

DEPARTMENT OF ARCHITECTURE, DSCE
(Autonomous Institution Affiliated to VTU, Belgaum)
SCHEME OF TEACHING AND EXAMINATION 2016-2017

I SEMESTER B.Arch

Sl. No	Subject Code	Subject	Evaluation Type	Teaching Dept	Board	Credit Hours/Week			Contact Hours/Week	Examination			Duration of Exam (Hrs)	Credits
						S	T	P		CIE	SEE	Total		
1	AT1AD	Architectural Design-Introductory Course	SEE - VIVA	Arch	Arch	7	1	0	8	50	50	100	-	7
2	AT1BCM	Building Construction and Materials-Masonry and Foundations	SEE - EXAM	Arch	Arch	4	2	0	6	50	50	100	4	5
3	AT1GRA	Introduction to Architectural Graphics	SEE - EXAM	Arch	Arch	3	1	0	4	50	50	100	4	3
4	AT1HOA	History of Architecture-Early Civilization	SEE - EXAM	Arch	Arch	0	3	0	3	50	50	100	3	3
5	AT1STR	Introduction to Structures	SEE - EXAM	Arch	Arch	0	3	0	3	50	50	100	3	3
6	AT1CS	Communication Skills	CIE	Arch	Arch	0	0	2	2	50	--	50	--	M
7	AT1BDV	Basic Design & Visual Aesthetics	CIE	Arch	Arch	6	0	0	6	50	--	50	--	2
8	AT1ADP	Architectural drawing & presentation	CIE	Arch	Arch	3	0	0	3	50	-	50	--	2
Total									35	400	250	650		25

CIE: Continuous Internal Evaluation, **SEE:** Semester End Examination **S:** Studio, **T:** Theory And **P:** Practical, **M:** Mandatory

ARCHITECTURAL DESIGN: Introductory Course

Sub Code	: AT1AD	CIE	: 50
Hrs/ Week	: 08	SEE	: 50
Total Hrs	: 128	Credits:	7
SEE Type	: VIVA	Duration	:NA

COURSE OBJECTIVES:

To develop the ability to translate abstract principles of design into architectural solutions for simple problems

MODULE I

What architectural education entails? What being an architect involves? And Architecture's connection with other forms of knowledge: Science, Mathematics, Philosophy, Religion, etc.

Local stories on Architecture.

Listing of important local buildings and explain why they are important. Listing and Drawing silhouettes of favorite buildings or places.

Observing the built environment around and experiencing enclosures (field trips)

MODULE II

Learning basics of architectural representation.

Scaled and measured drawing exercise of familiar objects & spaces - a table (object), a classroom and a staircase (static/transition spaces), pavilion, open/ enclosed spaces etc.

Collection and documentation of all building materials within 5 km radius

MODULE III

Introduction to basic development of forms: additive form, deductive form, rhythm, contrast, balance and symmetry.

Concepts of volume and scale, width to height ratio

Study models to explore the design principles. Multiple sectional drawings of study models

Introduction to anthropometry; relationship of architecture with human body

MODULE IV

Human functions and their implications for space requirements. Minimum and optimum areas for mono functions. User's data, movement and circulation diagrams. Spatial interpretations - various activities and their relationship with spaces

MODULE V

Introduction to furniture; relationship of objects with human body. Portfolio of study and design through drawing/representation

Design of functional furniture layout, circulation, lighting and ventilation for spaces such as living/dining, bedrooms, Architects office, Doctors clinic etc

Note:

The portfolio covering all the assignments shall be presented for evaluation.

REFERENCES:

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

BUILDING AND CONSTRUCTION MATERIALS: Masonry and Foundations

Sub Code	: AT1BCM	CIE	: 50
Hrs/ Week	: 06	SEE	: 50
Total Hrs	: 96	Credits:	5
SEE Type	: DWG EXAM	Duration	:4 Hrs

COURSE OBJECTIVE:

To introduce building materials and building elements and their intrinsic relationship to basic Building Systems

MODULE I

1. **Making Buildings 1:** Materials, Building Systems Overview (know-how of building materials and construction)
2. **Making Buildings 2:** Various conventions used for drawing plan, sections and elevations.
3. **Introduction to Brick Masonry Construction:** Brick as a building material: Types, properties, uses and manufacturing methods.

MODULE II

4. **Brick masonry load bearing wall construction:** Types of brick masonry walls and bonds, foundations, mortar type, plasters, buttresses, arches and lintels.
5. **Field visit:** Brick kiln, Sawmill, stone quarry, etc –Report on site visit.
6. **Stone Masonry Construction:** Stone as a building material: Types, properties and uses, quarrying
7. **Stone masonry load bearing wall construction:** Types of walls, bonds, arches and lintels.

MODULE III

8. **Wall construction:** Introduction to wall construction and detailing with building materials: Hollow and solid Concrete Blocks, Hollow and solid clay Blocks, Fly ash Blocks, Aerated Concrete Block, stabilized mud blocks, Glass Blocks, etc. Properties, uses and manufacturing methods.

MODULE IV

9. **Masonry Foundation:** Simple load bearing foundations in brick and stone
10. **Introduction to Wood as a Building Material:** Types – Natural, hard and softwood. Quality of timber used in buildings, defects, seasoning and preservation of timber.

MODULE V

11. **Wooden door assembly and production:** Types of wooden Doors, i.e., Battened, ledged, braced, paneled, flush and glazed doors. Study of joinery details.
12. **Wooden windows assembly and production:** Types of wooden glazed windows, study of joinery details.

Note:

Minimum one plate on each topic, site visits to be arranged by studio teacher. Study of material application in the form of portfolio. Material Palette mandatory. All the plates on construction and portfolio on material application shall be assessed for progressive marks.

REFERENCES:

1. *Building Construction* by W.B. Mackay
2. *Construction Technology* by Chudley
3. *Construction of Buildings* by Barry
4. *Building Construction* by Francis D K Ching

ARCHITECTURAL GRAPHICS: Introductory Course

Sub Code	: AT1GRA	CIE	: 50
Hrs/ Week	: 04	SEE	: 50
Total Hrs	: 64	Credits:	3
SEE Type	: DWG EXAM	Duration	: 4 Hrs

COURSE OBJECTIVE:

To introduce students to the fundamental concepts and techniques of graphical drawings, and multi-angle representations of built elements and built forms with applicable renderings

MODULE I

1. **Introduction to visual representation and scales:** The basic principles of drawing and sign conventions; the concept of scales and application in architecture.
2. **Practice in lettering:** Lettering used in architectural drawings, including different fonts.
3. **Introduction to Euclidian Geometry:** Exercises in lines and angles, construction of triangles, quadrilaterals and regular polygons. Introduction to the development of simple surfaces – cubes, cuboids and pyramids.

MODULE II

4. **Introduction to curves:** Construction of plane curves, ellipse, parabola, hyperbola and ovals. Exercise in physical modeling for parabola and hyperbola.
5. **Arches:** Typical arch forms and methods of drawing them.

MODULE III

6. **Orthographic projection (first angle projection):** Principles of orthographic projection; projections of points, lines, planes – explore all combinations.
7. **Orthographic projection of solids**
8. **Orthographic projection of architectural built elements and built forms:** (Simple to complex)

MODULE IV

9. **3D Projections:** 3D representation in isometric projection of solids.
10. **3D Projections:** 3D representation in isometric projection of built elements and built forms (simple to complex).

MODULE V

11. **3D Projections:** 3D representation in axonometric projection of solids.
12. **3D Projections:** 3D representation in axonometric projection of built elements and built forms.
13. **Introduction to rendering:** Simple rendering of the 3D drawings of built elements and built forms – free- hand pencil rendering with shading and textures.

Note: A consolidated portfolio containing exercises related to each of the above modules to be presented for term work examination

REFERENCES:

1. *Geometrical Drawing for Arts Students* by IH Morris
2. *Perspective* by SH Mullik
3. *Architectural Graphics* by D.K Ching.

HISTORY OF ARCHITECTURE: Early Civilization

Sub Code	: AT1HOA	CIE	: 50
Hrs/ Week	: 03	SEE	: 50
Total Hrs	: 48	Credits:	3
SEE Type	: EXAM	Duration	: 3 Hrs

COURSE OBJECTIVE:

To provide an introduction to the culture and architecture of early civilizations

MODULE I

1. **Introduction** What History education entails? Architectures connection with History
2. **Introduction to Pre-Historic Civilization:** Primitive man - shelters, settlements, religious and burial systems E.g.: Oval hut, Nice, Dolmen tomb, gallery grave, passage grave, Houses at Catal Huyuk, Henge Monuments, StoneHenge
3. **Introduction to River valley cultures:** generic forces shaping settlements and habitats

MODULE II

4. **Indus Valley Civilization:** Forces shaping settlements and habitats: Layout of Mohenjodaro, House plan, Community well, Great Bath, Granary
5. **River valley cultures, Tigris and Euphrates:** Ziggurats at Warka, Ur and Tchoga Zanbil, Palace of Sargon.

MODULE III

6. **River valley culture, Nile:** Mastaba Tombs, Pyramid of Cheops, Temple of Khons, Karnak
7. **Introduction to Chinese Architecture:** Forces shaping settlements and habitats
8. **Introduction to Mayan and Japanese Architecture:** Forces shaping settlements and habitats.

MODULE IV

9. **Introduction to Desert and Mountainous cultures:** Forces shaping settlements and habitats with examples
10. **Introduction to Pre-Classical Civilization:** Mycenea, Persia, Etruscan. Pre-classical Civilization. Examples: Tiryns, the Temple of Juno Sospita, the Palace of Persepolis.

MODULE V

11. **Pre-classical Aryan & Mauryan :** Vedic and Epic Age Salient features Vedic Village
12. **Introduction to contemporary Tribal Cultures:** Forces shaping settlements and habitats in tribal cultures with examples

REFERENCES:

1. *History of Architecture in India* by Christopher Tadgell
2. *Indian Architecture, Buddhist and Hindu period* by Percy Brown
3. *Architecture of India, Buddhist and Hindu* by Satish Grover

BUILDING STRUCTURES: Introductory Course

Sub Code	: AT1STR	CIE	: 50
Hrs/ Week	: 03	SEE	: 50
Total Hrs	: 48	Credits:	3
SEE Type	: EXAM	Duration	: 3 Hrs

COURSE OBJECTIVE:

Introduction to principles of loads, structural materials and transmissibility of force with examples

MODULE I

1. **Evolution of Structures:** Historical perspective and definition of structure as a device for channeling loads that result from the use or presence of the building in relation to ground.
2. **Structural systems overview:** Vertical/lateral systems: wall, cantilever, moment frame, braced frame, horizontal one-way and two-way systems: truss, arch, vault, dome, shell, cable stayed, suspended, membrane.
3. **Experiment with Structures:**
 - a. Example-1: Build a structure to house an un-boiled egg to be thrown from a building without breaking (avoid foam boxes and bulky structures).
 - b. Example-2: Build a Structure of dimension 150x150x150mm using A4 size paper to withstand a load of 1 kilogram.
 - c. Example-3: Build a beam or a truss using matchsticks to span a distance of 150mm, and test the maximum mid-span load the truss could carry.
 - d. Example-4: Build a geodesic dome of 150mm dia using straws, ice cream sticks or matchsticks to span a distance of 150mm.

MODULE II

4. **Structural Materials:** Mechanical properties of Structural materials: wood, masonry, steel, concrete, fabric; energy use and rupture length. Advantages and disadvantages of Structural Materials and choice of Structural Material for domestic buildings, Industrial buildings, Tall buildings and Long Span buildings.
5. **Loads on Structures:** Dead load (DL), live load (LL), static, dynamic, impact, and thermal loads.

MODULE III

6. **Principle of transmissibility of forces:** Understanding load flow by tributary load and load path (slab, beam, and girder) and vertical members (post, wall, and footing); load path.
7. **Equilibrium of Forces:** Force, Reaction, Moment and Principle of Support conditions and their significance in resistance to forces and to maintain equilibrium.
8. **Basic principles of mechanics:** Tension, compression, shear, bending, torsion; symbols and notations; force and stress.

MODULE IV

9. **Stress/strain relations (Hooke's Law):** Modulus of Elasticity, linear and non-linear materials, elastic, plastic, and elastic-plastic materials; Poisson's Ratio; Thermal stress and strain.
10. **Graphic vector analysis:** Resultant and equilibrant of coplanar, concurrent and non-concurrent force systems. Parallelogram, force polygon, resultant, equilibrant, components; numeric method

MODULE V

11. **Truss:** Truss concept of triangulation, common truss configurations.
12. **Truss loads and reactions:** For a given configuration of the trusses and center to center spacing, calculations of the dead weight of the truss and the dead weight of the roof cover and support reaction loads.

REFERENCES:

1. **Structures** - Martin Bechthold, Daniel L Schodek, and PHI Learning Private limited
2. **Structure in Architecture: the building of buildings**, by Mario Salvadori
3. **Structure and Design** by G. G. Schierle
4. **Engg Mechanics** by R K Bansal & Sanjay Bansal, 3rd ed
5. **Engg Mechanics** by Ferdinand L Singer, 3rd ed

COMMUNICATION SKILLS

Sub Code	: AT1CS	CIE	: 50
Hrs/ Week	: 02	SEE	: Nil
Total Hrs	: 32	Credits:	M
SEE Type	: NA	Duration	:NA

COURSE OBJECTIVE:

To develop skills in effective communication – both written and verbal and to explore the potential of media technology and the Internet to enhance communication

MODULE I

1. **Introduction:** Introduction to course objective and framework of assignments and assessment. Discussion on exploratory topics.
2. **Reading and listening comprehension:** Reading of a passage from famous books (e.g. Samskara). Students to draw an image on A4 paper based on the read passage.
3. **Verbal presentations:** Understanding the differences among seminars, conferences, convention, congress, debates, extempore speeches, panel discussions etc. Students to write a brief synopsis on seminar topic to be submitted to seminar committee for acceptance.

MODULE II

4. **ARCHITECTURAL LANGUAGE:** Basics of art and architecture terminology; Verbal expression of ideas and design description.
5. **INFOGRAPHICS:** Various techniques of representation of information in visuals

MODULE III

6. **Notes taking:** From spoken and written English.
7. **Comprehension of lectures and speeches to locate key points**
8. **Analytical Writing:** To develop the ability to write concisely and correctly and present ideas in a logical manner.

MODULE IV

9. **Introduction and discussion on exploratory topic for a letter:** Understanding the difference between formal and informal letters etc. Students to Write /draw a letter to fellow architects, clients, public authorities, contractors, enquiries to industries, dealers.
10. **Article writing:** on a Design or a Building, Introduction to Design Basis Report
11. **Writing a term paper:** term paper is a research paper written by students over an academic term

MODULE V

12. **Introduction and discussion on exploratory topic for a brief essay:** Observation based writing. Topic for assignment: PATTERNS (in nature, Architecture, art, mathematics, language, infrastructure, social systems etc.) and student to write and illustrate a 300 word essay on patterns.
13. **Using the Internet to enhance communication**

REFERENCES:

1. *Working in English: Teachers Book* by Jones Leo.
2. *Communicative English for Professional Courses* by Mudambadithaya G.S.
3. *English Conversation Practice* by Taylor, Grant

BASIC DESIGN AND VISUAL ARTS

Sub Code	: AT1BDV	CIE	: 50
Hrs/ Week	: 06	SEE	: Nil
Total Hrs	: 96	Credits:	2
SEE Type	: NA	Duration	: NA

COURSE OBJECTIVE:

To encourage a critical orientation to design thinking and action

MODULE I

1. **Observation & Study 1:** Selection of two outdoor objects/systems and observation of their natural occurrence, relationships with context, form & structure, colors & textures, and function.
2. Sketching & visual representation in various media.

MODULE II

3. **Observation & Study 2:** Selection of two indoor objects/systems and observation of their situation, relationships with context, form & structure, colors & textures, and functions.
4. 3 dimensional modeling in appropriate medium (Clay/paper/wire/plaster/wax etc.).

MODULE III

5. **Patterns-1:** Study of pattern-making in nature, (Such as trees, leaves, crystals, shells etc.) Observation & representation of 2-dimensional patterns in various visual media.eg. Charcoal/pencil/crayon/oils etc.
6. **Patterns-2:** Use of patterns to synthesize and create form. Use of Both physical and material patterns as well as patterns of transformation and Integration. Appreciation of the difference between architecture and pattern.

MODULE IV

7. **Material Study-1:** Selection of two materials used in everyday life (textiles, Earthenware, terracotta, metals, stone, plastic, glass etc.) Study of properties, Strength, examples of use.
8. **Material Study-2:** Sketching & visual representation of material in various media, like Paper, clay, plaster, wood, wire, wax, photography
9. **Material Study-3:** Hands-on making of object/joint/structure of own choice with one of the materials studied.

MODULE V

10. **Design of a free standing object using the materials studied.** E.g. park, Seat, bollard, push-cart, etc.
11. **Design of a semi-enclosed object/space using the materials studied.** E.g. gazebo, kiosk, bus stop, stage set, etc.

REFERENCES:

1. *The Art of Color and Design* by Maitland Graves
2. *Ways of Seeing* by John Berger
3. *Design of Everyday Things* by Donald Norman
4. *Rendering with Pen and Ink* by Robert Gill

ARCHITECTURAL DRAWING AND PRESENTATION

Sub Code	: AT1ADP	CIE	: 50
Hrs/ Week	: 03	SEE	: Nil
Total Hrs	: 48	Credits:	2
SEE Type	: NA	Duration	: NA

COURSE OBJECTIVE:

To train the students in methods of Architectural Representation including drawing, sketching and model making

MODULE I

Sketching: Learning to See

1. Introduction to architectural sketching using various mediums such as graphite pencil, charcoal, pens, markers etc.
2. Sketching the line -Principles of free hand sketching such as proportions, light and shade;
3. Sketching an Object -with primary thrust on sketching of building elements and built environment. Figure drawing and human proportion

MODULE II

Technical Drawing

4. Introduction to various drawing instruments and methods of employing them for technical drawing
5. Lettering - Fonts, spacing, hierarchy in sizes and thickness
6. Line weights - Strokes in lines, bold and thin line representation, line types, arrowheads and basic symbols
7. Subjective representation - Plan, Section, Elevation, Composite representation

MODULE III

Measured Drawing/ Scale Drawing

8. Measured drawing/ Scale Drawing: Plan/s Section/s Elevation/s and isometric/ axonometric view drawn to appropriate scale, of simple two storeyed building including a stairway and/or toilet.

MODULE IV

Model Making: Basic Shapes

9. Introduction to various materials (such as paper, mount board, thermocol, foam board, etc.) tools and techniques of architectural model making
10. construction of simple three dimensional objects

MODULE V

MODEL MAKING: Architectural models.

11. Introduction to materials such as balsa wood, plastics, cork and the techniques to make Architectural Models
12. Scaled building models - Exercises preferably co-ordinated with subjects like 'Design', 'Building Technology and Materials' History of Architecture' etc.

REFERENCES:

1. *The Art of Color and Design* by Maitland Graves
2. *Landscape Graphics*
3. *Rendering with Pen and Ink* by Robert Gill

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SCHEME OF TEACHING AND EXAMINATION 2016-2017

II SEMESTER B.Arch

Sl. No	Subject Code	Subject	Evaluation Type	Teaching Dept	Board	Credit Hours/ Week			Contact Hours/Week	Examination			Duration of Exam (Hrs)	Credits
						S	T	P		CIE	SEE	Total		
1	AT2AD	Architectural Design- Mono functional Spaces	SEE - VIVA	Arch	Arch	7	2	0	9	50	50	100	-	7
2	AT2BCM	Building Construction and Materials- Roof, Foundation and Staircase	SEE - EXAM	Arch	Arch	4	2	0	6	50	50	100	4	5
3	AT2GRA	Architectural Graphics- Projection & Perspective Drawing	SEE - EXAM	Arch	Arch	3	1	0	4	50	50	100	4	3
4	AT2HOA	History of Indian Architecture- Buddhist and Hindu Periods	SEE - EXAM	Arch	Arch	0	4	0	4	50	50	100	3	3
5	AT2STR	Structures- Basic Structural Systems	SEE - EXAM	Arch	Arch	0	3	0	3	50	50	100	3	3
6	AT2TOA	Theory of Architecture- Principles of Aesthetics & Composition	SEE - EXAM	Arch	Arch	0	3	0	3	50	50	100	3	3
7	AT2SSA	Site Surveying and Analysis	SEE - EXAM	Arch	Arch	0	3	0	3	50	50	100	3	3
8	AT2BDS	Basic Design - Self and Space	CIE	Arch	Arch	0	0	3	3	50	-	50	--	2
9	AT2VST	Vacation Study Tour	CIE	Arch	Arch	0	0	0	0	50	-	50	--	M
Total									35	450	350	800		29

CIE: Continuous Internal Evaluation, **SEE:** Semester End Examination **S:** Studio, **T:** Theory And **P:** Practical, **M:** Mandatory

ARCHITECTURAL DESIGN: Monofunctional Spaces

Sub Code	: AT2AD	CIE	: 50
Hrs/ Week	: 09	SEE	: 50
Total Hrs	: 144	Credits:	7
SEE Type	: VIVA	Duration:	NA

COURSE OBJECTIVE:

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

MODULE I

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

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

MODULE II

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

Emphasis on work in studio by hand drawing and study model with lift off roof. The One Room House Lecture cum discussion on the Poetics of Space like light, movement, transformation, scale, structure and skin (case study based): keywords for discussion: contemplative / severe / dramatic / minimalist / natural / organic / contemporary / traditional.

MODULE III

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

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

Any One Room enclosure could be taken to explore the implication of light, movement, transformation, scale, structure and skin. Emphasis on freeing the expression of the poetic self, rather than on meeting external standards, and student development of self-explanatory presentations

MODULE IV

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

Project presented in the form of a portfolio. Emphasis on studio work/participation and Hand drawings.

MODULE V

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

Note:

The portfolio covering all the assignments shall be presented for term work.

REFERENCES:

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

BUILDING AND CONSTRUCTION MATERIALS: Roof, Foundation and Staircase

Sub Code	: AT2BCM	CIE	: 50
Hrs/ Week	: 06	SEE	: 50
Total Hrs	: 96	Credits:	5
SEE Type	: DWG EXAM	Duration:	4 Hrs

COURSE OBJECTIVE:

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

MODULE I

1. **Introduction to Timber** : Timber, various parts, their purposes and method of construction. Use of tiling for roofing.
2. **Timber Roof** – Lean to roof, Collared Roof, King post roof, Queen Post Roof; Detailed Drawing of one roof system
3. **Introduction to Steel Roof** – Steel trussed roof, their purposes and method of construction. Use of GI sheets and aluminum sheets for roofing.

MODULE II

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

MODULE III

5. **Reinforced Cement Concrete as a building material**: Form work, placing, and compaction, curing of concrete, sampling and testing of concrete. Construction joints, expansion joints, finishes in concrete, chemical admixtures. (Site visit to concreting construction site)
6. **RCC Foundations** (Isolated footing) and Columns (Square and Round) Raft foundations, Grillage foundations and combined footing.

MODULE IV

7. **Introduction to Staircase**: Anthropometry of stairs, types of Staircases and construction methods of staircase in – Masonry, timber, RCC, Steel and Composite.
8. **Timber Stairs**: Single and Double Stringer stairs: Means and methods of Construction
9. **RCC Stairs**: Waist slab, folded plate, Stringer stairs, precast stairs: Means and methods of Construction.

MODULE V

10. **Steel Stairs**: Stringer stairs, Folded Type, Spiral stairs, Fire escape stairs: Means and methods of Construction
11. **Composite Stairs**: Brick/stone, Steel/Timber, Concrete/wood, steel/ glass: Means and methods of Construction

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

REFERENCES:

1. **Building Construction** by W.B. Mackay
2. **Construction Technology** by Chudley
3. **Construction of Buildings** by Barry
4. **Building Construction** by Francis D K Ching

ARCHITECTURAL GRAPHICS: Projection and Perspective Drawing

Sub Code	: AT2GRA	CIE	: 50
Hrs/ Week	: 04	SEE	: 50
Total Hrs	: 64	Credits:	3
SEE Type	:DWG EXAM	Duration:	4 Hrs

COURSE OBJECTIVE:

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

MODULE I

1. **3D Projections:** 3D representation in exploded axonometric projection of built elements and built forms.
2. **Development of surfaces:** Advanced topics with application to built forms, Suggested examples: Domes, curved roofs, etc.

MODULE II

3. **Section of solids, true shapes of section.**
4. **Inter-penetration of geometric solids:** Combination of different forms. Examples: Cylinder with cube or regular polygons, dome with a cube, etc.

MODULE III

5. **Perspective drawings:** History of perspective drawings with examples from international and Indian context. Principles of perspective drawings and examples of the visual effects of three dimensional objects when seen in perspective.
6. **Studies in perspective drawing:** Picture plane, station point, vanishing point, eye level, ground level, their variation and their resultant effects. Examples of simple geometric objects.

MODULE IV

7. **One-point perspective drawings:** Perspective drawings of simple built form with simple built elements – Suggested example: Interior view of a single room and built elements in incremental steps. Technical steps with the object falling within the cone of vision, object going out of the cone of vision, and objects and elements closer. Analysis of the differences with previous technical images. Perspective drawings of everyday objects like chair and table without many design features. Generate multiple perspective drawings by altering the VP and PP, and by keeping SP fixed for the same examples.
8. **2-point perspective drawings:** Perspective drawings of simple geometrical objects and their combinations. Examples: Perspective drawings of built forms with built elements. Perspective drawings of simple everyday objects. Generate multiple views of the same objects.

MODULE V

9. **Principles of shade and shadows:** Principles of drawing shade and shadow.
Exercises exploring the principles of drawing shade and shadow in perspective drawings – drafting shade and shadows to examples from the perspective drawings.
10. **Free-hand perspectives:** Exercises in free-hand techniques for generating perspective drawings with multiple views on site with simple rendering. Introduce simple street elements and simple trees for the buildings generated in the perspective drawing classes.

REFERENCES:

1. *Geometrical Drawing for Arts Students* by IH Morris
2. *Perspective* by SH Mullik
3. *Architectural Graphics* by Francis D.K Ching
4. *Rendering With Pen And Ink* by Robert Gill

HISTORY OF INDIAN ARCHITECTURE: Buddhist and Hindu Periods

Sub Code	: AT2HOA	CIE	: 50
Hrs/ Week	: 4	SEE	: 50
Total Hrs	: 64	Credits:	3
SEE Type	: EXAM	Duration:	3 Hrs

COURSE OBJECTIVE:

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

OUTLINE:

MODULE I

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

MODULE II

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

MODULE III

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

MODULE IV

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

MODULE V

11. **Hindu architecture at Rajputana & Khajuraho group:** (Temple of Surya, Orisa, Marwar) and Gujarat (Temple of Surya, Modhera). The Khajuraho group: Khandariya Mahadev, Jain temples – Chaumukh temple at Ranpur
12. **Later Dravidian period:** the Vijayanagar and– Noted temples at Hampi (Vitthala temple and Hazara Rama temple)

Note: Site visit & documentation of a Temple may be part assessment of the progressive marks.

REFERENCES:

1. *History of Architecture in India* by Christopher Tadgell
2. *Indian Architecture, Buddhist and Hindu period* by Percy Brown
3. *Architecture of India, Buddhist and Hindu* by Satish Grover

BUILDING STRUCTURES: Basic Structural Systems

Sub Code	: AT2STR	CIE	:50
Hrs/ Week	: 03	SEE	:50
Total Hrs	: 48	Credits:	3
SEE Type	:EXAM	Duration:	3 Hrs

COURSE OBJECTIVE:

Introduction to transmissibility of forces & reactions and to basic structural system of beams and columns

OUTLINE:

MODULE I

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

MODULE II

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

MODULE III

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

MODULE IV

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

MODULE V

11. **Steel Columns:** Axial stress and combined axial and bending stress design and analysis of steel columns.
12. **RCC columns:** Definition of short column as per IS 456 and design of short RCC columns (composite action, load taken by steel and load taken by concrete respectively).

REFERENCES:

1. **Structures** - Martin Bechthold, Daniel L Schodek, and PHI Learning Private limited
2. **Structure in Architecture: the building of buildings**, by Mario Salvadori
3. **Structure and Design** by G. G. Schierle
4. **Engg Mechanics** by R K Bansal & Sanjay Bansal, 3rd ed
5. **Applied Mechanics & Strength of Materials** by I B Prasad

THEORY OF ARCHITECTURE: Principles of Aesthetics & Composition

Sub Code	: AT2TOA	CIE	: 50
Hrs/ Week	: 03	SEE	: 50
Total Hrs	: 48	Credits:	3
SEE Type	: EXAM	Duration:	3 Hrs

COURSE OBJECTIVE:

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

MODULE I

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

MODULE II

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

MODULE III

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

MODULE IV

7. **Spatial organizations of Masses in Architecture -2:** linear, radial, grid organization. Illustrations of linear, radial, grid organization in spatial organizations of masses in Architecture and its application to the practice of design with both historical as well as contemporary buildings.
8. **Ornamentation in Architecture:** Historical perspective of the use of ornament in buildings and use of ornament as a decoration to embellish parts of a building. Use and need of ornament in architectural design – different types of ornamentation in buildings.
9. **Ornamentation in Architecture Criticism**–Argument against ornamentation. Ideas of architect Adolf Loos (Ornament and Crime); Ornaments as economically inefficient and morally degenerate, reduction of ornament or lack of decoration as the sign of an advanced society.

MODULE V

10. **Materials, Materiality and Tectonics:** Aesthetic and structural potentials in Architecture of materials like brick, timber, stone, concrete, glass.
11. **Style in Architecture:** Basis for classification of styles including chronology of styles arrangement according to order that changes over time. Evolution of styles; reflecting the emergence of new ideas as reaction to earlier styles as a result of changing of fashions, beliefs, technology etc.

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

REFERENCES:

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

SITE SURVEYING & ANALYSIS

Sub Code	: AT2SSA	CIE	: 50
Hrs/ Week	: 03	SEE	: 50
Total Hrs	: 48	Credits:	3
SEE Type	: EXAM	Duration:	3 Hrs

COURSE OBJECTIVE:

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

MODULE I

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

MODULE II

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

MODULE III

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

MODULE IV

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

MODULE V

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

REFERENCES:

1. *Surveying – Vol I* by DR PC Punmia
2. *Surveying and Levelling – Part 1* by Kanetkar TP and Kulkarni SV

BASIC DESIGN: Self and Space

Sub Code	: AT2BDS	CIE	: 50
Hrs/ Week	: 03	SEE	: Nil
Total Hrs	: 48	Credits:	2
SEE Type	:NA	Duration:	NA

COURSE OBJECTIVE:

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

MODULE I

1. **Mapping-1:** Conceiving one's own map – from home to studio/of the campus/of a Neighborhood. Explore issues of movement, navigation, circulation, direction and discovery through exercises.
2. **Mapping-2:** Drawing and Reading of maps – Explore issues of representation, scale, starting point, orientation, landmarks, and imagery. Use of different methods of rendering.

MODULE II

3. **Structure-1:** Understanding gravity, and the different ways we resist it. Study of Material & structure in nature, and how design brings them together. Sketch analysis of Structure and form in an example taken from Patterns-1.
4. **Structure-2:** Hands-on Design exercise – creation of a simple design in which form is distinct from structure. Eg. Portal frames, tensile structures
5. **Structure-3:** Hands-on Design exercise – creation of a simple design in which form is integral with structure. Eg. Shells, massive forms, pneumatics

MODULE III

6. **Scale-1:** Dimensional understanding of the human body; in static and dynamic modes. Measured drawing of space needed for basic postures & movements.
7. **Scale-2:** Study of the relationship between human body and the built environment understanding usage and comfort. Eg. Bazaar, doctor's clinic, train carriage etc.

MODULE IV

8. **Orientation & Climate:** Understanding of the significance of the Cardinal directions, and the role played by Sunlight, Wind and Rain in determining design response.
9. **Culture & Design:** Understanding social attitudes to Built-form: extroverted/introverted, formal/informal, typical/individual, simple/labyrinthine, contiguous/isolated etc.

MODULE V

10. **Documentation:** Sketch/photographic documentation of a street pattern, house form & community spaces
11. Analysis-1: Sketched analysis of built form in terms of patterns, structure and scale
12. Analysis-2: Sketched analysis of built form in terms of orientation & climate
13. Analysis-3: Sketched analysis of built form in terms of culture & society

REFERENCES:

1. **Architecture: Form, Space & Order** by Francis Ching
2. **Cradle To Cradle: Remaking The Way We Make Things** by Michael Braungart, William McDonough

DEPARTMENT OF ARCHITECTURE, DSCE
(Autonomous Institution Affiliated to VTU, Belgaum)
SCHEME OF TEACHING AND EXAMINATION 2016-2017

III SEMESTER B.Arch

Sl. No	Subject Code	Subject	Evaluation Type	Teaching Dept	Board	Credit Hours/ Week			Contact Hours/Week	Examination			Duration of Exam (Hrs)	Credits
						S	T	P		CIE	SEE	Total		
1	AT3AD	Architectural Design Multifunctional Spaces	SEE - VIVA	Arch	Arch	7	2	0	9	50	50	100	-	7
2	AT3BCM	Building Construction - RCC Roofs and Buildings finishes	SEE - EXAM	Arch	Arch	4	2	0	6	50	50	100	4	5
3	AT3CLI	Climatology	SEE - EXAM	Arch	Arch	0	3	0	3	50	50	100	3	3
4	AT3HOA	History of Indian Architectural -Islamic and Colonial	SEE - EXAM	Arch	Arch	0	4	0	4	50	50	100	3	3
5	AT3STR	Structures -Concrete Buildings	SEE - VIVA	Arch	Arch	2	2	0	4	50	50	100	--	3
6	AT3 TOA	Theory of Architecture: Design Theories	SEE - EXAM	Arch	Arch	0	3	0	3	50	50	100	3	3
7	AT3CAD	Basic Computer Applications	CIE	Arch	Arch	0	0	3	3	50	-	50	--	2
8	AT3ELEC	Elective-I	CIE	Arch	Arch	0	0	2	2	50	-	50	--	2
9	AT3KAN	KANNADA Language *	CIE	Language		0	0	2	2	50	-	50	--	M
Total									36	450	300	750		28

CIE: Continuous Internal Evaluation, **SEE:** Semester End Examination **S:** Studio, **T:** Theory And **P:** Practical, * **Non Credit (Mandatory Subject)**

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 – Placemaking as an architectural goal

KEYWORDS – Need, function, activity and place

Mode of study: Place (i) Permanent (full time), (ii) Temporary (seasonal/periodic) (iii) Transient (few hours, days) Elements promoting sense of "place" – colors, textures, shapes and forms, materials (e.g.: tents), enclosures (fences, walls, roofs, etc.), nodes (trees/platforms etc.), anthropometry and role of sensory aspects like sound, light, smell, texture etc. in creating "memory" of space

FIRST ASSIGNMENT – 3 weeks

Public spaces (bus shelter/station, streets etc.) Semi-public spaces – college campus, institutional (hospital) etc. Private spaces – Apartments, common spaces, lobby etc. Any one of the above to be the assignment – to study any one set of factors promoting the idea/sense of space

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

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

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

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

SECOND ASSIGNMENT – 3 weeks

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

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

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

KEYWORDS – Techniques, layered, comparative, historical, location, size, networks, visual layer,

perception (scale, forms etc.), functional.

Mode of study:

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

THIRD ASSIGNMENT – 6 weeks

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

COURSE OUTCOME

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

SHAPE OF THINGS TO COME – 4th Semester

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

REFERENCES:

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

BUILDING CONSTRUCTION AND MATERIALS: RCC Roofs and Building Finishes

Sub Code	: AT3BCM	CIE	: 50
Hrs/ Week	: 06	SEE	: 50
Total Hrs	: 96	Credits	: 5
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

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.

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.

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.

REFERENCES:

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

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 behaviour 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.
- 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

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, Boullee, Ledoux
2. **19th Century Theory:** Concepts of Viollet Le Duc, John Ruskin, Quatramere de Quincy and Gottfried Semper

MODULE 2

3. **Modern Movement Theory:** Ideas of Adolf Loos, Eero Saarinen, Erich Mendelsohn, Richard Neutra, Otto Wagner, Kenzo Tange.

4. **Post Modern Theory 1:** Ideas on Post-Modern Classicism by Robert Venturi and Charles Jencks. Deconstruction: Fundamental beliefs and philosophy and ideas of Peter Eisenman.

MODULE 3

5. **Post Modern Theory 2:** Contribution to architectural thought: Ideas of Kenneth Frampton and Christopher Alexander

6. **Post Modern Theory 3:** Contribution to architectural thought: Ideas of Amos Rapoport, Geoffrey Broadbent-his design generation theories.

MODULE 4

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

8. **Architectural Criticism types:** Definition, Sources, Types of Criticism according to Wayne Attoe.

MODULE 5

9. **Design Logic:** Design generation process: Role of logic and intuition in concept generation. Step by step development of design from problem definition, site analysis to post occupancy evaluation as the last stage of design.

10. **Contemporary Significant Theory:** Ideas of Hassan Fathy who pioneered the use of appropriate technology for building in Egypt, especially by working to re- establish the use of mud brick (or adobe) and tradition as opposed to western building designs and layouts and Paolo Soleri's concept of "Arcology", architecture coherent with ecology. Shape of built environment to come. Floating, walking, plug- in, satellite settlements, earth sheltered etc. Works of Archigram, Paolo Soleri, Kenzo Tange, Moshe Safdie etc.

REFERENCES:

1. Broadbent, Geoffrey. Design in Architecture, John Wiley & Sons Ltd, 1977

2. Lang, Jon , Creating Architectural Theory, Van Nostrand Reinhold Co, New York 1987
3. “ A moment in Architecture” and Other Books by Gautam Bhatia.

BASIC COMPUTER APPLICATIONS

Sub Code : AT3CAD	CIE : 50
Hrs/ Week : 3	SEE : Nil
Total Hrs : 48	Credits: 3
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 modelling, and vector graphics.

OUTLINE:

1. **Introduction to 2D drafting software:** Using latest version of relevant CAD software:
 - a. 2D commands, viewports, dimensions, annotations. Time problem introduction; Classroom exercises such as measured drawing of studio (windows, doors and staircases included), architecture School (windows, doors and staircases included) etc.
 - b. Understanding layers, paper space Vs model space, line weights, print set up and Modelling of Walls, Doors, Windows, Stairs etc.
2. **2D drafting:** Presentation of time problem; plan, sections, elevations of a floor of a single storied building of II / III semester architectural design studio project.
3. **Introduction to 3D modelling:** Latest version of relevant 3D modelling software – software interface, demonstration of 3D modelling commands required to convert 2D project (of 2D drafting) into 3D as a time problem.
4. **Simple 3D modelling:** Presentation of time problem; drawing quickly with basic shapes in 3D, viewing models in 3D, adding detail to Models in 3D space, use of cameras, material applications. Presenting models.
5. **Rendering & Visualization:** Presentation of time problem, generating 3d Model and introduction to concepts of visualization using rendering engines such as VRay. Flamingo,3D studio Max, or any other appropriate software.
6. Introduction to concepts of Building Information Modelling (BIM) using REVIT or other relevant BIM software.
7. **Introduction to graphics editing tools:**
 - a. Introduction to appropriate techniques to model walls, insert fenestration, curtain walls & staircases.
 - b. Lecture and Classroom exercise to convert into BIM project, relationship of other Industry standard file types (.dwg for AutoCAD or Trimble Sketchup input files or from any other relevant software.).
 - c. Lecture and Classroom exercise to further utilize rendering and visualization.
8.
 - a. Concepts of image scanning, image editing, effects and filters.
 - b. Classroom exercise to demonstrate use of Image editing for simple architecture design project projects. For e.g., rendering of 2D drawings, adding nature to 3D visualizations.
9. **Graphics editing tools:** Presentation of any simple project to illustrate skills attained in 2D drafting, 3D modeling, graphics editing tool.

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

REFERENCES:

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

ELECTIVE I

Sub Code	: AT3ELEC	CIE	: 50
Hrs/ Week	: 3	SEE	: Nil
Total Hrs	: 48	Credits:	3
SEE Type	:NA	Duration	:NA

a) VERNACULAR ARCHITECTURE**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. Encyclopaedia of Vernacular Architecture of the World, Cambridge University Press, 1997

b) VISUAL COMMUNICATION

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

c) IMPORTANCE OF HERITAGE & BASIC DOCUMENTATION

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

DEPARTMENT OF ARCHITECTURE, DSCE
(Autonomous Institution Affiliated to VTU, Belgaum)
SCHEME OF TEACHING AND EXAMINATION 2016-2017

IV SEMESTER B.Arch

Sl. No	Subject Code	Subject	Evaluation Type	Teaching Dept	Board	Credit Hours/ Week			Contact Hours/Week	Examination			Duration of Exam (Hrs)	Credits
						S	T	P		CIE	SEE	Total		
1	AT4AD	Architectural Design: Housing Studio	SEE - VIVA	Arch	Arch	7	2	0	9	50	50	100	-	7
2	AT4BCM	Building Construction & Materials: RCC, Structural steel & Aluminum	SEE - EXAM	Arch	Arch	4	2	0	6	50	50	100	4	5
3	AT4BS	Building Services: Water Supply & Sanitation	SEE - EXAM	Arch	Arch	0	4	0	4	50	50	100	3	3
4	AT4HOA	History of Architecture- Classical & Medieval Europe	SEE - EXAM	Arch	Arch	0	4	0	4	50	50	100	3	3
5	AT4STR	Structures -Steel, Rigid Frames and Composite Flooring	SEE - VIVA	Arch	Arch	2	2	0	4	50	50	100	--	3
6	AT4SQC	Specification, Quantity and Costing Of Buildings	SEE - EXAM	Arch	Arch	0	3	0	3	50	50	100	3	3
7	AT4CAD	Advanced Computer Applications	CIE	Arch	Arch	0	0	3	3	50	-	50	--	2
8	AT4ELEC	Elective-II	CIE	Arch	Arch	2	0	0	2	50	-	50	--	2
9	AT4VST	Vacation Study Tour	CIE	Arch	Arch	0	0	0	0	50	-	50	--	M
Total									35	450	300	750		28

CIE: Continuous Internal Evaluation, **SEE:** Semester End Examination **S:** Studio, **T:** Theory And **P:** Practical

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

BUILDING CONSTRUCTION AND MATERIALS: RCC, Structural steel & Aluminium

Sub Code	: AT4BCM	CIE	: 50
Hrs/ Week	: 06	SEE	: 50
Total Hrs	: 96	Credits	: 5
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

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

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

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

REFERENCES:

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

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 Epidauros. b) Domestic (Built to inhabit): House of Colline, House of Masks, etc. and c) Civic space: The Agora and Acropolis.

MODULE 2

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

MODULE 3

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

MODULE 4

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

MODULE 5

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

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

REFERENCES:

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

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.

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.
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.

ADVANCED COMPUTER APPLICATIONS

Sub Code : AT4CAD	CIE : 50
Hrs/ Week : 3	SEE : Nil
Total Hrs : 48	Credits : 3
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:

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

ELECTIVE II

Sub Code	: AT4ELEC	CIE	: 50
Hrs/ Week	: 2	SEE	: Nil
Total Hrs	: 32	Credits:	3
SEE Type	:NA	Duration	: NA

a) ENVIRONMENT RESPONSIVE ARCHITECTURE

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

b) PRODUCT DESIGN

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

Class assignments / exercises:

Short projects along with a time problem will be tackled in the class exploring the influences of design process, and ergonomics on the product ideation and development. The student will also study the product changes that will occur through the choices made of materials, manufacturing process, and marketing techniques.

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

REFERENCES:

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

c) ADVANCED DOCUMENTATION

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