

# DAYANANDA SAGAR COLLEGE OF ENGINEERING

An Autonomous Institution affiliated to Visvesvaraya Technological University, Belagavi & recognized by AICTE

NAAC Accredited with A Grade

ISO 9001:2008 Certified

CHOICE BASED CREDIT SYSTEM (CBCS)

SCHEME OF TEACHING AND EXAMINATION 2015-2016

## B. ARCHITECTURE - III SEMESTER

Sl.	Subject	Subject	Teaching Department	Teaching Hours/Week			Examination			Credits
				S	T	P	CIE	SEE	Total	
1	AT3AD	Architectural Design- Multifunctional Spaces	Arch	9	0	0	50	50	100	7
2	AT3BCM	Building Construction-RCC roofs and Building Finishes	Arch	6	0	0	50	50	100	4
3	AT3CLI	Climatology	Arch	0	3	0	50	50	100	3
4	AT3HOA	History of Indian Architecture -Islamic and Colonial	Arch	0	4	0	50	50	100	3
5	AT3STR	Structures -Concrete Buildings	Arch	4	0	0	50	50	100	3
6	AT3 TOA	Theory of Architecture: Design Theories	Arch	0	3	0	50	50	100	3
7	AT3CAD	Basic Computer Applications	Arch	0	0	3	50	-	50	2
8	AT3ELEC1	Vernacular architecture	Arch	0	0	2	50	-	50	2
	AT3ELEC2	Visual communication								
	AT3ELEC3	Introduction to heritage & documentation								
9	AT3KAN	Kannada Language		0	0	0	-	-	-	M
<b>Total</b>							<b>400</b>	<b>300</b>	<b>700</b>	<b>27</b>

**CIA:** Continuous Internal Assessment, **SEE:** Semester End Examination **S:** Studio, **T:** Theory, **P:** Practical Course, **M:** Mandatory Course  
 Elective - Any one subject to be selected

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## ARCHITECTURAL DESIGN: Multi Functional Spaces

Sub Code	: AT3AD	CIE	: 50
Hrs/ Week	: 09	SEE	: 50
Total Hrs	: 144	Credits	: 7
SEE Type	: VIVA	Duration	: NA

### COURSE 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** – Place making 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.

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**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 / neighborhood 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

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## BUILDING CONSTRUCTION AND MATERIALS: RCC Roofs and Building Finishes

Sub Code	: AT3BCM	CIE	: 50
Hrs/ Week	: 06	SEE	: 50
Total Hrs	: 96	Credits	: 4
SEE Type	: Dwg Exam	Duration	: 4 Hrs

### COURSE 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

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## CLIMATOLOGY

Sub Code	: AT3CLI	CIE	: 50
Hrs/ Week	: 03	SEE	: 50
Total Hrs	: 48	Credits	: 3
SEE Type	: Exam	Duration	: 3Hrs

### COURSE 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 (TERI Classification). Site Climate: Effect of landscape on site/ micro climate.
3. **Thermal comfort:** 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 performance of building elements:** Heat exchange in buildings, 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.
5. **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). Introduction to simulation software.

#### MODULE 3

6. **Sun-path diagram:** Solar geometry & design for orientation and use of solar charts in climatic design.
7. **Shading devices:** Optimizing Design of Shading devices effective for overheated periods while allowing solar radiation for under heated periods for different wall orientations.

#### MODULE 4

8. **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
9. **Day Lighting:** Nature of natural light, its transmission, reflection, diffusion, glares. Advantages and limitations in different climatic zones, North light, Daylight factor, components of Daylight devices.

#### MODULE 5

10. **Climatic Design considerations-1:** Design considerations for buildings in tropical climates with special reference to hot-dry, warm-humid and composite climates, with two Indian examples and one international for each of the above mentioned climatic zone.

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## **REFERENCES:**

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

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## HISTORY OF INDIAN ARCHITECTURE: Islamic and Colonial

Sub Code	: AT3HOA	CIE	: 50
Hrs/ Week	: 4	SEE	: 50
Total Hrs	: 64	Credits	: 3
SEE Type	: Exam	Duration	: 3 Hrs

### COURSE 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: Quawat.Ul.Islam, mosque and tomb of Iltumish , Qutb Minar , Alai Minar, Enlargement of Quwaat Ul Islam Complex and Alai Darwaza.
3. **Early Phase II:** Tugluq, Sayyid & Lodi dynasties: Tomb of Ghiyas- uddin Tugluq, Tomb of Firoz shah Tugluq, Shish Gumbad, Mubarak shah Sayyid's tomb, Khirkhi masjid Delhi and Hauz Khas complex

#### MODULE 2

4. **Provincial style I- Jaunpur and Bengal:** *Jaunpur:* Atala and Jami masjid, *Bengal:* Adina masjid & EkLakhi tomb, Pandua, Dakhil Darwaza, Gaur
5. **Provincial style II - Ahmedabad and Bijapur:** *Ahmedabad:* Vavs of Gujarat, Sarkhej complex, Jami Masjid, *Bijapur:* Golgumbaz, Ibbrahim Rauza, Bauli (Water tank).

#### MODULE 3

6. **Moghul Architecture I:** Introduction to Mughal Architecture, Characteristics and Typologies. Humayun's tomb
7. **Moghul Architecture II:** Fatehpursikri layout and Jami masjid, Diwan-I-Am, Diwan-I-khas, Tomb of Salim chisti, Buland darwaza, Birbal's house, Jodhabai's palace

#### MODULE 4

8. **Mughal Architecture III:** Akbar's tomb, Taj mahal, Itmaud Daula, Meena Bazaar Agra
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:** *Calcutta:* St. Paul's Cathedral, Victoria Memorial, *Bombay:* Town hall, Victoria Terminus(Chhatrapati Shivaji Station), Mysore Palace
11. **Colonial Architecture III:** Design of New Capital of Delhi- Contributions of Edward Lutyens, Herbert Baker, Layout of New Delhi, Parliament House, North Block and South Block at Secretariat, Rashtrapathi Bhavan. Rajpath, India Gate etc.

**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.

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## **REFERENCES:**

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



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## STRUCTURES: Concrete Buildings

Sub Code	: AT3STR	CIE	: 50
Hrs/ Week	: 4	SEE	: 50
Total Hrs	: 64	Credits	: 3
SEE Type	: VIVA	Duration	: NA

### COURSE OBJECTIVES:

To understand the fundamental principles and structural behavior of concrete buildings in withstanding gravity, lateral (seismic and wind), and other environmental forces and 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.

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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

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## THEORY OF ARCHITECTURE: Design Theories

Sub Code	: AT3TOA	CIE	: 50
Hrs/ Week	: 3	SEE	: 50
Total Hrs	: 48	Credits	: 3
SEE Type	: Exam	Duration	: 3 Hrs

### COURSE 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.

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## **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.

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## BASIC COMPUTER APPLICATIONS

Sub Code	: AT3CAD	CIE	: 50
Hrs/ Week	: 3	SEE	: --
Total Hrs	: 48	Credits:	2
SEE Type	:NA	Duration	:NA

### COURSE 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 modeling, and vector graphics.

### OUTLINE:

- 1. Introduction to 2D drafting software:** Using latest version of relevant CAD software:
  - 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.
  - 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 modeling:** Latest version of relevant 3D modeling software – software interface, demonstration of 3D modeling commands required to convert 2D project (of 2D drafting) into 3D as a time problem.
- 4. Simple 3D modeling:** 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 VRay. Flamingo, 3D studio Max, or any other appropriate software.
- Introduction to concepts of Building Information Modeling (BIM) using REVIT or other relevant BIM software.
- 7. Introduction to graphics editing tools:**
  - Introduction to appropriate techniques to model walls, insert fenestration, curtain walls & staircases.
  - Lecture and Classroom exercise to convert into BIM project, relationship of other Industry standard file types (.dwg for AutoCAD or Trimble Sketch up input files or from any other relevant software.).
  - Lecture and Classroom exercise to further utilize rendering and visualization.
- Concepts of image scanning, image editing, effects and filters.
  - 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.

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## **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.

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## **ELECTIVE – VERNACULAR ARCHITECTURE**

Sub Code	: AT3ELEC1	CIE	: 50
Hrs/ Week	: 2	SEE	: --
Total Hrs	: 32	Credits:	2
SEE Type	:NA	Duration	:NA

### **COURSE 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. Encyclopedia of Vernacular Architecture of the World, Cambridge University Press, 1997

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## ELECTIVE – VISUAL COMMUNICATION

Sub Code	: AT3ELEC2	CIE	: 50
Hrs/ Week	: 2	SEE	: --
Total Hrs	: 32	Credits:	2
SEE Type	:NA	Duration	:NA

### COURSE 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



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## ELECTIVE – INTRODUCTION TO HERITAGE & DOCUMENTATION

Sub Code	: AT3ELEC3	CIE	: 50
Hrs/ Week	: 2	SEE	: --
Total Hrs	: 32	Credits:	2
SEE Type	:NA	Duration	:NA

### COURSE 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
- 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

### REFERENCES:

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

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## KANNADA LANGUAGE (Non Credit Mandatory Course)

Sub Code	: AT3KAN	CIE	: --
Hrs/ Week	: 2	SEE	: --
Total Hrs	: 32	Credits:	M
SEE Type	:NA	Duration	:NA

### KANNADA KALI (Only for Non Karnataka Students)

#### COURSE OBJECTIVES:

Non Karnataka students are taught basics of Kannada through **Kannada Kali**.

#### Module 1

- Introducing each other – 1. Personal Pronouns, Possessive forms, Interrogative words.
- Introducing each other – 2. Personal Pronouns, Possessive forms, Yes/No Type Interrogation
- Enquiring about a room for rent. Qualitative and quantitative adjectives.
- Self study component: About Ramayana. Possessive forms of nouns, dubietive question,

#### Module 2

- Enquiring about the college. Predicative forms, locative case.
- In a hotel-dative case defective verbs.
- Planning for a picnic. Imperative, Permissive, hortative.
- Self study component: Vegetable market . Numeral, plurals.

#### Module 3

- Conversation between Doctor and the patient. Verb- iru, negation – illa, non – past tense.
- Doctors advise to Patient . Potential forms, no–past continuous.
- About Brindavan Garden. Past tense, negation.
- Self study component: Discussing about a film. Past tense, negation.

#### Module 4

- About routine activities of a student . Verbal Participle, reflexive form, negation.
- Telephone conversation. Past and present perfect past continuous and their negation.
- About Halebidu, Belur. Relative, principle, negation.
- Self study component: Discussing about examination and future plan.

#### Module 5

- Kannada Bhaashe (Lesson for reading)
- Manataruva Sangatialla (Lesson for reading)
- Beku Bedagalu (lesson for reading)

#### COURSE OUTCOMES:

Non Karnataka students will be able to interact in day to day activities.

#### TEXT BOOKS:

1. H K Lakappa Gowda, Sahitya: Bahumukha Chintane, IBH Prakashana.
2. Vivek Rai, Kannada Nudinadeya Barahagalu, Sapna Books.
3. K V Narayana, Kannada Adunudiya Sollarime, Pragathi Publishers.
4. Rahamath Tharikeri, Maradolagana Kichchu, Abhinava Publishers.

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## Note:

Each student admitted to the B.Arch program needs to register for this mandatory course. There is no Semester End Examination (SEE) for the mandatory course. The Pass Grade/ Not Passed will be awarded to the student based on the performance in the Continuous Internal Evaluation (CIE). Students who do not secure the Pass Grade for the mandatory courses are not eligible for the award of the degree.

## KANNADA MANASSU (Only for Karnataka Students)

### COURSE OBJECTIVE:

Students of Karnataka will be able to know about culture of Karnataka through **Kannada Manassu**.

### Self study component:

Proverbs (Gadhegalu), Kannada Poets (Kavigalu), Short Stories (Kathegalu), Essays (Prabhandagalu), Own sentences (Swantha Vakya).

## ಕನ್ನಡ ಮನಸ್ಸು

೧. ಶ್ರಾವಣ (ಕವನ) ದ ರಾ. ಬೆಂವೆ.
೨. ಡಾ. ದಿಕ್ಷಿತ್‌ರಾಯ್ ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ (ವ್ಯಕ್ತಿಚರಿತ್ರೆ) ಎ. ಎನ್. ಮೂರ್ತಿರಾವ್.
೩. ಮೊಜ್ ಸರಿಗೋಬುರಗಲ್ಲ (ಪ್ರವನ ಕಥನ), ಶಿವರಾಮ ಕಾರಂತ.
೪. ಅಲ್ಲವನ ರೇಷ್ಮೆ ಕಾಂಟಲೆ (ಪ್ರಬಂಧ) ಕುವೆಂಪು.
೫. ವಮ್ಮ ಎಮ್ಮೆಗೆ ಮಾತು ತಿಳಿಯುವುದೇ (ದಿನೇಂದಿ), ಗೋರೂರು ರಾಮಸ್ವಾಮಿ ಅಯ್ಯಂಗಾರ್.
೬. ಅನೇಕಲ್ಲದಲ್ಲ ಸುಡುಗಿಯರು (ದೀಪಾವ ಸೇವನ) ಜ. ಜ. ಎಲ್. ವ್ಹಾಡಿ.
೭. ಬೆತ್ ನಂ. ಬಟ (ಕಥೆ) ತ್ರಿವೇಣಿ.
೮. ದೊಡ್ಡ ಮತ್ತು ಕೋಡಿ (ಕವನ) ಮ. ರಂ. ಎಕ್ಕುಂಡಿ.
೯. ಗುಬ್ಬಿಣಿ ಗೂಡು (ಅಂಕಂ ಐರಸ), ಲಂಕೇಶ್.
೧೦. ಕೊಂಕ್ರೆ ಮೇತ್ತಿ ಮತ್ತು ಸಾವು ಮೀನು (ಪರಿವರ ಸೇವನ), ಕೆ. ವರ್ಣಾಚಂದ್ರ ತೇಜಸ್ವಿ.
೧೧. ಧಾಂಧಿ (ಕಥೆ), ದಿನಗರಸಳ್ಳಿ ರಾಮಸ್ವಾಮಿ.
೧೨. ಬೆಳ್ಳಿಯ ಸಾತು (ಕವನ), ನಿರ್ಮಲಗಯ್ಯ.
೧೩. ಎಲ್ಲ ಸುಡುಗಿಯರ ಕವನ (ಕವನ), ವಸಿಷ್ಠಾ ನಾರಾಯಣಪ್ಪ.
೧೪. ಬೀರು (ಕಥೆ) ಬನವರಾಜ ಕುಕ್ಕರಸಳ್ಳಿ.
೧೫. ಕರ್ನಾಟಕ ಸಂವತ್ಸರಿಯ ವ್ಯವಹಾರ (ಪರಿಚಯ ಸೇವನ), ರಸಮತ ತರೀಕೆರೆ.

### Course Outcome:

Through the study of this course Students of Karnataka will understand history, culture, practices and heritage of Karnataka.

## Note:

Each student admitted to the B.Arch program needs to register for this mandatory course. There is no Semester End Examination (SEE) for the mandatory courses. The Pass Grade / Not Passed will be awarded to the student based on the performance in the Continuous Internal Evaluation (CIE). Students who do not secure the Pass Grade for the mandatory courses are not eligible for the award of the degree.

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CHOICE BASED CREDIT SYSTEM (CBCS)

SCHEME OF TEACHING AND EXAMINATION 2015-2016

## B. ARCHITECTURE - IV SEMESTER

Sl.	Subject	Subject	Teaching Department	Teaching Hours/Week			Examination			Credits
				S	T	P	CIE	SEE	Total	
1	AT4AD	Architectural Design: Public Buildings	Arch	9	0	0	50	50	100	7
2	AT4BCM	Building Construction & Materials: RCC, Structural steel & Aluminum	Arch	6	0	0	50	50	100	4
3	AT4BS	Building Services: Water Supply & Sanitation	Arch	0	4	0	50	50	100	3
4	AT4HOA	History of Architecture-Classical & Medieval Europe	Arch	0	4	0	50	50	100	3
5	AT4STR	Structures -Steel, Rigid Frames and Composite Flooring	Arch	4	0	0	50	50	100	3
6	AT4SQC	Specification, Quantity and Costing o of Buildings	Arch	0	3	0	50	50	100	3
7	AT4CAD	Advanced Computer Applications	Arch	0	0	3	50	-	50	2
8	AT4ELEC1	Environment Responsive Architecture	Arch	0	0	2	50	-	50	2
	AT4ELEC2	Product design								
	AT4ELEC3	Heritage & documentation								
9	AT4VST	Vacation Study Tour		0	0	0	-	-	-	M
<b>Total</b>							<b>400</b>	<b>300</b>	<b>700</b>	<b>27</b>

**CIA:** Continuous Internal Assessment, **SEE:** Semester End Examination **S:** Studio, **T:** Theory, **P:** Practical Course, **M:** Mandatory Course  
 Elective - Any one subject to be selected

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## ARCHITECTURAL DESIGN: Public Buildings

Sub Code	: AT4AD	CIE	: 50
Hrs/ Week	: 09	SEE	: 50
Total Hrs	: 144	Credits	: 7
SEE Type	: VIVA	Duration	: NA

### COURSE OBJECTIVES:

- 1. To develop skills of problem analysis and design synthesis at an intermediate scale*
- 2. To understand the complexities of architectural design at an intermediate scale*
- 3. To communicate the corresponding architectural ideas*

### OUTLINE:

To understand the relationship between plan shapes and forms and their compositional behavior. Organization of functional activities in relation to the nature, topography and other physical limitations of the site. The issues to be addressed include horizontal and vertical circulation, climate, furniture and equipment layouts, material qualities, massing, interior volumes, basic structures and services at an intermediate level.

**MODE OF STUDY:** Case studies and seminars are suggested to enable the students to learn from visiting various contexts, expose the students to real issues that are integral to the understanding of the project and introduce the students to indigenous and contemporary building technologies.

**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.

One major project and one minor/time project to be tackled in the semester.

- 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.
- Detailing of architectural features of the major project like entrance lobby, skylights, staircases, etc has to be attempted
- Suggested projects: Police station, bank, post office, recreation center, restaurants, motels, primary health center, school, departmental store, etc.

### 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

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## BUILDING CONSTRUCTION AND MATERIALS: RCC, Structural steel & Aluminium

Sub Code	: AT4BCM	CIE	: 50
Hrs/ Week	: 06	SEE	: 50
Total Hrs	: 96	Credits	: 4
SEE Type	:Dwg Exam	Duration	: 4 Hrs

### COURSE 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 & Flat plate, Filler slabs, Waffle slab.
2. **RCC Moment framed:** Principles & methods of construction including detailing of Reinforcement.
3. **RCC Flat Plate & Slab:** Principles & 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

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## BUILDING SERVICES: Water Supply & Sanitation

Sub Code	: AT4BS	CIE	: 50
Hrs/ Week	: 4	SEE	: 50
Total Hrs	: 64	Credits	: 3
SEE Type	: Exam	Duration	: 3 Hrs

### COURSE 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:** Brief introduction on 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:** Introduction on 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, Definition of processes involved in treatment of water for different uses, filtration, softening, disinfection, Storage and pumping – gravity system, hydro-pneumatic system.

#### 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. Distribution of water to fixture and fittings, schematic diagrams, Swimming pool, water bodies, efficient usage of water.

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7. **Solid Waste Management:** Assessment of waste, Waste to wealth concept. Collection, segregation, treatment, disposal, Organic waste- Biomethanation, Vermicomposting, Organic waste converter.

## MODULE 5

8. **Introduction to Fire and Life safety:** Fire water storage requirements, Fire rating and Hydrants. Sprinkler system.
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:
- Water Treatment Plants, Sewage Treatment Plants, LPG & HSD Yards.
  - High Rise Residential Building – Plumbing (water supply, drainage)
  - Commercial Buildings like IT Campus, Hotel & Hospital for acquaintance of installation & space requirements.

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

- 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.
- Schematic diagram of similar study for a Basement floor.
- Portfolio on
  - Solid waste management and
  - Firefighting schematic plans

## REFERENCES:

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



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## HISTORY OF ARCHITECTURE: Classical & Medieval Europe

Sub Code	: AT4HOA	CIE	: 50
Hrs/ Week	: 4	SEE	: 50
Total Hrs	: 64	Credits	: 3
SEE Type	: Exam	Duration	: 3 Hrs

### COURSE 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 Epidaurus. 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.

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## 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

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## STRUCTURES: Steel, Rigid Frames and Composite Flooring

Sub Code	: AT4STR	CIE	: 50
Hrs/ Week	: 4	SEE	: 50
Total Hrs	: 64	Credits	: 3
SEE Type	: VIVA	Duration	: NA

### COURSE 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.

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## SPECIFICATION, QUANTITY AND COSTING OF BUILDINGS

Sub Code	: AT4SQC	CIE	: 50
Hrs/ Week	: 3	SEE	: 50
Total Hrs	: 48	Credits	: 3
SEE Type	: Exam	Duration:	3 Hrs

### COURSE 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.

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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.

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## ADVANCED COMPUTER APPLICATIONS

Sub Code	: AT4CAD	CIE	: 50
Hrs/ Week	: 3	SEE	: --
Total Hrs	: 48	Credits	: 2
SEE Type	:NA	Duration	: NA

### COURSE 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 VRay, 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 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:

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

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## ELECTIVE – ENVIRONMENT RESPONSIVE ARCHITECTURE

Sub Code	: AT4ELEC1	CIE	: 50
Hrs/ Week	: 2	SEE	: --
Total Hrs	: 32	Credits:	2
SEE Type	:NA	Duration	: NA

### COURSE 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 & Steane, Mary Ann. *Environmental Diversity in Architecture*, Spon Press, 2004.
2. McGlynn, Sue et al., *Responsive Environments*, Architectural Press, 2008

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## ELECTIVE – PRODUCT DESIGN

Sub Code	: AT4ELEC2	CIE	: 50
Hrs/ Week	: 2	SEE	: --
Total Hrs	: 32	Credits:	2
SEE Type	:NA	Duration	: NA

### COURSE 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, image ability.
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



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## **Class assignments / exercises:**

Short projects exploring the influences of design process, and ergonomics on the product ideation and development; studies on product changes that occur through the choices of materials, manufacturing process, and marketing techniques. Discussions, video presentations, seminars and case studies.

## **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.

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## ELECTIVE – HERITAGE & DOCUMENTATION

Sub Code	: AT4ELEC3	CIE	: 50
Hrs/ Week	: 2	SEE	: --
Total Hrs	: 32	Credits:	2
SEE Type	:NA	Duration	: NA

### COURSE OBJECTIVE:

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

### OUTLINE:

#### 1. Site work

- 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

#### 2. 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

#### 3. 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

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## VACATION STUDY TOUR

Sub Code	: AT4VST	CIE	: --
Hrs/ Week	: --	SEE	: --
Total Hrs	: --	Credits:	M
SEE Type	:NA	Duration:	NA

### COURSE OBJECTIVE:

To expose students to Historical, Vernacular and Contemporary architecture at a regional, national and international level

### OUTLINE:

- Vacation Study tour is to be undertaken after the end of 3rd semester exam and before the commencement of 4th semester classes.
- This assignment is primarily a study tour for visiting places of architectural and socio-cultural interest.
- The choice of the places to be visited and the buildings to be documented is left to the concerned faculty.
- The assignment may be given as group work.
- The students have to submit a report on the study tour within 15 days from the beginning of the 4th Semester.
- The reports are to be assessed by the concerned faculty for satisfying the course requirement

