bungalow. Design of various building elements and their locations to anchor the services such as walls, Floor and their features, ceiling, Shafts or ducts etc.

Unit IV: Storm Water- Introduction, necessity, utility, importance, collection, Drainage- Principles, various methods/ systems, planning and application.

Unit V: Refuse disposal- Sources, types, collection, storage and transport, provisions for refuse disposal individual building level, refuse chutes- introduction, principle, design, construction and locational aspects. Function, utility and application, its limitation, merits and demerits.

References

- Abnwos, F. and Others. Electrical Engineering Hand Book
- Bureau of Indian Standards. (2005). Code of Practice for Electrical Wiring Installations IS-732.
- Punmia, B. C., Jain, A. K. and Jain, A.K. (1998). Waste Water Engineering. New Delhi : Laxmi Publications.
- Birdie, B. S. (1996). Water supply and Sanitary Engineering. Dhanpat Rai and Sons.

5S-A-8

Vernacular Architecture

Objectives: Efforts and activities related to promotion of Sustainable Architecture are underway, and this can be reinforced with the knowledge of Vernacular Architecture. The objective is to instill sensitivity towards the less explored field that is concerned with Architectural building traditions/practices that are local, ecologically sensible and culturally relevant. The course introduces grass root principles of indigenous architecture that has evolved over time in response to environment, climate, culture, economy and basic human needs. The course covers variations in built forms and their environmental performance across different climatic and geographical regions of India.

Unit I: Introduction to Vernacular Architecture: Definitions and theories, Categories, Contextual responsiveness with respect to Climatic, Geographical, Anthropological and Cultural influences.

Unit II: Environment and Materials: Local building materials, Skill set, Built form & elements, Construction techniques & environmental performance.

Unit III: Regional Variations in Built Form: Tribal Architecture: Settlement Pattern, Dwelling Typology, Symbolism, Typical features, Construction materials and techniques in North of Maharashtra – Korku tribe, South-East of Maharashtra- Gond tribe, South - West of Maharashtra – Kolam tribe.

Unit IV: Regional Variations in Built Form: Traditional Architecture: Settlement Pattern, Dwelling Typology, Symbolism, Typical features, Construction materials and techniques in Leh Laddakh, Kutchha, Coastal Telangana, Western Ghats and North East region.

Unit V: Living style, beliefs, festivals and Spaces: Space- Activity relationship; living style and beliefs reflected on space usage and design with respect to Central Indian rural agrarian society; Indian Festivals and built habitat.

References:

- Brunskill, R. W. (1987). *Illustrated Handbook of Vernacular Architecture*. Castle Rock: Faber &Faber.
- Carmen, K. (1986). *VISTARA – The Architecture of India.* The Festival of India Publications.
- Cooper%_ __and Dawson%__. (1998). *Traditional buildings of India*. London : Thames & Hudson.
- Jain, K. and Jain, M. (1992). *Mud Architecture of the Indian Desert.* Ahmadabad: Aadi Centre.
- Kenneth, F. (1983). *Towards a Critical Regionalism: Six points for an architecture of resistance*, In *The Anti-Aesthetic: Essays on Postmodern Culture*. (Ed.) Hal, F. Seattle : Bay Press.
- Muthiah, S., Meyappan, M., Ramswamy, V. and Muthuraman, V. (2000). *The Chettiar Heritage*. Chennai: Chettiar Heritage.
- Oliver, P. (1997). *Encyclopedia of Vernacular Architecture of the World*. Cambridge: Cambridge University Press.
- Pramar, V. S. (1989). *Haveli-Wooden Houses and Mansions of Gujarat*, Ahmadabad: Mapin Publishing.
- Rapoport, A. (1969). *House, Form & Culture*. Eaglewood : Prentice Hall Inc.
- Tillotsum, G. H. R. (1989). *The tradition of Indian Architecture: Continuity, Controversy and Change since 1850.* Delhi : Oxford University Press.

Elective V

Pattern Language/ Product Design/ Advanced Spatial Analysis/ Behavioural Architectural/ Rhapsodic Architecture/ Vastu Shastra/ Institutional Project 5

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

Pattern Language

Objectives: Aim of this subject is to introduce students to the pattern language and its use to take decisions for different levels of design.

- What is design pattern and reasons to use it.
- Advantages of pattern over design guidelines.
- Vocabulary, syntax and grammar of pattern language.
- Common and optional elements of pattern library.
- Study of selected patterns from reference book and other examples.

Note:

- The concerned teacher may prepare a detailed syllabus based on above key points while referring to books given or any additional, references.
- Use of teaching methods to make subject interesting and absorbing is expected.
- Knowledge application shall be the part of sessional work.

Reference books

1. The timeless way of Building by Christopher Alexander.
2. A pattern language by Christopher Alexander and Sara Ishikqwa.
3. The Oregan Experiment by Christopher Alexander and Sara Ishikqwa..
4. Pattern Theory : Introduction and perspectives on the Tracks of Chiristopher Alexander.

Product Design

Key Words: Historical background, form semantics, bio mimicry, purpose function, systems, human factors, need, recyclability.

Objectives:

- To provide Knowledge about the various styles of furniture manufactured in various materials is vital to an architect.
- Understanding the methods and techniques involved in furniture and product design.

- To develop the skill of material explorations.
- To understand man machine system and human performance and system reliability.
- To Understand applied anthropometrics and ergonomics,
- To understand the multiutility oriented approach.

Sub Topics :
1. Introduction to product design.
2. Human Factors.
3. Aspects of product design
4. Design exercises.

Sessional Work:
Project, Assignment, Site visit

References:
- De Chiara and Callender - Time Savers Standards for Building Types
- De Chiara and Callender - Time Savers Standards for Architectural data
- Time Saver Standards for Interior Design
- Andrew Alpern, Handbook of specialty Elements in Architecture, SMcGrawhill Co., USA, 1982
- Francis D. K. Ching, Interior Design Illustrated, VNR Publications, New York, 1987.
- An invitation to Design, Helen Marie Evans

Advanced Spatial Analysis

Key Words: Complexity, Functionality, Geography, Space, Location, Built Environment, Spatial Analysis, Measurement, Transformation, Tolerance, Buffer, Density Estimation.

Objectives:
- To develop the skill of Modelling & Mapping.
- To study Visualisation, Compilation, Sequences.
- To understand the Methods of examine.
- To study Application of convolution in GIS.

Sub Topics :
1. Introduction.
2. Analysis based on location.
3. Analysis based on distance.
4. Qualitative and quantitative research methodology.
5. Conclusion.

Sessional Work:
Site visit, Assignment, workshop

References:

- Advanced spatial analysis: the CASA book of GIS, P. Longley, M Batty - 2003
- Advanced spatial statistics: special topics in the exploration of quantitative spatial data series DA Griffith –2012.

Behavioural Architectural

Objectives: The aim of this elective is to understand the significance of knowledge of human behaviour while designing the built environments for various activities.

Approach to the issue of mutual relationship between people and the physical environment from the perspective of an inter disciplinary discourse, environmental psychology.

- What is Environmental Psychology.
- Describing the mutual relationship between people and the environment.
- Components of Architecture which affects Human Psychology.
- Study and analysis of examples of behaviour facilitation.

Note:
1. The concerned teacher may prepare a detailed syllabus based on above key points while referring to books given or any additional, references.
2. Use of teaching methods to make subject interesting and absorbing is expected.
3. Knowledge application shall be the part of sessional work.

Reference Books:

1. Environmental psychology: Behaviour and experience in context by Carsidy T. 1997 Psychology Press, Hove, East Sussex.
2. Designing places for people: A handbook on human behaviour for architects, designers, and facility managers by Deasy M.L.
3. Environmental psychology: Principles and practice, by Gifford R. 2002, Optimal Books Publishers. Canada 2002.
4. Creating architectural theory: The role of the behavioral sciences in environmental design by Lang. J. - Van Nostrand Reinhold. New York.
5. Psychology of Architectural Design (Architecture & Design Science) by Akin. O

Rhapsodic Architecture

Vastu Shastra

Key Words: Ancient Hindu System, Science of architecture.

Objectives: To develop understanding of rules and regulations .

Sub Topics:
1. Importance of vastu shatra in Architecture.

2. Terminologies in vastu shatra.
3. Principles in vastu shatra.
4. Examples in Architecture based on Vastu Shatra.

Sessional Work: Assignments, Site visits, Plates

References:

- Indian Vastu Shastra: Science of Construction & Architecture of Building by Vaibhav Chawadre.
- The Miracles of Vaastu Shastra Paperback – 2013 by Shanku Shiva Dass.
- Golden Rules Of Vastu Shastra - Remedies And Solutions – 2004 by Suman Pandit.

Institutional Project 5

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.
