DEPARTMENT OF ARCHITECTURE
ANNA UNIVERSITY, CHENNAI

VISION OF DEPARTMENT OF ARCHITECTURE
The Department of Architecture is committed to excellence in the field of architectural education and the discipline of architecture through its pedagogical, research, extension and outreach activities, directed towards the betterment of the world that we inhabit, in all realms shaped by architecture. It shall uphold universal moral and ethical values in all endeavours that it undertakes and be exemplary in creating positive transformations.

MISSION OF DEPARTMENT OF ARCHITECTURE
The Mission of the Department of Architecture is

- To tap and strengthen the innate potential of each student and deepen their knowledge/skills in order to enable them to self-actualizes well as become catalysts for positive change.
- To contribute to immediate context, larger society and the world through knowledge creation and dissemination.
- To engage and extend the expertise of the department in addressing and solving of issues/problems related to the built environment.
- To actively interact and collaborate with professionals, educational institutions and other related organizations at all scales in order to collectively further the cause of appropriate architecture.
1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

I. Become a practicing architect who can provide holistic and innovative solutions to needs and problems of society.
II. Find gainful employment in architectural firms/building sector and contribute in design and decision making.
III. Be a part of organisations that influence policy and contribute to larger changes in society and environment.
IV. Contribute to the discipline of architecture through higher studies, research and development.
V. Become a thinker and entrepreneur who can direct creative vision, explorations, services and products towards a better future in an interconnected world.

2. PROGRAMME OUTCOMES (POs)

After going through the five years of study, our B.Arch. graduates will exhibit ability to:

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<tr>
<th>PO#</th>
<th>Graduate Attribute</th>
<th>Programme Outcome</th>
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<tr>
<td>1</td>
<td>Analysis and Design Skill</td>
<td>Analyse and design architectural projects of all scales in a competent, innovative and appropriate manner as the situation</td>
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<tr>
<td>2</td>
<td>Understanding of Form and Architecture</td>
<td>Represent, understand and analyse forms and attributes of architecture in different ways (manual/ graphic/ diagrammatic/digital means) so as to inform the architectural design process.</td>
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<td>3</td>
<td>Ability for Cognition, Expression and Communication</td>
<td>Understand situations through experience and express ideas through various modes- reading, writing, speaking, art, cognitive mapping, etc., that are consistent with the self and the world.</td>
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<td>4</td>
<td>Historical, Social and Cultural Awareness</td>
<td>Identify/analyse/ understand with sensitivity the various cultural, social and historical aspects of architecture as well as make meaningful and contextual design decisions.</td>
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<td>5</td>
<td>Critical and Creative Thinking</td>
<td>Critically understand/ theorise existing situations and make positive creative transformations towards the future.</td>
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<td>6</td>
<td>Knowledge in Making of Building</td>
<td>Understand and contribute to constructional aspects of buildings involving material strength and choice, building component and structural design.</td>
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<td>Support and Services to Buildings</td>
<td>Understand and work out basic and advanced services for a building in an optimal manner so as to enhance the quality of</td>
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<td>8</td>
<td>Environment and Physical Context</td>
<td>Understand the relationships between environment and architecture and design livable buildings that are sensitive to as well as tap the potential of the environment at different</td>
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<td>Skill in Building Analysis and</td>
<td>Calculate/analyse building costs and environmental performance and optimise design for varied criteria.</td>
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<td>10</td>
<td>Profession and Ethics</td>
<td>Serve as a competent and ethical professional architect.</td>
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<td>11</td>
<td>Life Long Learning, Research and Development</td>
<td>Understand and address specific aspects of the discipline of architecture in depth through rigorous exploratory and experimental studies and research.</td>
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<td>12</td>
<td>Larger contribution to Society</td>
<td>Understand broader interdisciplinary connections with architecture and engage them to serve as a catalyst for positive change.</td>
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PEO / PO Mapping:

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| III | 5 | Structural Design of Concrete | 3 |
|     |   | Electricity, Lighting and Acoustics in Buildings | 2 | 3 | 3 |
|     |   | Concrete in Building Construction | 3 |
|     |   | Urban Architecture Design Studio | 3 | 2 | 2 | 2 | 3 | 1 | 1 | 1 | 1 |
|     |   | Professional Elective I |
| IV  | 6 | Specification, Estimation and Budgeting | 3 | 2 |
|     |   | Structural Design of Steel | 3 |
|     |   | Advanced Building Services | 2 | 3 | 3 |
|     |   | Steel, Glass and Plastic in Building Construction | 3 | 2 |
|     |   | Environmental Design Studio | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 2 |
|     |   | Professional Elective II |
| IV  | 7 | Contemporary Architecture: Theories and Practice | 3 | 2 |
|     |   | Professional Practice of Architecture | 3 | 2 | 3 |
|     |   | Contemporary Housing | 2 | 2 | 1 | 1 | 2 |
|     |   | Critical Design Studio | 3 | 3 | 2 | 2 | 3 | 1 | 1 | 2 | 1 | 1 | 2 | 2 |
|     |   | Professional Elective III |
|     |   | Open Elective | 1 | 1 | 1 | 1 |
| IV  | 8 | Practical Training | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 3 |
| V   | 9 | Urban Design | 1 | 1 | 1 | 3 | 2 | 2 | 3 |
|     |   | Landscape and Ecology | 2 | 1 | 3 |
|     |   | Construction and Project Management | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 |
|     |   | Dissertation | 1 | 2 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 3 | 3 |
|     |   | Urbanism and Architecture Design Studio | 3 | 2 | 2 | 3 | 3 |
|     |   | Professional Elective IV |
| V   | 10 | Thesis | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |

‘1’ = Low; ‘2’ = Medium; ‘3’ = High
**ANNA UNIVERSITY: CHENNAI**
**UNIVERSITY DEPARTMENTS**
**B. ARCH. FULL-TIME PROGRAMME**
**REGULATIONS 2023**
**CHOICE BASED CREDIT SYSTEM**
**CURRICULUM AND SYLLABI FOR SEMESTERS I TO X**

### SEMESTER I

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### SEMESTER II

(Prerequisite - Pass in Foundational Design Studio)

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*NCC Credit Course level 1 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.*
**SEMMESTER III**
(Prerequisite - Pass in Basic Space Design Studio)

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**SEMMESTER IV**
(Prerequisite - Pass in Advanced Space Design Studio)

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* NCC Credit Course level 2 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.
### SEMESTER V
(Prerequisite - Pass in Rural Habitat Design Studio)

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**THEORY CUM STUDIO**

| 4.     | AR3511      | Concrete in Building Construction                   | BSC & AEC | 1 | 0 | 3   | 4                 | 4        |

**STUDIO**

| 5.     | AR3521      | Urban Architecture Design Studio                    | PCC      | 0 | 0 | 10  | 10                | 10       |

**TOTAL**

|        |             |                                                      |          | 10 | 0 | 13  | 23                | 23       |

**ELECTIVE**

| 6.     |             | Professional Elective I                             | PEC      | x | x | x   | 3                 | 3        |

**TOTAL**

|        |             |                                                      |          | 26 | 26|

### SEMESTER VI
(Prerequisite - Pass in Urban Architecture Design Studio)

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**THEORY CUM STUDIO**

| 5.     | AR3611      | Steel, Glass and Plastic in Building Construction    | BSC & AEC | 1 | 0 | 3   | 4                 | 4        |

**STUDIO**

| 6.     | AR3621      | Environmental Design Studio                          | PCC      | 0 | 0 | 10  | 10                | 10       |

**TOTAL**

|        |             |                                                      |          | 10 | 0 | 13  | 23                | 23       |

**ELECTIVE**

| 7.     |             | Professional Elective II                             | PEC      | x | x | x   | 3                 | 3        |

**TOTAL**

|        |             |                                                      |          | 26 | 26|

* NCC Credit Course level 3 is offered for NCC students only. The grades earned by the students will be recorded in the Mark Sheet, however the same shall not be considered for the computation of CGPA.
## SEMESTER VII
(Prerequisite - Pass in Environmental Design Studio)

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## SEMESTER VIII
(Prerequisite - Pass in Critical Design Studio of VII Semester)

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## SEMESTER IX
(Prerequisite - Pass in Practical Training of VIII Semester)

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SUMMARY
OBJECTIVES

- To give understanding of architecture as an outcome of the act of design by human society across history and region.
- To give an introduction to the discipline of architecture and its various facets.
- To introduce importance of form and its relation to design through study of nature and manmade environment.
- To introduce the vocabulary of form and space in terms of elements, principles, attributes and organisation as giving cognitive experience in the realm of architecture.

UNIT I  INTRODUCTION TO ARCHITECTURE  9
Origin and definitions of architecture as need based, cultural, environmental, social, psychological response of human society. Architecture as phenomenological mediation of nature. Components of architecture: use, means, site, shelter, relation to nature, structure, skin, materials, services, circulation, typology, aesthetics, expression, character, symbolism, experience, etc., History and types of design in architecture- unself-conscious/ self-conscious design, design through craft/ design through drawing, pragmatic/ iconic/ canonic/ analogic design.

UNIT II  FORM IN NATURE AND MANMADE ENVIRONMENT  9

UNIT III  FORM AS GEOMETRIC ELEMENTS AND THEIR EFFECTS  9
Form as embodied in and/or constituted by geometric elements such as point, line, plane, volumes. Attributes, generation and interrelationships among elements. Perceptual effects and use of specific manifestations of the elements- planes as shapes and volumes as geometric forms/space such as sphere, cube, pyramid, cylinder, cone and their sections/ derivatives. Architectural use of elements. Exercises and architectural case studies.

UNIT IV  ATTRIBUTES AND PRINCIPLES OF FORM  9
Form as manifesting attributes such as pattern, light, colour, surface, texture. Effects of these attributes. Form in its basic state, in combinations, composite organisations and configurations as manifesting characteristics such as proportion, scale, balance, symmetry, asymmetry, rhythm, axis, hierarchy, datum, unity, harmony, dominance, climax, focus. Characteristics acting as principles to generate architectural design. Exercises and architectural case studies.

UNIT V  ORGANISATION OF FORM AND SPACE  9

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1: Ability to recognise different facets of architecture.
CO2: Basic understanding of form and design in all aspects and scales.
CO3: Ability to discern the relationship between manifestations of form and its effects on humans.
REQUIRED READING


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AR3102 INTRODUCTION TO LANGUAGE AND ENGLISH SKILLS L T P/S C

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OBJECTIVES

- To give an introduction to the concepts and evolution of language in human society including its various expressions and functions
- To give basic skills of English language in everyday situations involving speaking, listening, reading, writing, presenting.
- To enable the use of language to think, express experience and communicate larger meaning.

UNIT I INTRODUCTION TO LANGUAGE AND LINGUISTICS 9

UNIT II  ENGLISH- SPEAKING AND LISTENING  9
Everyday communication and human interaction through language. Speaking and listening. Simple class exercises.

UNIT III  ENGLISH- READING, WRITING, PRESENTING  9
Reading and writing. Language comprehension skills through reading and writing. Presenting information and ideas. Simple exercises.

UNIT IV  LANGUAGE AS EXPRESSION AND COGNITION  9

UNIT V  LANGUAGE AS DISCOURSE  9
Thinking, talking and writing about ideas and situations within a social context and conveying broader meaning and abstraction. Discourse, dialectic. Simple class exercises.

TOTAL: 45 PERIODS

COURSE OUTCOMES
CO1: An understanding of basic role of language in humans.
CO2: Skill and confidence in everyday requirements of the English language.
CO3: Ability to express experience, explore meaning and construct reality through language.

REQUIRED READING
- Sharon Hendenreich, ‘English for Architects and Civil Engineers’, Springer, 2014
- www.cambridgeacademic.com
- www.robertwatkins.com/Englishworkbook.pdf

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OBJECTIVES

- To help derive solutions involving trigonometric and exponential functions in practical problems.
- To inform about three dimensional analytical geometry.
- To enable understanding of functions of more than one variable.
- To give information to solve differential equation of certain type.
- To enable data analysis and interpretation of results using statistical tools.

UNIT I  TRIGONOMETRY AND MENSURATION  9
Trigonometric (sine, cosine and tan functions) and exponential functions. De- Moiver’s theorem. Area of plane figures. Computation of volume of solid figures.

UNIT II  THREE DIMENSIONAL ANALYTICAL GEOMETRY  9

UNIT III  INTEGRATION AND FUNCTIONS OF TWO VARIABLES  9

UNIT IV  ORDINARY DIFFERENTIAL EQUATIONS  9
Linear equations of second order with constant coefficients. Simultaneous first order linear equations with constant coefficients. Homogeneous equation of Euler type. Equations reducible to homogeneous form.

UNIT V  BASIC STATISTICS AND PROBABILITY  9

TOTAL: 45 PERIODS

COURSE OUTCOME
CO1: Ability to understand the mathematical properties of geometric figures and objects.
CO2: Skill in solving mathematical problems that would be useful for the field of architecture.
CO3: Ability to analyse and interpret data.

REQUIRED READING

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AR3111 GEOMETRICAL UNDERSTANDING AND REPRESENTATION

OBJECTIVES

- To introduce geometrical understanding as one of the bases of architecture.
- To give an understanding of basic and derived geometry of form in terms of their generation and attributes.
- To give skills of representation of forms in terms of technical drawing and projections.

UNIT I 10
Relation between geometry and form. Introduction to point, line, plane, solid. Definition of geometrical drawing. Drawing lines and angles. Drawing shapes/planar surfaces - triangle, square, rhombus, rectangle, polygon, hexagon, etc). Drawing of circles, tangents, curves, conic sections (hyperbola, parabola, ellipse). Construction of physical planar models of all the above. Viewing the physical planar models from different angles and sketching them with light and shade, shadow as a prelude to understanding the concepts of different types of projections and sciography. Introduction and explanation of terminologies - orthographic, isometric, axonometric, perspective projections and sciography.

UNIT II 20
Drawing problems on orthographic, isometric and axonometric projections of lines and planes of different types in different positions. Sciography for the same.
Types of perspective projections- one point, two point, three point. Terminologies- picture plane, stationary point, vanishing point, cone of vision, eye level, etc., Methods of constructing perspectives.
Drawing perspective projections of simple planar surfaces/shapes. Sciography for the same.

UNIT III 20
Introduction to geometric solids- cube, prism, pyramids, cones, cylinders. Generation of geometric solids through construction of physical models from lines and planar surfaces (including concept of development). Construction of block models of solids. Viewing the models from different angles and sketching them with light and shade, shadow in order to understand them in different types of projections.

Drawing problems on orthographic, isometric and axonometric projection of solids of different types in different positions. Sciography for the same.
Perspective projection of simple solids. Sciography for the same.

UNIT IV 10
Understanding sections of solid and true shape of sections through cutting of block models, viewing them from different angles and sketching them. Understanding simple intersection of solids and composite forms through making block models and viewing them from different angles and sketching them.
Simple drawing problems on orthographic, isometric and axonometric projection of the above.

TOTAL: 60 PERIODS
COURSE OUTCOME
CO1: Ability to understand the relationship between geometry and architectural form.
CO2: Understanding of various attributes of geometric forms and skill in their creation and dissection.
CO3: Ability to represent geometric forms through technical drawings.

REQUIRED READING

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AR3112 ART AS COGNITION AND EXPRESSION L T P/S C

OBJECTIVES
- To give understanding of the role and importance of art as a means of understanding the world.
- To give skills in techniques and media of art.
- To enable expression of ideas, thoughts and experience through various visual modes both in terms of realism and abstraction.

UNIT I INTRODUCTION TO ART
Origin and evolution of art as human cognition, representation, expression. Role of art. Understanding representation in art - naturalistic, realistic, symbolic, stylistic, abstract, non-objective art, etc., through study of important works across history from different cultures of the world. Simple studio exercises in basic modes of representation through observation or thought.

UNIT II ART AS OBSERVATION AND RECORDING OF HUMAN EXPERIENCE
Properties and uniqueness of different media for art. Studio exercises to observe and record the nature of simple indoor and outdoor subjects through techniques of line, colour, light and shade, texture, etc., using different media- drawing, sketching, painting, sculpture, watercolour, tempera, oil, acrylic, pencils, pastels, crayons, paper, canvas, brush, airbrush, pen and ink, mixed media, clay, Plaster of Paris, wire, papiermache.

UNIT III ART AS HEIGHTENED REPRESENTATION OF REALITY
Understanding role of art in heightening reality through accentuation of line, colour, light and shade, texture, emphasis, contrast, balance, etc., by the study of examples from world of art. Studio exercises to understand and bring out the essential characteristics of landscapes, people, places, built environment, situations and objects by heightened reality through appropriate ideas/tools/techniques.
UNIT IV  ART AS ABSTRACTION OF REALITY

The power and role of abstraction as a way of expressing experience and reality through understanding exemplary artists’ works and art movements. Studio exercises in abstract expression of real environment, thoughts and emotions through any appropriate media and technique.

TOTAL: 60 PERIODS

COURSE OUTCOME
CO1: Sensitivity and knowledge of art as basic human endeavour.
CO2: Ability and skill to record experience through art.
CO3: Ability to abstract thought, observation and experience through art.

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AR3121  FOUNDATIONAL DESIGN STUDIO  L  T  P/S  C

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OBJECTIVES
- To give an understanding of design as creating form towards a purpose at various scales.
- To enable exploration of the universal visual, experiential and cognitive aspects of design through engaging elements and principles of form.
- To give an insight into the ways in which form/ morphology and use/effect can come together.

CONTENT
Architecture as a discipline starts with morphology as the answer to questions and needs of human society. While the needs are multifarious, including shelter and comfort, social and psychological wellbeing, culture and meaning, expression of time and context, etc., the means are negotiated through the fundamentals of form in its various attributes. In the foundational studio, the exploration would be on understanding these fundamentals as universals as well as in terms of particular manifestations in specific cultural and temporal contexts. The word form here means all physical manifested aspects.
The explorations in the foundational studio would be of two types. One would be to understand and break down form to its component elements and principles in order to get insight into the most important aspects that give a totality of cognitive effect (perceptive, behavioural, cultural etc.,) or use (anthropometrics, activities, scale, etc.). Design exploration would continue after this to create a form for use/effect. Another would be to explore component elements like point, line, planes, volume, shape, colour, texture light, pattern, etc., using principles such as balance, unity, dominance, transparency, proportion, scale, solid, void, fluidity, movement, fractal, order, chaos, gestalt, etc. This exploration could be an end in itself or could lead to the creation of a higher level of or composite form/design through using elements and principles in conjunction towards human need/ use (perceptive, behavioural, cultural, anthropometrics, activities, scale, etc.).

The whole studio would be conducted through a series of related design exercises with multiple stages as well as standalone independent exercises. Observational/ analytical study and design exploration could go hand in hand or one could precede the other, based on the specific project. The exercises would be mediated through situations and contexts, historic and contemporary references, local or global character, aesthetics, basics of human response and behaviour, etc. Different media would be explored in 2D and 3D. The final exercise(s) would be focussed towards small product/ furniture/ architectural design/ component design in urban context, etc.

**TOTAL: 135 PERIODS**

**COURSE OUTCOME**

CO1: Awareness of the totality and components of form in the creation of design.

CO2: Ability to explore the visual/ cognitive language and grammar of the universal elements and principles of design.

CO3: Ability to understand needs as encompassing functional, behavioural, cultural, experiential, etc.,

CO4: Ability to engage awareness towards creating a morphology that fulfils stated intents and needs.

**REQUIRED READING**


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OBJECTIVES

- To introduce the timeline and geography of evolution of human society in order to set the context for the study of architecture and urbanism across the ages.
- To give knowledge about early civilisations and their productions.
- To enable an understanding of the contributions of Classical Greece and Rome.
- To enable understanding of the intersecting forces in Europe such as religion, trade, technology, etc from the decline of Roman empire to the Medieval period and the resultant architecture and urbanism.
- To create awareness of the emergence of Renaissance and humanism in Europe and the resultant architecture and urbanism.

UNIT I   PREHISTORY TO RIVER VALLEY CIVILISATIONS  6
Different ages of human history. Time line and geography of human civilisations. Elements and determinants of human settlements. Prehistoric habitats and art. River Valley civilisations of Nile, Indus, Tigris/Euphrates and Yellow river; their geographical context; their political, social, religious, cultural and economic systems; settlement patterns, dwellings and other buildings.

UNIT II   PERSIA, GREECE AND ROME  10
Early Persian empire, its cities and architecture.
Political empires of Persia, Greece and Rome and their larger effects.

UNIT III   JUDAISM, CHRISTIANITY AND ISLAM  9

UNIT IV  MEDIEVAL EUROPE  10

UNIT V   RENAISSANCE IN EUROPE  10

TOTAL: 45 PERIODS
COURSE OUTCOME
CO1: An overall understanding of the timelines and early history of civilisations and their contributions across the world.
CO2: Knowledge about the contributions of Greece and Rome to architecture and urbanism.
CO3: Familiarity with the intersecting forces in Europe from decline of Roman empire to Medieval times and their manifestation in cities and architecture.
CO4: An understanding of Renaissance and humanism and the resultant architecture and urbanism.

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AR3202 STRUCTURAL MECHANICS

OBJECTIVES
- To give familiarity about structural resolutions and its important in realisation of architectural design concepts
- To give exposure to forces, moments and resolution of forces.
- To give understanding of geometrical properties of sections of different shapes.
- To give understanding of basic elastic properties of solids.
- To introduce to behaviour of solids under complex stresses

UNIT I FORCE SYSTEM
UNIT II  SUPPORTS AND REACTIONS
Types of supports and reactions-Bending moment and Shear forces-Determination of reactions for simply supported beams. Relation between bending moment and shear force.

UNIT III  SECTIONAL PROPERTIES
Properties of section – Centre of gravity, Moment of Inertia, Section modulus, Radius of gyration for various structural shapes. Theorem of perpendicular axis. Theorem of parallel axis.

UNIT IV  ELASTIC PROPERTIES AND CONSTANTS

UNIT V  COMPLEX STRESSES
Principal stresses and strain. Numerical and Graphical method. Mohr’s diagram.

TOTAL: 45 PERIODS

COURSE OUTCOME
CO1: Ability to apply the concepts of action of forces on a body and should be able to apply the equilibrium concepts.
CO2: Understanding the concept of bending moment and shear force of beam.
CO3: Understanding of the basic geometrical properties of sections.
CO4: Knowledge about elastic properties of solids.
CO5: Ability to solve problems of principal stresses and strains using numerical and graphical method.

REQUIRED READING

REFERENCES

CO-PO Mapping

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OBJECTIVES
- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasise on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and non-renewable resources, causes of their degradation and measures to preserve them.
- To familiarise about influence of societal use of resources on the environment and introduce the legal provisions, National and International laws and conventions for environmental protection.
- To inculcate the effect of population dynamics on human and environmental health and inform about human right, value education and role of technology in monitoring human and environmental issues.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – bio geographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.
Introduction to the design of built environment with consideration of environment, ecosystems and biodiversity.

UNIT II ENVIRONMENTAL POLLUTION 8
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.
Built environment and its relation to environmental pollution, both as a cause and as a response.

UNIT III NATURAL RESOURCES 10
Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land 47 degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.
The use of natural resources in architecture and the built environment through principles and case studies.
UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT
Socially and environmentally sensitive design of built environment through case studies.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT
Architectural design and density.

COURSE OUTCOME
CO1: Understanding of the functions of environment, ecosystems and biodiversity and their conservation.
CO2: Ability to identify the causes, effects and environmental pollution and natural disasters and contribute to the preventive measures in the immediate society.
CO3: Understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
CO4: Familiarity with different forms of energy and apply them for suitable applications in for technological advancement and societal development.
CO5: Knowledge of societal activity on the long and short term environmental issues and abide by the legal provisions, National and International laws and conventions in professional and personal activities and to identify and analyse effect of population dynamics on human value education, consumerism and role of technology in environmental issues.
CO6: An understanding of the design of built environment with due consideration of environmental implications.

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## NCC Credit Course Level 1*

**NX3251** *(ARMY WING) NCC Credit Course Level - I*

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**NCC GENERAL**

- **NCC 1** Aims, Objectives & Organization of NCC [1]
- **NCC 2** Incentives [2]
- **NCC 3** Duties of NCC Cadet [1]
- **NCC 4** NCC Camps: Types & Conduct [2]

**NATIONAL INTEGRATION AND AWARENESS**

- **NI 1** National Integration: Importance & Necessity [1]
- **NI 2** Factors Affecting National Integration [1]
- **NI 3** Unity in Diversity & Role of NCC in Nation Building [1]
- **NI 4** Threats to National Security [1]

**PERSONALITY DEVELOPMENT**

- **PD 1** Self-Awareness, Empathy, Critical & Creative Thinking, Decision Making and Problem Solving [2]
- **PD 2** Communication Skills [3]
- **PD 3** Group Discussion: Stress & Emotions [2]

**LEADERSHIP**

- **L 1** Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code [3]
- **L 2** Case Studies: Shivaji, Jhasi Ki Rani [2]

**SOCIAL SERVICE AND COMMUNITY DEVELOPMENT**

- **SS 1** Basics, Rural Development Programmes, NGOs, Contribution of Youth [3]
- **SS 4** Protection of Children and Women Safety [1]
- **SS 5** Road / Rail Travel Safety [1]
- **SS 6** New Initiatives [2]
- **SS 7** Cyber and Mobile Security Awareness [1]

**TOTAL: 30 PERIODS**
### NCC Credit Course Level 1*

**NX3252** *(NAVAL WING) NCC Credit Course Level - I*

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**SOCIAL SERVICE AND COMMUNITY DEVELOPMENT**

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**TOTAL : 30 PERIODS**

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**NX3253** *(AIR FORCE WING) NCC Credit Course Level - I*

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LEADERSHIP 5
L 1 Leadership Capsule: Traits, Indicators, Motivation, Moral Values, Honour Code 3
L 2 Case Studies: Shivaji, Jhasi Ki Rani 2

SOCIAL SERVICE AND COMMUNITY DEVELOPMENT 8
SS 1 Basics, Rural Development Programmes, NGOs, Contribution of Youth 3
SS 4 Protection of Children and Women Safety 1
SS 5 Road / Rail Travel Safety 1
SS 6 New Initiatives 2
SS 7 Cyber and Mobile Security Awareness 1

TOTAL : 30 PERIODS

AR3211 BUILDING COMPONENTS AND THEIR REPRESENTATION L T P/S C 1 0 3 4

OBJECTIVES

- To introduce the components of a typical building and their nomenclature.
- To introduce the concept of scale and enable understanding of a building through measured drawing.
- To give skills of representing physical characteristics of materials.
- To give skills in isometric and perspective projections of the measured building.

UNIT I INTRODUCTION TO BUILDING COMPONENTS AND THEIR NOMENCLATURE 12
Building as act of construction for human use layered over the earth - foundation, structural systems, enclosures, weather protection. Understanding building components and their nomenclature using historic and contemporary examples from literature study, site visits, sketches. The nomenclature to include 1) basic types of construction such as load bearing/framed/space structure 2) basic components in a building such as foundation, plinth, walls, floors, roofs( flat, sloped, vaulted), roof covering, ceilings, staircases (principles and different geometric types), doors, windows and ventilators, lintel, sunshade, coping, cornice, stringcourse, parapet, waterproofing, finishing, mortar, decoration, paving3) basic materials for the components.

UNIT II MEASURED DRAWING AND PROJECTIONS OF BASIC COMPONENTS 16
Introduction to concept of scale and measured drawing through basic components such as handrails, furniture, arches, etc., Orthographic (plan, elevation, section) and isometric projection of the simple components. Representation of different materials through rendering, Perspective projection of simple components.

UNIT III MEASURED DRAWING OF HISTORICAL BUILDING 18
Understanding a historic building in totality or in part through measuring drawing.

UNIT IV MEASURED DRAWING OF CONTEMPORARY BUILDING 14
Understanding a contemporary building in totality or in part through measuring drawing.

TOTAL: 60 PERIODS

COURSE OUTCOME
CO1: Ability to recognise and name components of a building.
CO2: Ability to measure and draw components of a building.
CO3: Ability to make isometric and perspective projections of components of a building.
CO4: Understanding a building in total or in part through the process of measured drawing.
REQUIRED READING


REFERENCES


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AR3212 THINKING THROUGH DIAGRAMS AND MODELS  L T P/S C

OBJECTIVES

- To introduce diagrams and models as representation of reality and thought.
- To enable understanding of the important attributes of built environment through diagrams and models.
- To introduce how design thinking can be enhanced through diagrams and models.

UNIT I INTRODUCTION TO DIAGRAMS IN ARCHITECTURE 12
Introduction to idea of diagrams and models as basic representation of reality and thought. Historical evolution of diagrams and models in architecture with key examples from the past to the present, illustrating how attributes are identified and diagrammed for study and for design.

UNIT II UNDERSTANDING BUILT ENVIRONMENT THROUGH DIAGRAMS 18
Introduction to conventional functional diagramming such as activity, zoning, matrix, proximity chart, etc., Overview of diagrammable aspects of a building. Understanding key attributes of a real building through diagrammatic aspects. Exploring various methods to diagram the same building. Exploring different real buildings with the same methods to discern key differences in them.

UNIT III UNDERSTANDING BUILT ENVIRONMENT THROUGH MODELS 18
Model making as a tool to understand buildings through analogical thinking. Understanding different degrees of representations in models from the most realistic to the most abstract, based on purpose for which model is done. Techniques and materiality in model making.

UNIT IV DIAGRAMS AND MODELS AS AID TO DESIGN THINKING 12
Creating simple diagrams and models as proposition towards the future for an existing simple real life situation or for a future projection. The scale could range from macro to micro.

TOTAL: 60 PERIODS
COURSE OUTCOME
CO1: An understanding of diagrams and models as a mode of thought and analysis.
CO2: An ability to discern the important attributes of a building through diagrams and models.
CO3: Ability to project thoughts towards the future through diagrams and models.

REQUIRED READING

REFERENCES

CO-PO Mapping

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AR3221    BASIC SPACE DESIGN STUDIO    L    T    P/S    C
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OBJECTIVES
- To enable the understanding of the qualitative and quantitative aspects of basic space design for human use.
- To facilitate exploration of ways to address timeless aspects involved in the design of human built habitat in a micro scale.
- To enable a sensitivity towards the cultural, particular and temporal aspects of architecture.

CONTENT
Humans create and shape spaces/forms for use. Use includes all aspects of human life - starting from containing the human as a unit (anthropometrics), the needs for carrying out of basic activities, spatial requirements for them, relationship between spaces, requirements of shelter, privacy, social and cultural factors, environmental response, psychological well being, light and air,
meaning and symbolism, structure and economy, and so on. Architecture as a discipline brings all these needs together into a coherent totality through the act of conscious design. Conscious design involves the study/analysis of the existing and extrapolating towards the future through speculation.

In the Basic Space Design Studio, the focus would be on simple architectural design projects that would enable the learning of the fundamentals of space with respect to all the above. The projects would be based on small, everyday situations involving simple circulation, materials and use. It could a typology of private or public nature. Some suggestive projects are bedroom, bathroom, kitchen, shop, pavilion, creche, snack bar, residence, petrol bunk, fire station, bus stop. There would be a maximum of three projects.

The techniques used for study and presentation can align themselves towards the above, such as cognitive maps, sketches, manual drawings, physical models with simple materials.

**TOTAL: 135 PERIODS**

**COURSE OUTCOME**

CO1: Ability to design simple spaces for human use addressing spatial, social, cultural and temporal human needs.

CO2: Ability to consider the particular context in the process of designing.

**REQUIRED READING**


**REFERENCES**


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OBJECTIVES

- To give an overall understanding of the architecture in India up to the colonial period as parallel and sequential productions rising from the cumulative effect of forces operating and intersecting in the Indian subcontinent.
- To inform about prominent modes of architecture in India terms of evolution, function, morphology and character.
- To give exposure to works that are architecturally exemplary and/or representative.
- To appreciate architecture as giver of particular and universal meaning.

UNIT I  EARLY INDIA AND ITS CULTURAL PRODUCTIONS  8
Overview of early history of the Indian subcontinent bringing out different conjectures. Indus Valley Civilisation and its society, culture and urbanism. Vedic culture, settlements and architecture through textual and inscriptional sources as well as conjectures. Outline of textual sources related to architecture and town planning in ancient India.

UNIT II  ARCHITECTURE OF SOUTHERN INDIA  11
Outline history of South India with particular emphasis on Bhakthi movement and evolution of temple town urbanism and architecture. Art and architecture under the Pallavas, Cholas, Pandyas, Nayaks and Vijayanagara kingdom with specific focus on Hindu temple architecture. Influence of social and political history on them. Hoysala architecture. Study of important monuments for all the above.

UNIT III  ARCHITECTURE OF NORTHERN INDIA  8
Architecture of Gujarat, Orissa, Madhya Pradesh and Rajasthan with specific focus on Hindu temple architecture. Study of important monuments. Architecture of step wells in Northern India and their socio-cultural importance.

UNIT IV  INTRODUCTION TO ISLAMIC ARCHITECTURE AND EARLY ISLAMIC ARCHITECTURE IN INDIA  8
Brief history of Islam. Islamic architecture of the world as rising from Islam as a socio-cultural and political phenomenon. Evolution of building types in terms of forms and functions. Principles and characteristics of Islamic architecture - to include aspects of religion, geometry, structure, materials, decoration, light.
Early political history of Islam in India. Evolution of Islamic architecture under the Delhi Sultanate - Slave, Khaji, Tughlaq, Sayyid and Lodi dynasties. Study of important monuments. Early Islamic architecture of Punjab.

UNIT V  REGIONAL ISLAMIC ARCHITECTURE, MUGHAL ARCHITECTURE AND AFTER  10
Spread of Islam into other regions of India and their architectural expressions - Gujarat, Bengal, Malwa and the Deccan. Study of important monuments.
Political History of the Mughals. Mughal architecture and urbanism under Humayun, Akbar, Shahjahan and Aurangazeb. Study of important monuments.
Outline of Post Mughal Islamic architecture. Outline of architecture related to Islam in Tamil Nadu.

TOTAL: 45 PERIODS
COURSE OUTCOME
CO1: An understanding of the diversity of architecture in India and sensitivity towards its syncretic aspects.
CO2: Ability to appreciate particular cultural, symbolic, spatial and material qualities in architecture and cities as givers of meaning and continuity.
CO3: Ability to appreciate universal qualities of architecture and their effects.

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AR3302 STRUCTURAL SYSTEMS AND THEIR ANALYSIS

OBJECTIVES
- To introduce the principles of loads and distribution.
- To enable understanding of the basic concepts of shear force and bending moment under different load conditions and determination of bending and shearing stress acting on beam sections.
- To give knowledge about how to calculate slope and deflection of beams using different methods.
- To explain theory and analysis of columns subjected to axial and eccentric loading. To give understanding of the concept of statically indeterminate structures and their analysis.
UNIT I  LOADS AND LOAD DISTRIBUTION  6

UNIT II  BENDING OF BEAMS  11
Beams and supporting conditions. Types of supports. Shear force and bending moment for simply supported, cantilever and over hanging beams. Theory of simple bending. Stress distribution at a cross section due to bending moment and shear for Rectangular, I and T sections. Concept of Flitched beams (no mathematical calculation).

UNIT III  DEFLECTION OF BEAMS  11
Relation between slope, deflection and curvature. Determination of deflection and slope for simply supported and Cantilever beams using Double Integration Method, Macaulay's method and Moment Area Method.

UNIT IV  COLUMNS  8

UNIT V  STATICALLY INDETERMINATE STRUCTURES  9

TOTAL: 45 PERIODS

COURSE OUTCOME

On completion of the course, the student is expected to be able to

CO1  Categorise loads and their distribution paths for various structural systems.
CO2  Solve problems of shear force and bending moment calculation of beams.
CO3  Calculate the slope and deflection of beams by different methods.
CO4  Analyse columns for combination of axial and eccentric loads.
CO5  Recall various methods used for the analysis of statically indeterminate structures.

TEXTBOOKS


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AR3303 CLIMATE AND BUILT ENVIRONMENT

OBJECTIVES

- To introduce climate and concept of human comfort.
- To inform about the effects of sky and sun on the earth and building.
- To inform about the effects of wind and air with respect to siting and design of buildings.
- To inform about principles of day lighting in architecture.
- To understand architecture as a response to environment in totality, including climate, sun, sky, wind, lighting, vegetation, microclimate.

UNIT I CLIMATE, HUMAN COMFORT AND HEAT


UNIT II BUILDING RESPONSE TO SUN AND SKY


UNIT III HEAT FLOW THROUGH BUILDING ENVELOPE- CONCEPTS


UNIT IV AIR MOVEMENT AND BUILDINGS


UNIT V ENVIRONMENT AND DESIGN OF BUILDINGS

Design strategies in warm humid climates, hot humid climates, hot and dry climates and cold climates. Understanding through case studies and site visits.

TOTAL: 45 Periods
COURSE OUTCOME
CO1 An understanding of climate, comfort and heat balance in human beings.
CO2 An understanding of material effects in buildings.
CO3 Ability to conceptually design buildings considering the effect of sun and wind on buildings

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AR3311 BUILDING CONSTRUCTION WITH BASIC MATERIALS

OBJECTIVES
- To introduce basic building materials including lime, mud, stone, brick and thatch.
- To give knowledge about building construction using the above materials.
- To facilitate in the design of buildings using wood and wood based materials

UNIT I LIME, MUD AND STONE

Lime as basic binding material/mortar. Extracting, slaking, hardening, storage, precautions in handling. Lime putty. Lime as finishing material. Lime based finishing materials and products.

Mud as basic material for construction, Mud plaster and mortar. Types of soil and soil stabilisation. Mud products- stabilised blocks, etc., Mud walls construction - cob, rammed earth, wattle and daub, adobe, compressed stabilised earthen blocks. Foundation and plinth for mud structures. Damp and weatherproofing of mud structures. Mud flooring. Mud domes.

Stone in building construction. Sources, characteristics selection, seasoning, dressing, testing, deterioration, preservation and durability of stone.

Basic principles of masonry with stone. Different types of stone masonry walls. Mortar, plastering, pointing and finishes for stone masonry. Structural use of stone masonry in foundation, walls, piers, columns, arches and lintels. Masonry integrated elements such as openings, cornices and copings. Structural use of stone for beams and slabs.
Understanding all the above through sketches/ drawing/ models/ product catalogues/site visits. Drawings of typical examples.

UNIT II  BRICK AND CLAY PRODUCTS 18

Basic principles of masonry with brick. Types of brick bonding. Mortar, plastering, pointing and finishes for brick masonry. Structural use of brick masonry in foundation, walls, piers, columns, arches and lintels. Masonry integrated elements such as openings, cornices and copings. Structural use of stone for beams and slabs. Structural use of brick for roofing as Madras Terrace.

Introduction to innovative and composite construction using brick and clay products - prefabricated brick panels, precast curved brick arch panels, reinforced brick/ reinforced brick concrete slabs, prefabricated floor/ roof using structural clay units, Hourdi block roofing,

Understanding construction principles and procedures through sketches/ drawings/ models / site visits/ documentation. Drawings of typical examples.

UNIT III  STRAW AND THATCH IN BUILDING CONSTRUCTION 12
Straw and thatch as building materials. Physical aspects. Properties with respect to fire, moisture, insects and pests. Thatch and straw bale roofing details.

Understanding construction principles and procedures through sketches/ drawings/ models / site visits/ documentation.

UNIT IV  DESIGN AND DETAILING USING BASIC MATERIALS 12
Innovative design and detailing of a small and simple structure for a specific purpose using basic materials applying the knowledge of materials and construction principles studied in the previous units. Design to be submitted in the form of sketches/ drawings/ detailing/ model.

TOTAL: 60 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to
CO1  Familiarity with the properties and uses of some basic building materials.
CO2  Knowledge about the construction details of the materials for structural and non structural use.
CO3  Ability to design and detail buildings using basic materials.

TEXTBOOKS

REFERENCES
OBJECTIVES

- To inform about the ways in which the characteristics of sites can be understood.
- To enable an understanding of the macro and micro impact of buildings on it.
- To give understanding of the potential/ limitations site offers to the design of buildings.
- To give exposure to different terminologies and techniques associated with site, site surveying, site analysis and site planning.
- To explore all the above through a project.

UNIT I  INTRODUCTION TO SITE AND SITE SURVEYING  15

Definition of plot, site, land and region, units of measurements. Introduction to survey and need for surveying. Methods of surveying and context of use. Chain survey and Triangulation - instruments used, method of survey and plotting into survey drawing. Plain table, Compass and the odolite surveys - method, instruments used and application. Modern surveying Instruments such as EDMs and Total Stations and their application.

Understanding of administrative maps and site drawings, including FMB.

Introduction to measuring a site, drawing out a site plan from measurements and computing area by geometrical figures and other methods. Introduction to marking plans, layout plans and centre-line plans. Importance and procedure for making these drawings and dimensioning. Procedure and precautions of setting out a plan on site.

Understanding the above through site visits to real projects.

UNIT II  SITE CONTEXT AND ANALYSIS  15

Detailed understanding of context of the site. Introduction to master plans, land use for cities, development control rules. Site selection criteria for different building typologies. Impact of building developments on the surroundings including aspects such as traffic, noise, pollution, microclimate, etc., especially in the context of large scale projects. Understanding the above through real projects/ case studies.

Site as offering potential/ limitations to architectural design. Importance of site analysis. On site and off site factors. Analysis of natural, cultural and aesthetic factors. Factors to include topography, hydrology, soils, vegetation, climate and microclimate, surface drainage, accessibility, size and shape, infrastructure, sources of water supply and means of disposal system, visual aspects, context of built environment. Introduction to detailed analysis involving aspects like contours, slope analysis, grading process, grading criteria, functional and aesthetic considerations. Maps of matrix analysis and composite analysis methods. Understanding the above through real projects/ case studies.

UNIT III  PRINCIPLES OF SITE LAYOUT AND DEVELOPMENT  15

Organisation of pedestrian and vehicular circulation. Geometric calculation for movement. Types of roads, hierarchy of roads, networks, road widths and parking regulations. Principles of positive drainage and grading for drainage. Location and design of sewage treatment plants. Methods to control soil erosion. Location of utility lines to simplify maintenance. Planning for rain water harvesting. Incorporation of services such as drinking water pipelines, fire hydrants, communication and networking facilities at site. Vegetation, landforms and water as modifiers of microclimate.

Understanding the above through real projects/ case studies.
UNIT IV  EXERCISE IN SITE SURVEYING AND PLANNING

Application of all the knowledge gained in previous units through a real/ hypothetical project involving a real site. The process would involve choosing site for a building typology or vice versa, field exercise in measuring and drawing the site, detailed site analysis, schematic site layout and development. The project will be explored through analysis/ models/ sketches/ drawings.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to:

- **CO1** Sensitivity towards aspects of site at macro and micro contexts.
- **CO2** Ability to exploit potential of site to design the built environment.
- **CO3** Ability to measure, draw, analyse and plan a particular site for a specific purpose.

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AR3321  ADVANCED SPACE DESIGN STUDIO

OBJECTIVES

- To enable an understanding of the fundamental possibilities of architectural form and space in relation to human experience and use within the context of the immediate living environment.
- To get the above understanding through personal, first hand exploration as well as through theoretical and literature studies.
- To use this understanding to create meaningful built environment in the context of small scale projects that involve simple function and experience.

CONTENT

Designing a built environment requires the development of individual capacity for thought with respect to subjective and objective aspects. Studying and designing projects of small scale that involve a more immediate and basic experience is important in this context. The study and project exploration will involve the following aspects from first principles as well as through live studies and
theory – human behaviour, activities and needs for various purposes, role of specific form/space in creating particular experiences and effects, built form-open space relationships, spatial organisation, environment behaviour aspects (especially those relating to children), lighting and ventilation, site as a positive tool in all scales, potential of materials and construction. Through this, both the qualitative and quantitative attributes of design can be understood and engaged. This would give training in the ingenious use of architecture to fulfil goals towards a responsive and stimulating environment.

The techniques used for study and presentation can align themselves towards the above, such as cognitive maps, sketches, manual drawings, physical models with simple materials. The scale and complexity of projects will be commensurate with this - small to medium size projects involving buildings/ small campuses with simple circulation, passive energy, multiples of single unit space, single use buildings. Some suggestive projects are small buildings or small campuses involving civic/ cultural use, uses related to children such as schools, facilities for people with special requirements. The number of projects is left to the discretion of the faculty based on scale and complexity.

TOTAL: 135 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 Ability to perceive, understand and represent fundamental attributes of form-space with respect to human experience and use.

CO2 Ability to ideate, innovate and create meaningful built environment in basic human situations.

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OBJECTIVES

- To introduce the nature of evolution/determinants of human settlements.
- To give an understanding of regional manifestations in settlements and architecture as evolving from contextual forces.
- To give familiarity to the methods and approaches for the study of regional/vernacular built environment.
- To study the important manifestations of regional/vernacular architecture and settlements in different regions of India.

UNIT I  HUMAN SETTLEMENTS AND THEIR DETERMINANTS  7
Determinants of morphology of human settlements – climate, culture, socio-economic aspects, geography, etc., Differentiating between rural and urban settlements. Overview of settlement evolution in India. Relation between settlement morphology and architecture. Discussion of the terms traditional architecture, regional architecture, indigenous architecture, vernacular architecture, etc.,

UNIT II  STUDY OF VERNACULAR/REGIONAL ARCHITECTURE  8
Vernacular/regional architecture as a process and responsive design. Concepts, approaches, survey and study of vernacular/regional architecture - aesthetic, architectural, anthropological, etc., General aspects to be studied in vernacular/regional architecture of India –climatic response, forms, spatial planning, socio-cultural aspects, symbolism, colour, art, materials of construction and construction technique, etc.,

UNIT III  SETTLEMENT MORPHOLOGY AND REGIONAL ARCHITECTURE OF GUJARAT AND RAJASTHAN  10
Determinants and morphology of rural and urban settlements in Gujarat. Vernacular/regional architecture of Gujarat as particular productions. Determinants and morphology of rural and urban settlements in Rajasthan. Vernacular/regional architecture of Rajasthan as particular productions.

UNIT IV  SETTLEMENT MORPHOLOGY AND REGIONAL ARCHITECTURE OF KASHMIR AND BENGAL  10

UNIT V  SETTLEMENT MORPHOLOGY AND REGIONAL ARCHITECTURE OF TAMILNADU AND KERALA  10
Determinants and morphology of settlements in Kerala. Vernacular/regional architecture of Kashmir as particular productions. Determinants and morphology of rural and urban settlements in Tamil Nadu. Vernacular/regional architecture of Tamil Nadu as particular productions. Colonial and modern influences.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1 An understanding of the built environment as a process and knowledge of its determinants.
CO2 Ability to analyse built environment through the knowledge of approaches to its study.
CO3 Knowledge of settlement morphologies and regional/vernacular architecture in specific regions of India.

TEXTBOOKS

REFERENCES

CO-PO Mapping

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AR3402 STRUCTURAL DESIGN OF MASONRY AND TIMBER L T P/S C 3 0 0 3

OBJECTIVES
- To enable the learning of design of masonry walls.
- To introduce concepts of reinforced masonry design
- To understand design of timber beams.
- To enable the learning of timber column design.
- To understand the analysis and design of timber trusses.

UNIT I BASIC MASONRY DESIGN
Analysis and design of masonry wall with and without openings. Use of nomograms. Design of masonry wall subjected to combined action of axial load and bending.

UNIT II REINFORCED MASONRY DESIGN
Introduction to reinforced masonry design. Application to simple problems.

UNIT III DESIGN OF TIMBER BEAMS

UNIT IV DESIGN OF TIMBER COLUMNS

UNIT V DESIGN OF TIMBER TRUSSES
Analysis of plane trusses. Introduction to Determinate and Indeterminate plane trusses. Analysis of simply supported and cantilevered trusses by Method of Joints and Method of Sections. Analysis and design of timber trusses.

TOTAL: 45 PERIODS
COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 Ability to design structural masonry walls.
CO2 Ability to design reinforced masonry walls
CO3 Ability to design timber beams, columns and trusses by applying the code provisions.

TEXTBOOKS

REFERENCES
2. IS 883 – Code of Practice for Design of Structural Timber in Buildings.
5. SP10- Nomograms for Thickness of Masonry Walls–1975
6. Arun Menon, NPTEL course on Design of Masonry Structures.

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AR3403 WATER SUPPLY AND SANITATION IN BUILDINGS L T P/S C 3 0 0 3

OBJECTIVES
- To introduce and give knowledge about the different environmental services for human environment- water supply, sewerage, drainage, waste management and plumbing systems.
- To give familiarity about sustainable practices and systems for environmental services.
- To enable the conceptual design of small buildings/ campuses for environmental services.

UNIT I WATER SUPPLY
Water supply system at macro level - sources, pumping, reservoirs, water treatment, tanks, piping systems and materials. Quantitative and qualitative requirements of water for different activities in a small building/campus of simple typologies. Overhead tanks, underground sumps, fire fighting storage, water meter, R.O. Plant, water heating systems, solar water heaters, fixtures and fittings for a small building/ campus. Design calculations for the same and related mechanical equipment. Sustainable practices and systems.
Site visits with documentation in the form of sketches/ drawings/ photos.

UNIT II SEWERAGE
Sewage and sullage. Sewerage systems. Different types/stages of sewage treatment at city level. Sewer line, gradients, manholes, inspection chambers. One pipe/ two pipe plumbing systems. Sewage treatment at campus/ building level -sewage treatment plants, septic tank, leach pits.
Sustainable practices and systems. 
Site visits with documentation in the form of sketches/ drawings/ photos. 

**UNIT III**  
**DRAINAGE AND WASTE MANAGEMENT**  6
Solid waste- types, segregation and refuse collection. Disposal - Incinerator, composting, vermicomposting, sanitary land filling, bio gas system, modern renewable energy system. 
Site visits with documentation in the form of sketches/ drawings/ photos.

**UNIT IV**  
**PLUMBING SYSTEMS IN BUILDINGS**  9

**UNIT V**  
**DESIGN FOR ENVIRONMENTAL SERVICES**  10
Site planning, building and room design principles for water supply, sewage and storm water in an integrated manner for a small building and campus. Understanding of service drawings. Site visits and documentation in the form of sketches/ drawings/ photos. Conceptual design for a small building.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**
On completion of the course, the student is expected to be able to

- **CO1** Ability to understand environmental services from macro to micro level human environment.
- **CO2** Ability to adopt sustainable practices and systems for environmental services.
- **CO3** Ability to design environmental services in a building/ small campus.

**TEXTBOOKS**
5. 'National Building Code', Bureau of Indian Standards. 

**REFERENCES**

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Disaster Management

DM 1: Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation
DM 2: Initiative Training, Organising Skills, Do's & Don't's, Natural Disasters, Man Made Disasters
DM 3: Fire Service & Fire Fighting

Environmental Awareness & Conservation

EA 1: Environmental Awareness and Conservation

General Awareness

GA 1: General Knowledge

Naval Orientation

AF 1: Armed Forces and Navy Capsule
EEZ 1: EEZ Maritime Security and ICG

Adventure

AD 1: Introduction to Adventure Activities

Border & Coastal Areas

BCA 1: History, Geography & Topography of Border/Coastal areas

Total: 45 Periods

NCC Credit Course Level 2*

NX3453: (Air Force Wing) NCC Credit Course Level - II

Personality Development

PD 3: Group Discussion: Change your mindset, Time Management, Social Skills
PD 5: Public Speaking

Leadership

L 2: Case Studies: APJ Abdul Kalam, Deepa Malik, Maharana Pratap, N Narayan Murty, Ratan Tata, Rabindra Nath Tagore, Role of NCC cadets in 1965

Disaster Management

DM 1: Disaster Management Capsule: Organisation, Types of Disasters, Essential Services, Assistance, Civil Defence Organisation
DM 2: Initiative Training, Organising Skills, Do's & Don't's, Natural Disasters, Man Made Disasters
DM 3: Fire Service & Fire Fighting

Environmental Awareness & Conservation

EA 1: Environmental Awareness and Conservation

General Awareness

GA 1: General Knowledge

General Service Knowledge

GSK 1: Armed Forces & IAF Capsule
GSK 2: Modes of Entry in IAF, Civil Aviation
GSK 3: Aircrafts - Types, Capabilities & Role
OBJECTIVES

- To give introduction to wood as a material for construction straw and timber.
- To give knowledge about construction using wood.
- To facilitate in the design of buildings using wood and wood based materials.

UNIT I  BAMBOO IN BUILDING CONSTRUCTION  12
Bamboo- anatomy, properties, strength, processing, harvesting. Working with bamboo. Treatment, preservation and uses of bamboo. Joints in Bamboo. Framed construction for walls and floors. Techniques of construction of roofs with bamboo. Finishes for construction of all the above.

UNIT II  TIMBER FOR STRUCTURAL USE  18

UNIT III  TIMBER FOR NON STRUCTURAL USE  18
Timber as a material for doors, windows, ventilators, partitions, floor finish, false ceiling, panelling, handrails. Types and characteristics of timber and timber based materials such as plywood, blockboard, particle board, other types of industrial timber.

Types of timber doors, windows and ventilators as applicable- swing (single, double, degree of swing), mechanisms of operation (fixed, openable, sliding, folding, sliding and folding, pivoted, revolving, top hung, bottom hung, louvred), nature (french, corner, bay). Understanding through sketches/product literature/ case studies.

Basic components for timber door, window, ventilator of different types- outer frame, shutter frame, shutter material, hardware, fixtures, etc... Their joining and fixing procedures, insect screens. Finishing materials and procedures. Understanding of detailed drawings/ published work. Site visits with documentation in the form of sketches/ drawings/ photos. sketches/models of the principles. Drawings of typical examples.

Basic components of timber in building interior elements such as partitions, flooring, false ceiling, panelling, handrails, etc., and their different types. Different kinds of systems and methods. Drawings/ sketches of the principles. Understanding of product literature. Site visits with documentation in the form of sketches/ photos. Sketches/models of the principles. Drawings of typical examples.

Finishes for timber in all the above uses.
UNIT IV   DESIGN AND DETAILING WITH WOOD

Innovative design and detailing of a small and simple structure for a specific purpose using wood as a material applying the knowledge of materials and construction principles studied in the previous units. Design to be submitted in the form of sketches/drawings/detailing/model.

TOTAL: 60 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 Familiarity with the properties and uses of wood as a building material.
CO2 Knowledge about the construction details of wood for structural and non-structural use.
CO3 Ability to design buildings using wood.

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AR3412   DIGITAL DRAWING, VISUALISATION AND REPRESENTATION

OBJECTIVES
- To introduce computer operation principles and explore image editing through a graphical composition.
- To impart training in computer aided 2D drafting and 3D modelling through projects.
- To enable the use of computer applications to develop a design from the initial stages to the
final outcome.
- To enable the rendering of a building so as to create a photo realistic image.

UNIT I  INTRODUCTION TO COMPUTER AND IMAGE EDITING  9
Technology of small computer system. Computer terminology. Operation principles of P.C. Introduction to application software, graphic system, use of printers, scanner, plotter, file management, etc. Understanding bitmap images and vector graphics, image size and resolution. Basic tools for editing and creating graphics.
Exercise in creating visual compositions using digital graphics (pixels/vector).

UNIT II  BASICS OF BUILDING MODELLING AND VIEWING THE BUILDING MODEL  18
Creating a basic floor plan. Temporary dimensions. Adding and modifying walls. Working with compound walls. Using editing tools. Adding and modifying doors. Adding and modifying windows. Understanding the drawing unit’s settings, scales, limits, drawing tools, drawing objects, object editing, and text, dimensioning. Transparent overlays, hatching utilities, line type, line weight and colour. Multiline, polyline, etc. Styles, blocks and symbol library.
2D Drafting exercise of a simple building.

UNIT III  INTRODUCTION TO 3D MODELLING  18
Slide facilities script attributes, V-port, editing session. Introduction to 3D-modelling technique and construction planes, drawing objects, 3D surfaces setting up elevation thickness and use of dynamic projections. Solid modelling with primitive command and Boolean operation.
3D sculpture exercise using 3D primitives (cubes, spheres etc.)

UNIT IV  3D RENDERING AND SETTING  15
Rendering and scene setting to create a photo realistic picture, understanding material mapping, environment setting and image filling.
Exercise on visualising a building and exploring the potential of lights and camera.

TOTAL: 60 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 Ability to express using digital tools in the realm of visual composition, drafting, 3D visualisation and rendering.

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OBJECTIVES

- To create understanding of human built environment as a holistic, living entity from macro to micro scales, and shaped by geographic and socio-cultural forces as well as by historic, political and economic factors, through study of and design within the context of rural settlements.
- To enable a comprehensive study of rural settlement and architecture in order to understand them as exemplar of collective design that evolved through various parameters.
- To observe changes in the above, analyse their nature and causes for them.
- If required, to explore possible policy and physical interventions towards positive changes within the context studied.
- To enable design process that engages context and community.

CONTENT

Rural settlements offer an opportunity to understand basic aspects of human built environment and what goes into its making/ influences it. The interrelationship between built form and society will be studied, understood and established, starting from either end as required. Study of specific modes of rural/vernacular/traditional architecture including their morphology, local materials and construction techniques, details, meaning, etc., will be done to give an insight into the particulars and universals of architecture.

Appropriate tools and processes can be used to aid the understanding. These include different methods of historical and socio-cultural study, oral history, discussions, information collection, surveys, maps, perceptual sketches, documentation through drawings, demographic study, assimilation and analysis.

Transformations across time need to be traced to understand constants and dynamics in human society. They will also be critically evaluated through discussions with experts. Rising from this, future changes can be projected/envisaged and if found required, policy and physical interventions can be suggested/explored. The physical interventions found necessary will be taken up as design situations. This could range from individual to community level and involve any aspect of the physical environment (including building projects) as the situation/viewpoint warrants.

If the context does not warrant a building need, a small community oriented building design will be given as a separate project in addition to the rural project. For building projects, the scale and complexity of planning and construction usually involved will be simple - small or medium span, ground plus two storeyed maximum, simple horizontal and vertical movement, simple/ local materials and construction, passive energy.

TOTAL: 135 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

- CO1: Ability to collect, assimilate and integrate knowledge in a holistic manner.
- CO2: Sensitivity towards the nature and values of unselfconscious and collective design as well as the interconnectedness of human society and environment.
- CO3: Ability to observe and analyse changes in the above.
CO4 Ability to project future transformations and give possible/appropriate ways to address issues, if any.

CO5 Sensitivity in design approach in community oriented projects with respect to context, collective values and needs.

TEXTBOOKS

REFERENCES

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AR3501 ARCHITECTURE AND URBANISM OF COLONIALISM AND MODERNITY L T P/S C

OBJECTIVES
- To introduce the condition of modernity and outline its impact on society, cities and architecture.
- To give a detailed understanding of modern architecture as new expression with different strands rising from various aspects and effects of modernity.
- To create an overall understanding of the architectural developments in India rising out of colonialism, modernity and nationalism.

UNIT I COLONIALISM, INDUSTRIAL REVOLUTION AND MODERNITY


UNIT II REACTIONS TO INDUSTRIALISATION

Reactions to industrialisation in design. Arts and Crafts in Europe and America. Works of Morris and

UNIT III EVOLUTION OF MODERN ARCHITECTURE - IDEOLOGIES, MOVEMENTS AND STYLES

UNIT IV ARCHITECTURE OF COLONIALISM, MODERNITY AND NATIONALISM IN INDIA

UNIT V MODERN ARCHITECTURE – SPREAD AND LATER DIRECTIONS
Brutalism. Team X. Ideas, works and evolution of Philip Johnson, Louis Kahn, Paul Rudolph, Eero Saarinen, SOM, Eames, I.M. Pei. Modern architecture and post independence India - national building, institutions and PWD architecture. Chandigarh and Corbusier’s other works in India. Outline of evolution of the architectural profession in India, influences on architects. Outline of modernist architecture of India. Works of Kanvinde, Habib Rehman, Raje, early works of B.V. Doshi, Charles Correa, Uttam C. Jain, Hasmukh Patel

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 An understanding of modernity as a fundamental transformation in Western society that spread across the world and the resultant architectural production.
CO2 An insight into the development of various strands of modernism and modern architecture.
CO3 An understanding of architecture of colonialism, nationalism and modernity in India.

TEXTBOOKS

REFERENCES
OBJECTIVES
- To inform about different methods of design of structures.
- To enable design of concrete beams.
- To enable design of slabs, staircase.
- To enable design of column.
- To enable design of foundations under axial loading.

UNIT I  DESIGN METHODS - INTRODUCTION  5
Concept of elastic method, Ultimate load method and limit state method. Advantages of limit state method over other methods.

UNIT II  LIMIT STATE DESIGN OF BEAMS  10
Analysis and design of singly and doubly reinforced rectangular and flanged beams for bending and shear. Design of Continuous Beams using IS 456 codal coefficients.

UNIT III  LIMIT STATE DESIGN OF SLABS  11
Behavior of one way and two way slabs. Design of one way and two way slabs for various edge conditions. Torsion effects. Design of simply supported and fixed circular slabs subjected to uniformly distributed loads. Types of staircases. Design of dog legged staircase.

UNIT IV  LIMIT STATE DESIGN OF COLUMNS  8

UNIT V  LIMIT STATE DESIGN OF FOUNDATION AND RETAINING WALL  11

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1  Ability to understand the different concepts of WSM and LSM.
CO2  Ability to design RCC beams, slabs, staircase, columns, foundations and retaining wall.

TEXTBOOKS

REFERENCES

CO-PO Mapping

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‘1’ = Low; ‘2’ = Medium; ‘3’ = High

AR3503 ELECTRICITY, LIGHTING AND ACOUSTICS IN BUILDINGS L T P/S C
3 0 0 3

OBJECTIVES

- To give familiarity about the different requirements of electrical services in a building.
- To give knowledge about sources, principles, products and design of lighting from artificial sources.
- To give knowledge about basics of acoustics and acoustical design of buildings.

UNIT I GENERATION OF ELECTRICITY AND DISTRIBUTION IN BUILDINGS 11
Site visits with documentation in the form of sketches/ drawings/ photos. Understanding of products, product catalogues for a small building.

UNIT II ELECTRIC LIGHTING 9
Site visits with documentation in the form of sketches/ photos. Understanding of products, product catalogues.

UNIT III LIGHTING DESIGN FOR BUILDINGS 8
Lighting calculations. Brief overview of lighting simulation and performance analysis using software. Design exercise involving lighting design for appropriate projects of simple scale through choice, calculations, layout, drawings, physical models.

UNIT IV FUNDAMENTALS OF ACOUSTICS 9
Fundamentals – sound waves, frequency, intensity, wave length, measure of sound, decibel scale, speech and music frequencies. NC curves. Permissible noise limits. Material property - absorption,

UNIT V  DESIGN FOR ACOUSTICS
8
Basic principles in acoustic designing of classroom, lecture and conference hall, offices, open air theatre, auditorium, concert hall, theatre, cinema, recording studio. Understanding of drawings/details related to real acoustic design projects. Site visits with documentation in the form of sketches/drawings/photos. Simple problems based on reverberation time and absorption coefficients.

TOTAL:45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to
CO1 Ability to understand electrical services in a building.
CO2 Ability to design artificial lighting in a building.
CO3 Knowledge of principles of acoustic design in different building typologies.

TEXTBOOKS

REFERENCES

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To give an introduction to cement and concrete as materials for building construction.
To help understand the principles, types, methods of construction and applications of concrete for structural and non-structural building components.
To enable design and detail using concrete in buildings.

UNIT I  INTRODUCTION TO CEMENT AND CONCRETE  12

UNIT II  CAST IN-SITU CEMENT CONCRETE IN BUILDING CONSTRUCTION  21
Construction principles and procedures for building components using cast in situ cement concrete (plain and reinforced). Components to include different types of foundations, columns, beams, slabs, walls, lintels and sun shades, staircases, sump, water tank, flooring. Drawings/ models/ sketches of the principles. Understanding of detailed drawings/ published work. Site visits with documentation in the form of sketches/ photos. Drawings of typical examples.

UNIT III  PRECAST CONCRETE, SPECIAL CONCRETES AND INNOVATIONS  15

UNIT IV  DESIGN AND DETAILING USING CONCRETE  12
Design and detailing exercise involving concrete as primary construction material in an appropriate typology involving a simple scale project. The project will integrate knowledge from all the previous units. Design and construction details in the form of drawings, sketches and models.

TOTAL: 60 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1  Ability to use concrete as a versatile material in different contexts.
CO2  An understanding of the concepts of concrete as a building construction material.
CO3  Ability to design and detail specific components in concrete where there is scope for architectural design.
CO4  Ability to use concrete innovatively in simple projects.

TEXTBOOKS
REFERENCES
5. Alan Blanc, 'Stairs, Steps and Ramps', Butterworth, Heinemann Ltd., 1999
8. Pamphlet and Manuals of SERC, BMPTC, HUDCO and other research organisations.

CO-PO Mapping

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AR3521 URBAN ARCHITECTURE DESIGN STUDIO L T P/S C 0 0 10 10

OBJECTIVES
• To introduce the challenges involved in the design of projects and typologies related to diverse needs and ways of contemporary urban life.
• To enable exploration of the above projects and typologies with perception, socio-cultural awareness and innovation.

CONTENT
Human environment today is synonymous with heterogeneity of populace and their diverse needs and lifestyles. Private and public spaces for varied programmes such as living, working and socio-cultural needs bring individuals and groups in intersection or proximity to each other. Further, current transformations in urban society have led to many changes in buildings. The challenge within the discipline of architecture is not only to create conducive spaces for contemporary ways of life within particular contexts, but also to identify issues and programmes and address them in innovative ways. These would include urban living, urban working, socio-cultural life, urban recreation, etc., Achieving comfort without sacrificing on density would also be a concern, along with exposure to building byelaws and barrier free environment. The approach and projects will be directed towards
one or more of these aspects.
The tools and techniques engaged for study and design can be those which are best suited to study
the above, including mapping of urban patterns/ways of life and needs, demographics, socio-cultural
aspects, densities, land use, etc.,
Projects will address specific situations/scenarios/typologies characteristic of urban life and context,
either single or mixed use. They will be of medium to large scale, involving repetitive or unique
spaces, low or mid rise buildings with passive/active energy. The number of projects is left to the
discretion of the faculty based on scale and complexity.

TOTAL: 150 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1  Ability to understand the nature, needs and ways of contemporary urban society as well as
relate the existing built environment as a reflection of this.

CO2  Ability to draw from this understanding and identify issues/ challenges involving
contemporary urban life and the built environment.

CO3  Ability to give appropriate/ innovative design solutions in the above context.

TEXTBOOKS
   Hill, 2010.

REFERENCES
6. Luis Alexandre Casanovas Blanco (Ed), 'After Belonging: Objects, Spaces, and Territories
   of the Ways We Stay in Transit', Lars Muller Publishers, 2016.

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AR3601  SPECIFICATION, ESTIMATION AND BUDGETING  L T P/S C
3 0 0 3

OBJECTIVES
- To give basic understanding of specification writing and how to draw specification for the different
  items of a building.
- To give knowledge about different types of estimates and introduction to cost estimation.
• To prepare detailed estimates and basic rate analysis.
• To give understanding of how to prepare valuation of real and rental property.
• To give exposure to budgeting in projects.

UNIT I  SPECIFICATION AND SPECIFICATION WRITING  9

UNIT II  ESTIMATION  9

UNIT III  DETAILED ESTIMATE  11
Deriving detailed quantity estimates for various items of work for a single storied building. To include earthwork excavation, brick work, plain cement concrete, reinforced cement concrete works, wood work, iron works, plastering, painting, flooring, weathering course. Rate analysis for some basic items of work.

UNIT IV  VALUATION  8

UNIT V  BUDGETING  8

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1  An understanding of the art of building construction through specification writing.
CO2  Ability to work out the approximate estimate and detailed estimate for small scale building projects.
CO3  An understanding of valuation and budgeting.

TEXTBOOKS

REFERENCES
2. Latest Schedule of Rates of P.W.D.
3. Latest Data book of P.W.D.
4. PWD Standard Specifications. India Govt Publication.

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**AR3602 STRUCTURAL DESIGN OF STEEL**

**OBJECTIVES**
- To introduce basic structural members in steel.
- To enable an understanding of the types, efficiency and strength, advantages and disadvantages of bolted and welded joints.
- To enable the design of tension members, beams and columns under different conditions.

**UNIT I INTRODUCTION TO STRUCTURAL STEEL**
Introduction to properties of steel, Standard sections, advantages and disadvantages of steel as construction material.

**UNIT II BOLTED AND WELDED JOINTS**

**UNIT III TENSION MEMBERS**

**UNIT IV COMPRESSION MEMBERS**

**UNIT V FLEXURAL MEMBERS**
Introduction. Laterally supported and unsupported beams. Design of laterally supported beams using limit state method.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**
On completion of the course, the student is expected to be able to
- **CO1** Ability to design steel joints for maximum efficiency and strength.
- **CO2** Ability to design tension and compression members for different conditions by applying the code provisions.
- **CO3** Ability to design different types of laterally unsupported and supported steel beams for different conditions.

**TEXTBOOKS**

**REFERENCES**
5. SP 6 IS Handbook for Structural Engineers.

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**OBJECTIVES**

- To give exposure to the science behind air-conditioning systems, the different types and applications.
- To enable understanding of architectural aspects related to air-conditioning systems and take appropriate design decisions.
- To inform about fire protection, fire safety and fire fighting in buildings and how to plan for the same.
- To inform about mechanical transportation systems for buildings and how to plan for the same.

**UNIT I**  
**PRINCIPLES AND SYSTEMS OF AIR CONDITIONING**  
Thermodynamics. Transfer of heat. Refrigeration cycle components. Vapor compression cycle. Refrigerant, Compressor, condenser, evaporator, refrigerant control devices, electric motors, air handling units, cooling towers. Cooling load. Air conditioning systems for buildings of different scales and their requirements - window type, split system, package unit, direct expansion system, chilled water system, fan coil unit, district cooling systems. Energy efficient systems, environmental aspects and latest innovations.

Understanding all the above through product literature/field visits.

**UNIT II**  
**DESIGN ASPECTS OF AIR CONDITIONING SYSTEMS**  
Design criteria for selection of air conditioning. Configuring/sizing of mechanical equipment, equipment and spaces for them. Horizontal and vertical distribution of services for large buildings. Exercise on the above through choice, calculations, layout, drawings.

**UNIT III**  
**FIRE SAFETY**  

Understanding all the above through product literature/field visits. Exercise on design of fire safety systems for different building types through choice, calculations, layout and drawings.

**UNIT IV**  
**MECHANICAL, COMMUNICATION AND SECURITY SYSTEMS**  

Understanding all the above through product literature/field visits. Exercise on the above through choice, calculations, layout and drawings.

Access control CCTV system. Security and surveillance systems. Telecommunication and related information technology based facilities. Understanding the above through product literature/field visits.
UNIT V INTEGRATION OF SERVICES INTO ARCHITECTURAL DESIGN

Principles of grouping and integrating of all services for horizontal and vertical distribution in a multi-storeyed building/ large building. Services to include vertical transportation, electrical, communication, air conditioning and fire safety, communication and security systems.

Integrating service requirements into architectural design in an appropriate typology involving a simple scale project through sketches/ conceptual layout and sections/ drawings.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1 Familiarity with different air conditioning systems, their context of use and basics of planning involved.

CO2 An understanding of fire safety, fire fighting, fire prevention and installations in buildings.

CO3 An understanding of mechanical, communication and security systems in a building.

CO4 Ability to design building layouts and sections for service integration.

TEXTBOOKS


REFERENCES

4. ISHRAE, 'All about AHUs- Air Handling Units'.

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**NX3651**  
**(ARMY WING) NCC Credit Course - III**  

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**TOTAL: 45 PERIODS**

### NCC Credit Course Level 3*

**NX3652**  
**(NAVAL WING) NCC Credit Course - III**  

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PRINCIPLES OF FLIGHT

PF 1 Principles of Flight 3
PF 2 Forces acting on Aircraft 3

NAVIGATION

NM 1 Navigation 2
NM 2 Introduction to Met and Atmosphere 3

AERO ENGINES

E 1 Introduction and types of Aero Engine 3
E 2 Aircraft Controls 3

TOTAL: 45 PERIODS

AR3611 STEEL, GLASS AND PLASTIC IN BUILDING CONSTRUCTION L T P/S C

OBJECTIVES
• To give an introduction to metals, predominantly iron and in building construction.
• To give an overview about glass and plastics, especially in building envelope/roofing.
• To give detailed knowledge about the principles, methods of construction and applications of steel in building construction.
• To enable design and detail using steel, glass and plastic in buildings.

UNIT I METAL, GLASS AND PLASTIC


Glass as a building material. Brief history of its use through examples. Manufacture, properties and uses of glass. Types of glass - float glass, cast glass, glass blocks, foamed glass, decorative glass, solar control, toughened glass, wired glass, laminated glass, fire-resistant glass, glass blocks, structural glass. Glass and energy efficiency in buildings. Current innovations

Plastic as a building material. Brief history of their use through examples. Manufacture, properties, types, uses and application of plastics in building industry. Plastic based finishes and paints including types, composition, characteristics, context of usage, preparation and application techniques and methods. Different types of adhesives and sealants. Water proofing using plastic based materials. Plastic based materials for roofs such as fibre glass, etc., Specific materials such as polycarbonate sheet and teflon. Current innovations.

Understanding of product literature and site visits with documentation in the form of sketches/photos for all the above.

UNIT II STEEL IN BUILDING CONSTRUCTION

Construction principles and procedures for structural building components using steel of different sections. Components to include foundations, columns, beams, staircases, roofs (different types of trusses, space frames, etc), roofing and glazing material. Connections between the different components and fixing. Sketches/models of the principles. Understanding of product literature/shop drawings. Site visits with documentation in the form of sketches/drawings/photos. Drawings of typical examples.
Overall understanding of total structures such as geodesic dome, space frame, diagrid, etc. Outline of prefabrication in steel. Preco beams, cellular beams, composite slim floor beam. Steel curtain wall glazing. Recent trends in roofing materials like corrugated GI Sheets, corrugated hypar shells, pre-coated metal sheets. Cable Structures.

UNIT III METAL, PLASTIC AND GLASS IN DOORS, WINDOWS VENTILATORS AND INTERIOR COMPONENTS 18
Outline of steel, aluminium, PVC/UPVC material for doors, windows and ventilators. Comparing their characteristics and context of use. Basic components for door/ window/ ventilator of different types-typical sections for outer and shutter frame, shutter material, hardware and fixtures, etc., Their joining and fixing procedures, insect screens. Finishing materials and procedures. Sketches/models of the principles. Understanding of product literature/shop drawings. Site visits with documentation in the form of sketches/photos. Outline of specialised products such as steel rolling shutters.

Steel, aluminium, PVC/UPVC, glass, partitions, flooring, false ceiling, panelling, handrails, etc., and their different types. Different kinds of systems and methods. Sketches of the principles. Understanding of product literature. Site visits with documentation in the form of sketches/photos. Drawings of typical examples.

Basic waterproofing of buildings. Understanding of product literature. Understanding construction techniques through site visits/case studies.

UNIT IV DESIGN AND DETAILING USING STEEL, GLASS AND PLASTIC 12
A design and detailing exercise involving steel as primary construction material with glass and plastic in building envelope in an appropriate typology involving a simple scale project. The project will integrate knowledge from all the previous units. Design and construction details in the form of sketches/drawings/models.

TOTAL: 60 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 Knowledge of properties of ferrous and non ferrous metals as materials for buildings.
CO2 Knowledge of the use of glass and plastics in building industry.
CO3 An understanding of possibilities of steel as an important building construction material.
CO4 Ability to use steel, glass and plastic appropriately in building projects.

TEXTBOOKS

REFERENCES
AR3621  ENVIRONMENTAL DESIGN STUDIO  
L T P/S C 
0 0 10 10

OBJECTIVES
- To introduce buildings as consumers of resources for human needs and to enable responsible, creative addressing of this fact through design choices.
- To enable an understanding of architectural design as integrating diverse functional concerns in a complex building through analysis and innovation.
- To impart training in the resolving of spatial considerations with other physical aspects such as structures, services and climate.

CONTENT
Architecture is a man made addition to the world and is resource intensive. The questions in this regard are how to simplify needs and means. Concerns of sustainability drive the basic act of designing through the act of making. Further, architecture today is also required to integrate several physical concerns in a building as human needs in built environment have become more complex with respect to intensity, distribution and interdependency of activities/programmes. Here the challenge is to address complex, service intensive needs in an efficient and innovative manner so as to conserve/optimise resources and use them in an ingenious manner. Appropriate tools and techniques can be used in study and design.

Following this, the nature of projects can be either or both of these- 1) simple scale, ordinary or special use projects examining design through resources of different types 2) large, complex projects (multi storeyed buildings, office complexes, buildings for healthcare, performing art centre, etc.,) that need technical resolution and/or balance of various aspects. Aspects to be addressed can be urban land as resource, planning integration and detailing, sustainable building practices, green issues, alternative energy, intelligent building techniques and service integration, advanced building practices, appropriate materials and construction, sensitive and optimal use of resources. The number of projects are left to the discretion of the faculty based on scale and complexity.

TOTAL: 150 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1  Ability to critically and sensitively understand and address issue of resources.

CO2  Ability to balance diverse aspects/concerns of buildings by making informed choices and innovative design in the context of buildings with intense or complex programmes.

CO3  Ability to apply knowledge intensively in realms such as sustainable built environment, services.

TEXTBOOKS

REFERENCES

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AR3701 CONTEMPORARY ARCHITECTURE: THEORIES AND PRACTICE L T P/S C 3 0 0 0 3

OBJECTIVES
- To introduce the large scale changes from 1960s as context for new thought in architecture.
- To give exposure to the critiques of modern architecture.
- To study in detail the different post modern directions in architecture.
- To give an outline of architectural approaches across the world from late 20th century.
- To give an understanding of the trajectory of post independence architecture of India till the present.

UNIT I THE POSTMODERN WORLD- CRITIQUE AND THEORIES 7
The postmodern world and multiple world views- to include the realms of literature, economics, technology, culture, society, environment. Critique of modernist cities by Jane Jacobs. Theories and works of Christopher Alexander. Aldo Rossi’s ideas on the city. Neorationalism. Semiology. Writings of Venturi and Umberto Eco. Poststructuralism and Deconstruction.

UNIT II TECHNOLOGY AND ARCHITECTURE 7
Urban ideas/works of Soleri, Archigram and Metabolism. High Tech architecture, works of Stirling, Rogers and Piano.

UNIT III POSTMODERNISM AND DECONSTRUCTIVISM 9

UNIT IV CONTEXT AND MODERN ARCHITECTURE 10

UNIT V CONTEMPORARY ARCHITECTURE 12
Nature of contemporary society. Architectural responses and movements today -parametric design and digital processes, sustainability, globalisation, phenomenology, complexity. Ideas and works of ZHA, contemporary Dutch architecture, Bjarke Engels and BIG, OMA and Rem Koolhaas, Steven
Holl, Mcdonough, Yeong, Zumthor, Pallasma, Murcutt. Outline of contemporary architecture in the non Western world. Large scale changes in India from the 90s. Outline of post 1990s architecture of India.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 An awareness of the spread and varied later directions of modern architecture across the world.

CO2 An understanding of architectural production from the 1960s as driven by large scale changes across the world.

CO3 Familiarity with contemporary forces and directions in architecture across the world.

CO4 An understanding of post independence architecture in India contemporaneous with the rest of the world, along with its own particular influences.

TEXTBOOKS
5. Bhatt and Scriver, 'Contemporary Indian Architecture- After the Masters', Grantha Corporation, 1999

REFERENCES

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OBJECTIVES

- To introduce the evolution of the architectural profession.
- To give familiarity about the role of professional and statutory bodies as well as ethics of the profession.
- To introduce the basic aspects of running an architectural practice – fees, services, project management, etc.,
- To inform about legal aspects and legislations associated with the profession.
- To give exposure to the larger implications of professional practice in the globalised world today.

UNIT I  INTRODUCTION TO ARCHITECTURAL PROFESSION CODE OF CONDUCT AND ETHICS


Architecture as a professional service towards clients. Architect’s office and its management - organisational structure, infrastructure requirement, skills required, elementary accounts, tax liabilities. Setting up architectural practice.

UNIT II  ARCHITECT’S SERVICES, SCALE OF FEES and COMPETITIONS


UNIT III  PROJECT MANAGEMENT - TENDER and CONTRACT


UNIT IV  LEGAL ASPECTS


UNIT V  IMPORTANT LEGISLATIONS AND CURRENT TRENDS


TOTAL: 45 PERIODS
COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1 An understanding about the evolution of the architectural profession.
CO2 An awareness of the role and responsibilities of an architect in all realms.
CO3 Familiarity with the laws related to architecture.
CO4 Knowledge about current issues and aspects related to the architectural profession.

TEXTBOOKS

1. Acts and Regulations of Council of Architecture
5. Manual of Architectural Practice 2022 (Published by Registrar Council of Architecture, India)

REFERENCES

2. Tamil Nadu Combined Building Rules 2019
3. Master plans of CMDA.

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AR3703 CONTEMPORARY HOUSING L T P/S C
3 0 0 3

OBJECTIVES

- To introduce housing in the Indian context and the various agencies involved in the production of housing.
- To outline factors, aspects and standards related to housing.
- To inform about the various housing design typologies and the processes involves in housing project development.
- To inform about current issues and aspects in housing.

UNIT I INTRODUCTION TO HOUSING AND HOUSING ISSUES IN INDIA

UNIT II  
SOCIO-ECONOMIC ASPECTS  
9 

UNIT III  
HOUSING STANDARDS  
8 
UDPFI guide lines, standard and regulations. DCR. Performance standards for housing.

UNIT IV  
SITE PLANNING AND HOUSING DESIGN  
11 
Site Planning for housing. Selection of site for housing, consideration of physical characteristics of site, location factors, orientation, climate, topography, landscaping. Integration of services and parking. Housing design relating to Indian situations – traditional housing, row housing, cluster housing, apartments, high-rise housing. Case studies in India of the various types.

UNIT V  
CURRENT ASPECTS AND ISSUES IN HOUSING  
8 
Green building and sustainable practices. Disaster resistance and mitigation. Prefabrication Community participation.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 Knowledge of various issues concerning housing and housing development in Indian and global context covering a cross section of income groups.

CO2 Ability to appreciate socio-economic aspects in housing.

CO3 An understanding of housing standards, site planning principles, housing concepts and types.

CO4 An understanding of key issues in housing today.

TEXTBOOKS

REFERENCES
4. HUDCO Publications, 'Housing for Low Income, Sector Model'.

CO-PO Mapping

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OBJECTIVES
- To enable an understanding of architecture as having the capacity to critically interpret and transform status quo in the built environment and society through the act of design.
- To guide in the taking of critical/philosophical/ideological positions respect to various aspects of contemporary life and to explore architectural morphology as an expression of those positions.
- To encourage propositions/projections directed at positive future transformations.

CONTENT
Architecture as a discipline balances many concerns in the creation of buildings. However, it also represents ideas and production reacting to/reinforcing/anticipating/transforming specific aspects of the existing world towards a more desirable future. This could spring from individual perspectives as well as through concerted efforts which then become movements. Architecture can thus seek to understand, reflect, strengthen, question, change status quo. The process of design can thus offer a possible, intended future.

Projects/design situations will be given in this regard which address issues/programmes of current society with a larger impact in terms of scale or importance. Different realms/aspects of contemporary life can be explored. Some possible projects/area of inquiry are institutional campuses of significance, mixed use projects involving diverse user groups, culturally and socially important buildings, urban life, technological developments, culture, globalisation, place, meaning, identity, appropriate architecture, etc.

Suitable processes can be engaged for critical and creative thinking which could include wide and interdisciplinary reading to take critical positions, social processes, contemporary processes such as mapping and diagramming, methods related to technical or empirical aspects, etc.

The particular line of thought will be taken through to completion through the processes. It is preferable to have one major project with small exercises under it if required.

TOTAL: 165 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 Ability to understand the wider implication of design decisions and their interdependency with larger processes of society.

CO2 Ability to take creative, critical and informed decisions in the context of significant projects that could shape society in positive ways.

TEXTBOOKS

REFERENCES
OBJECTIVES

- To give overall exposure to the practice of architecture, its scope, needs and challenges.
- To give familiarity about different stages in real life architectural projects.
- To create involvement in these stages as much as possible within the scope of a specific architectural practice.

CONTENT

Practical Training will be done in offices/ firms in India, empaneled by the institution, in which the principal architect is registered with the Council of Architecture. The student will attempt to learn as much of aspects involved in real life projects as possible through direct involvement, and wherever that is not possible, through study and indirect observation. The aspects include initiation and ideation of project (including competitions), study research in specific areas, development of concepts into schematic drawings, or approval process, presentations and working drawings, involvement in office discussions and client meetings, integrating structural and service concerns, estimation and tendering processes, site supervision and coordination in the construction process. The progress of practical training will be assessed periodically internally through submission of log books along with work done by the students in terms of drawings, reports, etc., along with the regular progress report from the employers.

The students will be evaluated based on the criteria related to their contribution in the office some of which are given below.

- Understanding and involvement in the process of architectural practice within the scope of the specific office in which training is undertaken.
- Adherence to time schedule, overall responsibility and professional conduct.
- Ability to carry out the instructions on preparation of schematic drawings, presentation drawings, working drawings and skill in this regard.
- Ability to participate and contribute to research, study, ideation.
- Ability to work as part of a team in an office and contribute to related activities.
- Ability to participate in client meetings and discussions.
- Involvement in supervision at project site.
- Involvement/ initiative/ participation in any other aspects during the course of the training.

At the end of the Practical Training, a portfolio of the specific work done by the student during the period of internship certified by the office should be submitted for evaluation through a viva voce examination.

TOTAL:  PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1 An overall idea of the nuances of architectural practice.
CO2 An understanding about the total process that goes into the making of a building.
CO3 Clarity about the field of architecture that could be carried forth to the higher semester(s).
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AR3901 URBAN DESIGN

OBJECTIVES

- To create an understanding of urbanism and urban morphology as rising from various forces through history.
- To introduce the components of the modern city and their interdependencies.
- To introduce the scope and nature of urban design as a discipline.
- To introduce key theories associated with urbanism and cities.
- To create awareness of contemporary urban issues and how they are addressed.
- To give exposure to ways of perceiving, documenting and analysing cities.

UNIT I URBANISM IN HISTORY


UNIT II MODERN URBANISM

Industrialisation and impact on urbanism. American grid iron planning. Theories, ideas and practice of good urban planning/cities/urbanism in early 20th century. Outline of modernist cities and urbanism across the world. Morphology of Indian modernist cities of Chandigarh, Bhuvaneshwar and Gandhi Nagar. Components of modern urbanism such as blocks, density, neighbourhood, streets etc., and their interdependencies. Evolution of urban design as a discipline, its scope and objectives.

UNIT III CITIES AND URBANISM THROUGH TEXTS AND THEORIES

Introduction to and discussion of key texts and theories of cities and urbanism - Imageability and Lynch, Townscape and Cullen, Genius Loci and Schulz, historic city and Rossi, social aspects of urbanism and the works of Jane Jacobs, William Whyte and Jan Gehl, Collage City and Colin Rowe, current theories and texts.

UNIT IV CONTEMPORARY URBANISM AND URBAN INTERVENTIONS

Understanding aspects, issues and solutions related to urbanism today through study of literature and best practices/case studies in urban design. Topics to include urban decay, change and renewal, place making, heritage, conservation, identity, suburban sprawl, gated communities, generic form, privatisation of public realm, role of real estate, transportation, zoning, globalisation, technology, digital age, sustainability, community participation, gender, class, power.

UNIT V URBAN STUDIES

Introduction to study and interpretation of cities (especially Indian) through understanding published studies/ analysis. The focus will be on components/aspects as well as tools/methods. Tools and
methods to include different types of maps/mapping, drawings, sketches, photo documentations, reading, data collection, analysis. Aspects to include topography, geology, hydrology, micro climate, vegetation, urban density, growth, city limits/boundaries, history, urban architecture, typologies, infrastructure, land parcels, public space, demographics, patterns of usage, land use.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**
On completion of the course, the student is expected to be able to

**CO1** Awareness of the evolution and characteristics of urban forms, their components and interdependencies.

**CO2** Understanding of urbanism through theories, aspects, issues and solutions.

**CO3** Knowledge of ways to look at and interpret urbanism today.

**TEXTBOOKS**

**REFERENCES**

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**AR3902 LANDSCAPE AND ECOLOGY**

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**OBJECTIVES**
- To introduce the different ways in which humans have shaped and designed landscapes across history and region in terms of need, culture and experience.
- To give an overview of ecological balance and impacts of human activities today and stress on the role and scope of landscape design in sustainability and environmental conservation.
- To provide familiarity with the various elements and principles of landscape design and its contribution to human built environment.
- To introduce analytical, artistic and technical aspects involved in site planning, open space and outdoor design.
UNIT I  LANDSCAPES IN HISTORY  10

UNIT II  BASICS OF ECOLOGY  7
Introduction to landscape architecture as a discipline and field. Basic concepts of ecology and the impact of human activities on them. Bio, Geo, chemical cycles including water cycle, carrying capacity of an ecosystem. Environmental impact assessment. Reclamation and restoration of derelict lands.

UNIT III  ELEMENTS IN LANDSCAPE DESIGN  10
Introduction to hard and soft landscape elements. Different types of hard landscape elements. Plant materials, water and landform - classification, characteristics, use and application in landscape design.

UNIT IV  SITE PLANNING  10
Organisation of spaces in the outdoor environment. Role of circulation and built form in shaping the environment. Role of landscape design in design of neighbourhood parks, children's play area and campus development.

UNIT V  LANDSCAPING OF FUNCTIONAL AREAS  8
Urban open spaces and principle of urban landscape. Street landscaping, landscape design for waterfront areas and functional areas in urban centres. Green infrastructure including green roofs and walls.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1  An understanding of reasons for evolution of landscapes across time and context.
CO2  Ability to discern the role of natural and human actions with respect to macro scale of sustainability and ecology as well as in the micro scale of shaping of outdoor environments.
CO3  Knowledge about the elements of landscape design and their scope.
CO4  An understanding of landscape design with respect to site planning and different functional typologies of spaces.

TEXTBOOKS

REFERENCES
2. Grant W Reid, 'From Concept to Form in Landscape Design', Wiley, 2007.
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AR3903  CONSTRUCTION AND PROJECT MANAGEMENT  L T P/S C
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OBJECTIVES

• To introduce different management techniques suitable for planning and construction projects.
• To enable understanding of management systems for accomplishing the task efficiently in terms of quality, time and cost.

UNIT I  INTRODUCTION TO PROJECT MANAGEMENT

UNIT II  PROJECT PROGRAMMING AND CRITICAL PATH METHOD

UNIT III  RESOURCE PLANNING
Cost model- project cost, direct cost, indirect cost, slope curve, total project cost. Optimum duration contracting the network for cost optimisation. Steps in cost optimisation, updating, resource allocation, resource smoothing, resource leveling.

UNIT IV  COMPUTERISED PROJECT MANAGEMENT
Creating a new project, building task. Creating resources and assessing costs, refining project. Project tracking, recording actual. Reporting on progress. Analysing financial progress. Introduction to BIM.

UNIT V  CONCEPT TO COMMISSIONING
Project feasibility study. Real estate and regulatory strategies. Facility programming and planning. Design management. EPC. testing and commissioning.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1 Summarize the concepts of project management.
CO2 Construct critical path diagrams for construction projects.
CO3 Organise resources for effective project execution.
CO4 Demonstrate the use of computers for project management.
CO5 Inspect feasibility reports and projects before commissioning.

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AR3921 DISSERTATION L T P/S C 0 0 3 3

OBJECTIVES
- To inculcate the spirit of exploration and research in architecture.
- To enable the acquisition of in-depth knowledge in a specific aspect/issue in the discipline of architecture as well as develop perspectives on the same through thought, reading, study, analysis, expression, documentation.
- To enable the conversion of effort into a coherent line of thought through writing/documentation/models/any media.
- To serve as prelude to Thesis.

CONTENT
Design studio emphasises on explaining and understanding architecture primarily through the mode of making. However, architecture as a field itself is driven by explicitly stated or implicitly understood ideas/points of view of particular society and individuals. Dissertation offers an opportunity to look at architecture and built environment through phenomena, ideas, texts, intent. It involves process of observation, reflection and abstraction. Students are encouraged to choose any topic of their interest. Topics may range from analysing the works of an architect, history, typological changes, materiality, visual culture, contemporary society, cities, design process and many more. They could involve research based on primary sources in terms of doing actual field studies and/or secondary sources through reading. The dissertation proposal in about 1000 words stating the topic, issues to be explored and the scope must be submitted for approval. Work on the approved topic should start from the beginning of the semester and would be periodically reviewed.

At the end of the semester, a report that is a maximum of 100 pages should be submitted in the prescribed format. The suggested structure for the report is open- it could be writing, visual, documentation, sketches or analysis based depending on the topic. However, a written structure should tie the research together with the following areas - outline/background of the area of study, statement of objectives or research questions within the area of study, outline of methodology/way to achieve the objectives or answer the questions of research, core section with necessary content such as study/documentation (any suitable way based on the nature of topic-drawings, sketches, photos, surveys, etc.)/analysis/arguments, etc., final conclusion. The report will be presented in the viva-voce exam and defended.

TOTAL: 45 PERIODS
COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 A dissertation report with a coherent line of thought as reflected in the written structure and the core content which could be open ended.

CO2 Ability to research deeply into a subject and develop depth in thought in any specific area based on point of view, observation, analysis and study.

CO3 Ability to look at architecture from an informed, analysed and well thought out personally unique or objective perspective which would help strengthen the thesis process.

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AR3922 URBANISM AND ARCHITECTURE DESIGN STUDIO LT P/S C 0 0 11 11

OBJECTIVES
- To enable an understanding of urbanism as a continuous experience involving the interrelated disciplines of architecture, urban design and town planning.
- To understand architecture as influenced by and influencing the dynamics of cities/urbanism.
- To facilitate the taking of architectural design decisions in the context of the urban environment.

CONTENT
Urbanism is a dynamic phenomenon involving many aspects - urban growth, land use distribution and change, urban form, demographics including gender and class, cultural aspects such as place and heritage, physical infrastructure such as roads and transportation nodes, public spaces, etc.,
Architecture is an integral and large part of urbanism, shaping and being shaped by it. It can serve to include/gather society and enrich the urban environment in a seamless manner. Understanding of this aspect of architecture will be achieved by architectural projects involving interdependencies between architecture and the city. Some of the issues and areas that could be addressed are transportation nodes, heritage areas, adaptive reuse, suburban sprawl, place making, identity, collective memory, mixed use programming, large scale urban interventions, revitalisation and renewal of urban fragments, urban waterfront development, urban nodes, multi-use urban complexes.

The tools and techniques can include contemporary ways/tools of perceiving, gathering and analysing data, inclusive, collaborative and participatory approaches, etc.

It is preferable to have one major project with small exercises under it if required.

TOTAL: 165 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 Ability to perceive and design buildings as contributing to/transforming the urban fabric.

CO2 Ability to bring inclusivity into the architectural design process.

TEXTBOOKS

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AR3081 THESIS

OBJECTIVES
• To ensure consolidation and application of the knowledge gained in preceding years of architectural education in the context of an architectural design project of the student’s choice.
• To enable identification and addressing of key issues/aspects inherent in a project or to enable development of thought processes in specific issues/aspects/situations leading organically to an architectural design project.
• To facilitate development of ability to handle and complete projects independently as a precursor to professional life in architecture.
CONTENT
Thesis is the culmination in the journey of architectural education that encapsulates ability of design exploration and skills of design execution. Students should decide a thesis topic of their choice in terms of design potential and/or idea/issue exploration. The topic could be project based with specific areas of study/ approach or study/ approach based leading to a project. If the latter, care should be taken to choose topics that can lead to sufficient architectural design component. Students should submit the topic for approval with a rough outline of their interest in the topic, the nature of the project, area of focus, study and design scope, challenges, possible case studies, methodology and outcome. The areas of study/research/design can include any of the broad areas of the discipline - contemporary needs of society, history, theory, architectural philosophy, sustainability, structural or service oriented design, projects that involve complex planning and integration of several aspects, appropriate architecture, urban design, contemporary processes, social housing, urban oriented architectural design, conservation oriented architectural design, etc. The progress of work will be reviewed periodically throughout the semester. At the end of the semester, students should submit the final thesis project for the viva voce exam. The final submission will comprise of study sheets, optional study models, design approach sheets, optional design process models, design presentation sheets, final model, detailed drawings of an important part of the project, project report summarising the entire thesis work and soft copy of all the work.

TOTAL: 345 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to
CO1  Skill, knowledge and expertise in the domain of architectural design.
CO2  Ability to handle a major architectural project independently through all stages.
CO3  Ability to intensify thought process directed at a specific area of focus and convert it to a product.

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AR3001  DESIGN PROCESS AND THINKING  L  T  P/S  C
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OBJECTIVES
- To give understanding of design as a broader field and the changing role of designer in society.
- To give exposure to methodologies, theories and models of the design process.
- To give deeper understanding of the process of creativity as well as to introduce techniques which will enable creative thinking.
- To introduce collaborative design and consideration of all stake holders.
UNIT I  INTRODUCTION TO DESIGN
Definition and understanding of design as a fundamental activity of humans. History of design process - earliest times through Renaissance, Beaux Arts, Bauhaus, contemporary processes. Classification of design - according to scale, process, mode of production, etc., Self-conscious and unselfconscious design. Design through drawing and design through craft. Pragmatic design, iconic design, analogic design, canonic or syntactic design.

UNIT II  DESIGN METHODOLOGY
Context for the rise of the design methodology movement from the 1950s with the critique of modernism. Theories of the first generation and the second generation design methodologists. Design as wicked problem. Escalation and regression in design. Different approaches to design process - parametric or analysis/ synthesis/ evaluation, conjecture-refutation, paradigmatic. Current ideas on Design Thinking in different disciplines including IDEO. Exercises using different methodologies.

UNIT III  CREATIVE THINKING

UNIT IV  CREATIVITY AND PEOPLE
Design as social process. Team work and group creativity. Consensus in design decisions. Participatory approach to design. Stakeholders, iteration and the design process. Exercises involving roleplaying.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1  Ability to think about architecture as one of the many fields under the broader ambit of design as a fundamental human activity.
CO2  Self awareness with respect to the creative process.
CO3  Ability to engage different processes to give creative output in an appropriate manner.
CO4  Awareness of the importance of considering people/ stakeholders in the design process.

TEXTBOOKS
10. Design Process in Architecture, Geoffrey Makstutis, Laurence King 2018

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**AR3002 SUSTAINABLE DESIGN**

**OBJECTIVES**

- To give understanding of the concept of sustainability and sustainable development in the context of issues like climate change, ecological footprint, etc.
- To inform about concepts of sustainable settlements design.
- To give knowledge about passive building design.
- To inform about the role of material and construction practices in sustainability.
- To inform about the concept of green buildings and rating systems.

**UNIT I INTRODUCTION TO SUSTAINABILITY**


**UNIT II SUSTAINABILITY IN SETTLEMENT DESIGN**


**UNIT III SUSTAINABILITY IN BUILDING DESIGN**

Sustainable site selection and development. Simple passive design considerations involving site conditions, building orientation, plan form and building envelope for sun and wind. Passive heating of buildings- direct, indirect and isolated gain. Passive cooling of buildings – shading of buildings, insulation, induced ventilation (air vents, wind tower, etc..), radiative cooling, evaporative cooling, earth coupling, dessicant cooling.

**UNIT IV SUSTAINABILITY IN MATERIALS AND CONSTRUCTION**

UNIT V BUILDING RATING SYSTEMS

Concept of Green Architecture/Buildings. Rating systems - LEED, TERI, GRIHA and BREEAM.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 An overall understanding of sustainability and its relation to human activities.
CO2 Knowledge about sustainable design of settlements, buildings, materials and technology.
CO3 Familiarity with evaluation systems for green buildings.

TEXTBOOKS

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AR3003 STRUCTURE AND ARCHITECTURE L T P/S C 3 0 0 3

OBJECTIVES

- To outline the evolution of structural systems through history.
- To introduce concepts of structural design through works of architects/engineers.
- To create understanding about the relationship between architectural expression/form and structure.
- To give information about contemporary structures and architecture.
UNIT I  STRUCTURES IN THE PRE INDUSTRIAL ERA

UNIT II  STRUCTURES IN THE INDUSTRIAL AND POST INDUSTRIAL PERIOD
Industrial revolution, evolution of modern typologies such as railway stations, factories, etc., Use of iron and steel. Concrete in modern architecture. Modular construction. Suspension structures. Projects by Pier Nuigi Nervi, Maillart, Candella, Buckminster Fuller, Eero Saarinen, Calatrava.

UNIT II  BUILDING TYPOLOGIES AND LARGE SPAN STRUCTURES
Evolution of building typologies with need for larger spans - airports, stadia, multiuse architecture, public architecture, exhibition pavilions, etc., Corresponding structural and material innovations based on need. Contemporary use of steel, concrete, glass, plastic and other materials. Examples of different building typologies with large span structures from late 20th century and early 21st century with focus on iconic structures.

UNIT III  STRUCTURAL DESIGN AND PARAMETRIC PROCESSES
Parametric/ digital processes and structure. Structural calculations. Iterative design process. Material and technical advancements including structural calculations, simulations, etc. Examples of buildings using all this.

UNIT V  CASE STUDY
Detailed case study of any innovative structure based on history/ typology/ structural innovation/ material innovation/ design process.

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1  Familiarity with concepts of structural design and its influence on the functional and aesthetic domains of architectural design relating to historic and contemporary periods.

CO2  Understanding of architectural expression and its relation to form, structure and changing technology.

CO3  Awareness of contemporary innovations in structures.

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REFERENCES
2. Christopher Beorkrem, 'Material Strategies in Digital Fabrication', Routledge, 2012
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**AR3004 CONTEMPORARY PROCESSES IN ARCHITECTURAL DESIGN L T P/S C**
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**OBJECTIVES**
- To introduce theories of media and its influence on the perception of space.
- To enable study of the various aspects of digital architecture and its exploration through emerging phenomena that relies on abstraction of ideas.
- To give understanding of the works of contemporary architects who have illustrated the influence of digital media in architecture.

**UNIT I INTRODUCTION**
15
Investigation of contemporary theories of media and their influence on the perception of space and architecture. Technology and art. Technology and architecture. Digital technology and architecture.


**UNIT II CONTEMPORARY PROCESS**
10
Emerging phenomena such as increasing formal and functional abstractions. Diagrams, diagrammatic reasoning, diagrams and design process. Animation and design. Digital hybrid. Exercises.

**UNIT III GEOMETRIES AND SURFACES**
9

**UNIT IV CONTEMPORARY PROCESS AND ARCHITECTURAL WORKS**
11
Ideas and works of architects related to contemporary processes. The architects to include Greg Lynn, Reiser + Umemoto, Lars Spuybroek / NOX Architects, UN studio, Diller Scofidio, Dominique Perrault, Decoi, Marcos Novak, Foreign Office Architects, Asymptote, Herzog and de Meuron, Neil Denari, Serie Architects, BIG Architects. Study to be undertaken in the form of assignments/discussions/seminars/presentations.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**
On completion of the course, the student is expected to be able to

**CO1** An understanding of the effect of contemporary theories of media on contemporary architectural design.

**CO2** Insight into contemporary design process/theories and their relation to computation.

**CO3** Ability to understand specific aspects of contemporary processes appropriate to a design situation.

**CO4** Familiarity with architectural works derived from contemporary processes.
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AR3005 HUMAN BEHAVIOUR AND BUILT ENVIRONMENT L T P/S C

OBJECTIVES
- To introduce the relationship between human behaviour and the built environment.
- To give familiarity about theories and frameworks related to human behaviour and built environment.
- To give knowledge about methods and techniques to study human behaviour in the context of specific situations.
- To give theoretical and practical basis to approach architectural design through the understanding of human behaviour.

UNIT I INTRODUCTION TO ENVIRONMENTAL PSYCHOLOGY
Introduction to the term environmental psychology as relation between human behaviour and natural and built environment. Interdisciplinary and multidisciplinary aspect of environmental psychology. Outline of history of study of human behaviour with respect to context.

UNIT II ENVIRONMENTAL PERCEPTION AND COGNITION
UNIT III  ENVIRONMENT AND BEHAVIOUR  12
Place identity and place attachment. Human behaviour in different contexts - nature, residential, work, urban public space, city, etc., Human behaviour and geometry of spaces/buildings.

UNIT IV  ENVIRONMENT BEHAVIOUR STUDIES AND DESIGN  12
Environment behaviour studies. Methods of study such as physical traces, observation, interviews, self reporting, experimental methods, mock up, post occupancy evaluation. Methods and case studies to apply environment-behaviour studies in design.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1  An overall understanding of the relationship between human behaviour and built environment.
CO2  Knowledge about various terms and aspects related to human behaviour.
CO3  An ability to study physical situations with respect to human behaviour.
CO4  Sensitivity to apply knowledge of human behaviour in design situations.

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OBJECTIVES

- To enhance the students in fundamental strategies, methods of making paintings.
- To create and experiment colour concepts and render architecture.
- To produce art works from everyday environment and to effectively communicate their observations to others.
- To have a good understanding of the various 3D art techniques.

UNIT I  DRAWINGS FROM OBSERVATION  11
Freehand drawing, Leaf study, foliage, Tree. Observational Study: Drawings from Natural objects and Manmade objects. Various shading techniques such as Hatching, Cross catching, stippling, stumbling and Blending. Principles of light and shade: Light and shade, Aware of depth, Illusion of depth, Emulate on a two-dimensional plane.

UNIT II  WATERCOLOUR SKETCHES  12
Basic watercolour practices, Painting Techniques, Reproduction, Paintings from direct observations, Still life, Life study, Outdoor study, Landscape Painting, Mixed media, Pen and Colour, Rendering massive drawing.

UNIT III  URBANSCAPE  11
Direct observational sketches & Paintings, Buildings, Indoor Sketches, Outdoor Sketches, Street sketches, Garden sketches, Landscape, Seascape, Public space, market, festivals, street scenes, monuments, recreational spaces, etc

UNIT IV  3D VISUAL ART  11

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1  Capacity to create art works with understanding of elements and principles of art.

CO2  Ability to experiment with colour techniques and visual language.

CO3  Ability to create illustrations from their direct observation.

CO4  Ability to use 3D modeling techniques and explore the creativity through 3D art.

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OBJECTIVES

- To provide familiarity with the characteristics of interior spaces and furniture across history.
- To introduce the profession of interior design and bring out its role.
- To inform about the various components of interior space and give an understanding of the design aspects involved in each.

UNIT I  INTERIOR SPACES AND FURNITURE ACROSS HISTORY  12
Outline of the characteristics of representative/exemplary interior spaces, interior decoration and furniture in the Western world from the beginnings to twentieth century. Outline of characteristics of representative/exemplary interior spaces, interior decoration and furniture in India across the ages, including living folk traditions.
Exercises in understanding historical aspects of interior spaces through literature review and case studies. Exercises involving conceptual design of contemporary interiors inspired by precedents.

UNIT II  VOCABULARY OF INTERIOR DESIGN  9
Introduction to the professions of interior decoration, interior design and furniture design, bringing out their origin, evolution and current scope of work. Definition and process of interior design.
Introduction to the design of interior spaces as related to typology, function and themes. Vocabulary of design in terms of elements (point, line, shape, form, space, colour, light, pattern, texture) and principles (balance, proportion, scale, rhythm, hierarchy, unity, contrast, harmony, emphasis, movement) with specific reference to examples from interior design.
Exercises in understanding vocabulary of design through case studies and conceptual design.

UNIT III  COMPONENTS OF INTERIOR SPACE  12
Role of interior treatment and finishes in the experience of interior spaces. Outline of the design of components such as floors, ceilings, walls, partitions, window treatments and accessories based on parameters such as context, function, ambience, materials, properties, methods of construction, colour, texture.
Role of lighting in the experience of interior spaces. Outline of different types of interior lighting systems and fixtures based on their effects and suitability in different contexts.
Role of landscaping in the experience of interior space. Outline of interior landscaping elements such as rocks, plants, water, flowers, fountains, paving, artefacts. Their physical properties and effects on spaces.
Study of representative examples for all the above. Conceptual design exercises in all the above.

UNIT IV  FURNITURE  12
Introduction to furniture design as related to parameters such as human comfort and function (including anthropometrics and ergonomics), built in or freestanding, materials and methods of construction, cultural particularities, changing trends and lifestyles, innovations and design ideas.
Study of representative examples.
Furniture design exercises involving conceptual understanding of the above.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 An understanding of interior design as an integral part of architecture and as an interdisciplinary and allied field related to architecture.

CO2 An overall exposure to the ways in which interior spaces can be enriched through the design of specific interior components.

TEXTBOOKS
REFERENCES


OBJECTIVES

- To introduce various aspects involved in the construction of buildings through the understanding of different types of architectural and technical drawings.
- To enable the understanding of architectural design as integrating spatial and technical concerns.
- To enable development of an architectural design project into schematic drawings through integrating concerns of structure, construction and services.
- To give knowledge to create architectural drawings for construction and as a base for structures and services drawings.
- To give knowledge to design, incorporate and detail architectural and interior components of the architectural design project.

UNIT I UNDERSTANDING ARCHITECTURE THROUGH BUILDING DRAWINGS

Understanding architecture as a physical, workable product through study of comprehensive set of drawings for any live building project, interpreting them and presenting their characteristics through seminars/ assignments. The drawings to be studied should include architectural working drawings from macro to micro scale- site plan, building plans, staircase details, kitchen and toilet detail of joinery, etc., structural drawings and service drawings to include electrical, plumbing, mechanical and HVAC details.

UNIT II SCHEMATIC DESIGN INTEGRATING ARCHITECTURAL DESIGN WITH STRUCTURAL AND SERVICE CONSIDERATIONS

Evolving a conceptual design project into schematic design, balancing different technical considerations. Considerations to include appropriate structural, plumbing, electrical, mechanical
and HVAC systems. Working out schemes to decide and finalise on the best possible design that integrates everything together. Scale of the project could be small to medium and include any typology, involving a newly created, quick, simple design or an older design from previous academic years.

UNIT III  ARCHITECTURAL WORKING DRAWINGS  12
Preparation of architectural working drawings for the resolved schematic design. Drawings to include site plan, centre line drawings, building drawings, detailed drawings of specific areas like staircases and wall sections, dimensions explaining the various components, joinery schedule. Design and preparation of layouts of service intensive rooms like kitchens and toilets.

UNIT IV  DETAILED DRAWINGS OF ARCHITECTURAL AND BUILT IN COMPONENTS  12
Design and preparation of detailed drawings of joinery including doors, windows and ventilators. Design and detailing out of floor, wall and ceiling finishes/ construction/ laying. Design and preparation of detailed drawings of built in furniture and components based on the room/ typology to include counters, cabinets, wardrobes, storage, fittings and fixtures, display units, workstation.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1  An understanding of all the aspects that go into the making of a building through study of drawings related to construction.

CO2  Ability to resolve spatial concerns with technical aspects of a building.

CO3  Ability to design and detail components within a building.

TEXTBOOKS

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OBJECTIVES

- To introduce the procedure of climatic design of buildings.
- To emphasize on the climatic significance of architectural “form”.
- To learn through application; the understandings of climatic design in form of design exercises.

UNIT I  SITE AND BUILDING FORM  15
Climatic data of a place: sourcing, analysing and inferring. Mahoney tables, periodic chart, Overheated periods, other climatically significant periods, activity charts of building. Site specific climatic factors; identification, listing and analysis. Land form and orientation – its effects on radiation and daylight. Open space and built form – its effects on radiation and air flow. Ground character. Climatic design of outdoor spaces and adjacent outdoor spaces – its design considerations; lowering surface temperature and air temperatures of outdoor spaces. Orientation of building; evaluation of best orientation, optimum orientation climatically. Form and proportion of the overall building and site. Exercises on analysis of the above aspects at different climatic conditions.

The geometrical form of building envelop and its climatic significance; varieties of form and its influence of heat gain and wind flow. Study of various roof forms and Study of various building form in plan, for various climatic conditions. Form and its relation to radiant and convective cooling. Optimum built form. Exercises on the application of the above understandings.

UNIT II  FORM, MATERIAL AND HEAT FLOW -  10
Form, material and heat flow. Selection of materials for climatic performance. U value and time lag calculations for various climatic situations. Homogenous material elements and Heterogeneous material elements Thermal properties of commonly used building materials. Thermal performance of some typical building section and building components. Exercises on the application of the above understandings.

UNIT III  CLIMATIC DESIGN OF BUILDING ELEMENTS – I  10
Wall opening varieties. Wall opening design considering wind, light and heat gain. Orientation, Size, Position; its climatic significance. Protection and Control of wall openings. Sunshade and Louvre design; its varieties, its performance optimization considering wind, light and heat. Exercises on design and detailing of wall openings for different of climatic conditions.

UNIT IV  CLIMATIC DESIGN OF BUILDING ELEMENTS – II  10
Courtyards and its effect on heat gain and heat loss in building interiors. Form, scale and proportion of courtyards; their climatic effect. Courtyards and ventilation inside building. Exercises on design of courtyards for applying the understanding of above aspects. Verandahs, corridors and other transition spaces and their roles. Different varieties of roof openings; their climatic significance. Water bodies in building and evaporative cooling.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

- CO1 An understanding of procedures involved in climatic design of buildings
- CO2 An understanding on the significance of architectural “form”; climatically.
- CO3 Ability to design and generate multiple iterations for various building elements climatically.

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AR3010 EARTHQUAKE RESISTANT ARCHITECTURE L T P/S C 3 0 0 3

OBJECTIVES
- To enable an understanding of the fundamentals of earthquake and the basic terminologies.
- To give basic knowledge of earthquake resistant design concepts.
- To provide familiarity with design codes and building configuration
- To enable understanding of the different types of construction details to be adopted in a seismic prone area.
- To give knowledge for applying earthquake resistant principles in an architectural design project.

UNIT I FUNDAMENTALS OF EARTHQUAKES
Earth's structure, seismic waves, plate tectonics theory, origin of continents, seismic zones in India. Predictability, intensity and measurement of earthquake. Basic terms- fault line, focus, epicentre, focal depth etc.

UNIT II SITE PLANNING, PERFORMANCE OF GROUND AND BUILDINGS
Historical experience, site selection and development. Earthquake effects on ground, soil rupture, liquefaction, landslides. Behaviour of different types of building structures, equipments, lifelines, collapse patterns. Behaviour of non-structural elements like services, fixtures in earthquake-prone zones

UNIT III SEISMIC DESIGN CODES AND BUILDING CONFIGURATION
Seismic design code provisions. Introduction to Indian codes. Building configuration - scale of building, size, horizontal and vertical plane, building proportions, symmetry of building - torsion, re-entrant corners, irregularities in buildings like short storeys, short columns, etc.

UNIT IV DIFFERENT TYPES OF CONSTRUCTION DETAILS
Seismic design and detailing of masonry structures, wood structures, earthen structures. Seismic design and detailing of RC and steel buildings. Design of non-structural elements - architectural elements, water supply, drainage, electrical and mechanical components.
UNIT V  URBAN PLANNING AND ARCHITECTURAL DESIGN

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1  Ability to understand the formation and causes of earthquakes
CO2  An understanding of the factors to be considered in the design of buildings and services to resist earthquakes.

TEXTBOOKS

REFERENCES
1. Ian Davis, 'Safe Shelter within Unsafe Cities: Disaster Vulnerability and Rapid Urbanization', Open House International, UK, 1987
2. 'Socio-economic developmental record'- Vol.12, No.1, 2005.

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AR3011  PARAMETRIC MODELLING AND CODING

OBJECTIVES
- To introduce parametric platform, various tools and its potentials.
- To impart training in parametric tools by 2D and 3D modelling through projects.
- To enable the use of parametric platform to develop a design from the initial stages to the final outcome.

UNIT I  INTRODUCTION TO PARAMETRIC MODELLING
Introduction to Parametric Modelling: Difference between Parametric and Non-Parametric Modelling; Advantages of Parametric Modelling; Introduction of Software tools like Rhino/Grasshopper, and its interface; Etc.,

UNIT II  INTRODUCTION TO CODING
Exercises in Processing (java) /Phython to understand Input/Output; Variable, Integers, Array, Operations, Object, Data Structure, List and Sort, Series/Range, Class, Function, Etc.,
UNIT III DIGITAL FORMATION
Construct Curve, Surface, Solid, Mesh Etc., in parametric setup difference between Polygon & Nurbs modelling, Poly-surfaces, b-reps and meshes, Field, Operations, Modifiers, Manipulations, Etc.,

UNIT IV GENERATIVE & PERFORMATIVE MODELS
(Grassshopper/ Processing/Phython, Etc.),
Computational Geometry: Voronoi, Delaunay Triangle, Etc;
Rule-based System: L-System (LS), Fractals, Etc.,
Performative: Simulation, Analysis, Evaluation, Etc.,

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 Familiarity with digital tools and techniques in the realm of contemporary design processes;
CO2 Ability to use parametric software to generate design variants;
CO3 Understanding of emergent possibilities in digital design, analysis and fabrication;

TEXTBOOKS
1. Form+Code by Casey Reas, Chandler McWilliams, Lust, Princeton Architectural Press/New York;
2. The Nature of Code: Simulating Natural Systems with Processing by Daniel Shiffman;
3. Elements of Parametric Design by Robert Woodbur, Bentley Institute Press & Routledge;
4. From Control to Design Paperback by Tomoko Sakamoto, Actar;
5. The Alphabet and the Algorithm by Mario Carpo, The MIT Press;
6. AAD Algorithms-Aided Design by Arturo Tedeschi, Le Penseur;

REFERENCES:
1. Patrick Schumaker, ‘ Parametricism as Epochal Style n, Antoine. ‘Digital culture in Architecture’

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OBJECTIVES

- To provide knowledge about disasters, their significance and types.
- To inform about the relationship between vulnerability, disasters, disaster prevention and risk reduction.
- To give a preliminary understanding of approaches to Disaster Risk Reduction (DRR).
- To enhance awareness of institutional processes in the country.
- To give information about how to respond to surroundings with potential disaster response in familiar areas.

UNIT I  INTRODUCTION TO DISASTERS
Disaster, hazard, vulnerability, resilience, risks. Types of disasters – earthquake, landslide, flood, drought, fire etc. Classification and causes. Impact including social, economic, political, environmental, health, psychosocial, etc. Differential impacts in terms of caste, class, gender, age, location, disability. Global trends in disasters: urban disasters, pandemics, complex emergencies, climate change. Dos and don’ts during various types of disasters.

UNIT II  APPROACHES TO DISASTER RISK REDUCTION (DRR)
Disaster cycle.. Culture of safety, prevention, mitigation and preparedness. Structural and non-structural measures. Roles and responsibilities of community, Panchayat Raj Institutions/ Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders. Institutional processes and framework at State and Central Level. State Disaster Management Authority (SDMA). Early warning . Advisories from appropriate agencies.

UNIT III  INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT
Factors affecting vulnerabilities. Differential impacts. Impact of development projects such as dams, embankments, changes in land-use etc. Climate change adaptation. IPCC scenario and scenarios in the context of India. Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV  DISASTER RISK MANAGEMENT IN INDIA

UNIT V  DISASTER MANAGEMENT: APPLICATIONS, CASE STUDIES AND FIELD WORK

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1  Ability to differentiate the types of disasters, causes and their impact on environment and society.
CO2  Knowledge about assessing vulnerability and various methods of risk reduction measures as well as mitigation.
CO3  Familiarity with real situations and responses during disasters.
REQUIRED READING

- Gupta Anil K, Sreeja S. Nair. ‘Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011.

REFERENCES


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AR3013 ART APPRECIATION

OBJECTIVES

- To introduce art as a fundamental human activity, its characteristics and ways in which it can be understood. To introduce the vocabulary of art and to enable the appreciation of art.
- To understand different productions of art as manifestations within particular contexts.

UNIT I INTRODUCTION TO ART AND ANCIENT ART

Definition of art, need for art, role of art. Art, reality, perception, representation. Appreciating art in terms of form (means, types, tools and techniques, vocabulary of art - principles and elements), content (story conveyed, meaning) and context (the situation and time of production of art).

Prehistoric Art across the world. Egyptian and Mesopotamian art. Greek and Roman art. Indian Art: Manuscript paintings, Mural paintings, Miniatures, Folk Paintings.

UNIT II WESTERN ART: RENAISSANCE TO MODERN


UNIT III INDIAN MODERN ART

Art in India during colonial period. Birth of modern art, CollEge of Arts, Madras, Bengal, Mumbai, Baroda. Subaltern art movements in India, Progressive Artists’ Group, Delhi Silpi Chakra, Cholamandal Artist’s Village, Women Artist.

UNIT IV POSTMODERN AND CONTEMPORARY


TOTAL: 45 PERIODS
COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1  An understanding and appreciation of art as basic and varied human creation related to cognition and experience.
CO2  Awareness of important art productions in the West and India.
CO3  Sensitivity towards collective and individual cultural productions as unique expressions of historical and geographic context.

TEXTBOOKS

REFERENCES
4. 'Indian Art since the early 1940s- A Search for Identity', Artists Handicrafts Association of Cholamandal Artists Village, Madras, 1974.

AR3014 CRITICAL WRITING

OBJECTIVES
- To enable the building of critical thinking through discussions, reading and writing exercises exploring specific themes.
- To enable a coherent line of thought, connecting and ordering different aspects of a situation/theme.
- To help in verbal and written expression at an advanced level.
- To facilitate applying skills in critical thinking in the realm of architecture.

CONTENT
Critical writing will help to develop thoughts/ideas/opinion on a topic backed by discussion, research and discernment.

A list of themes will be selected and offered to the class in small groups. The themes will be similar in terms of scope and workload. Students would read up on the themes and come for discussion to class. Based on the discussion, the students will hone their thoughts and read further. They would then write about the themes. These writings would be presented and discussed in class. A further development of the writing would then be done. This process would be iterated a few times so that a coherent thought process and written narrative results about the theme in consideration. The discussions and draft essay for this would constitute the first assessment.

Further to this, themes within architecture will be introduced. The training ensured in the previous
themes would be applied to looking at larger architectural themes. While the process would be the same as for the general themes, in the architectural themes, the scale would be larger and the discussions would be more one to one with faculty. There will be sessions on developing a voice, finding sources, referencing research, narrative building. One well-researched essay on a topic of interest in architecture would ensue. The length and nature of the essay will be based on the topic and will be informed during the course of the semester. The discussions and draft essay on architecture would be evaluated in the second and third assessment.

The final two essays would be submitted for the Viva Voce Examination in the form of a report.

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 Ability to think, talk, discuss, read, conclude and write about a specific topic with knowledge, insight and skill.
CO2 Clarity in identifying, connecting and structuring facts and thoughts through writing.
CO3 Ability to write an architectural essay that is perspective based supported by facts and arguments or fact based supported by analysis and argument.
CO4 Overall development of skills in critical thinking that would guide design actions.

REQUIRED READING

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AR3015 SOFT SKILLS L T P/S C
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OBJECTIVES
• To introduce soft skills as important human attribute/ quality to be developed.
• To enable development of communication skills in various scales and media.
• To enable development of skills in terms of group and team behaviour.

UNIT I INTRODUCTION TO SOFT SKILLS 9
UNIT II  INTRODUCTION TO COMMUNICATION SKILLS; LISTENING AND TALKING  

UNIT III  COMMUNICATION SKILLS – READING AND WRITING  

UNIT IV  GROUP COMMUNICATION  

UNIT V  PRESENTATIONS, INTERVIEW AND GROUP DISCUSSIONS  

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1  Familiarity with the importance of soft skills.
CO2  Knowledge about how to communicate effectively in various scales and media.
CO3  Exposure to importance of appropriate team and group behaviour.

TEXTBOOKS
1. Soft Skills, K.Alex, S.Chand, 2010

REFERENCES
2. Interpersonal Communication, Steven A. Beebe, Susan J. Beebe, Mark V. Redmond, Pearson 2011.

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OBJECTIVES

- To give knowledge about the importance of analysing a building design on various parameters.
- To give familiarity with digital tools available to model the attributes and information of a building.
- To enable the analysis and simulation of attributes and qualities of a building in order to improve the quality of design from different considerations.

UNIT I  INTRODUCTION

Importance of analysing a building design based on various parameters- energy performance, attributes of lighting and ventilation, structure, cost estimating, phasing of project, construction, administration and management, etc., Overview of different platforms available to analyse a building on its various parameters. Difference between CAD and BIM. Outline of the whole process- building modelling, giving information in terms of inputs, understanding the attributes/parameters of the model and extracting information in terms of analysis and performance. Various BIM platforms currently available- Revit, Bentley, Archicad, Digital Project, Vector works, Tekla Structures, DPpar, etc., Knowledge required by an architect as designer and as advisor in the building projects with respect to analysis of a building.

UNIT II  BASIC BUILDING MODELLING

Overview of modelling of a building - components, materials, assemblies, relational structures, objects, libraries, parametric shapes, details, property, attributes, etc., Basic modelling of a building - creating components such as walls, roofs, floors and ceilings, doors and windows, skylights, staircases and railings, etc., Adding information in terms of dimensioning. Exercise in some of the above.

UNIT III  APPLYING DETAILED ATTRIBUTES TO BUILDING MODEL

Overview of applying specification, material information, consideration of day lighting and sunpath, artificial lighting fixtures, MEP (Mechanical, Electrical, Plumbing) components, site and landscape components, applying performance information, installation and application info, sustainability information, management information, quality control information, etc., to a basic building model. Exercise in some of the above.

UNIT IV  UNDERSTANDING THE QUALITIES OF BUILDING THROUGH MODEL

Overview of how to understand, analyse the qualities and working of a modelled building through knowledge and theoretical concepts studied in previous semesters as well as through simulation of the building model. The qualities will include thermal performance, cooling load, lighting effects, etc., Extracting information from the model in terms of BOQ, cost, etc., Exercises in some of the above.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1 An understanding of the importance of modelling information and analysing model for a building.

CO2 A familiarity with making basic models, applying attributes/parameters to the model, understanding aspects of a building design through analysing the model.

TEXTBOOKS

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AR3017 CONTEMPORARY BUILDING MATERIALS L T P/S C 3 0 0 3

OBJECTIVES
- To introduce current materials and products in architecture that are eco-friendly, composite, durable, advanced, smart.
- To inform about innovations in materials and practices in building industry.
- To focus on materials and systems, their properties and connections, intrinsic relationship with structural systems and environmental performance.

UNIT I INTRODUCTION 7
Introduction and need for ultra-performance materials in building design as a substitute to conventional materials. Newer application for special performance, thermal/sound/moisture protection, fitting, equipment and furnishing. Properties of contemporary materials – multidimensional, repurposed, recombinant, intelligent, interfacial, transformant, etc.

UNIT II ADVANCED CONCRETE AND COMPOSITE REINFORCEMENT 10

UNIT III COMPOSITE MATERIALS 10
Types, terminology and classification of composite materials based on particle reinforced, fiber reinforced, structural and composite benefit in building construction. Composite materials manufacturing process. Use of composite materials namely Polymer Matrix Composites (PMCs) and Fibre- Reinforced Polymers (FRPs) along with cement, steel, aluminium, wood, glass, etc., for thermal insulation, fire protection, coating, painting and structural monitoring, etc.

UNIT IV NANO-MATERIALS AND NANO-COMPOSITES 9
Definition, manufacture and types of nano materials. Properties, performance of nano materials in building construction, types and application of nano-materials like carbon, nanotubes etc., Nano composite used with cement, steel, aluminium, wood, glass for thermal insulation, fire protection, coating and painting and structural monitoring etc.. Nano technologies in building and construction.
UNIT V  DIGITAL AND TENSILE MATERIALS


TOTAL: 45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1  Exposure to the need and use of various contemporary materials in creating innovation and ultra-performance in building design.

CO2  An understanding of characteristics and performance of the newer materials in terms of detailing and application to the context.

TEXTBOOKS


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AR3018  DIGITAL FABRICATION AND ARCHITECTURE  L T P/S C
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OBJECTIVES

- To give exposure to various digital production tools to build artefacts as part of creative design process.
- To give knowledge about utilising prototyping and modelling as a design medium that supports the full spectrum of digital design as a paperless process.
- To give knowledge about fabrication process in Digital Architecture as a way to bring software models into reality.

UNIT I  INTRODUCTION TO DIGITAL FABRICATION

Introduction to Digital Fabrication; Advantages of Digital Fabrication; Evolution of digital fabrication in architecture, overview of the impact the technology, new realm of possibilities for architectural expression, etc.,
UNIT II ADDITIVE FABRICATION 9
3d Printing, Process of 3d printing, it’s Possible Materials Etc., Case studies of Application of 3d printing in practice at different scales;

UNIT III SUBTRACTIVE FABRICATION 9
Laser Cut, CNC Milling, Water Jet Cutting, Etc., it’s Possible Materials Etc., Case studies of Application of Subtractive Fabrication in practice at different scales;

UNIT IV TRANSFORMATIVE FABRICATION 9
Robotic Fabrication, Mechanically Transformative Process, Etc., it’s Possible Materials Etc., Case studies of Application of Transformative Fabrication in practice at different scales;

UNIT V FILE TO FACTORY PROCESS 9
Preparation of File to Factory Process, Optimization of meshes/files, STL Formats, Etc.,

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 Awareness to the machines, different methods of fabrication and the workability with materials.

CO2 Ability to correlate between the design processes and Digital Prototype or Model attribute.

REFERENCES
2. Digital Fabrication, Paul Andersen, David Salomon, Sanford Kwinter, David Carson, Architecture of Patterns, W. W. Norton &amp; Co, 2010
7. Emergent Design Group, Morphogenetic Design Strategies AD, 2004
8. Farshid Moussavi, Daniel Lopez, Garrick Ambrose, Ben Fortunato, Ryan R. Ludwig and Ahmadreza Schricker, The Function of Form

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OBJECTIVES
- To give an overview of the historic evolution of Chennai city.
- To introduce its different and distinguishing characteristics including geography, topography, hydrology, ecology, demographics, economics, culture, politics, art, etc.,
- To give knowledge of the evolution of the architecture and urbanism of Chennai in the context of its history.
- To outline the current issues and characteristics of Chennai.

UNIT I PRE-COLONIAL CHENNAI REGION 7
Natural history and geography of Chennai region including its ecology, topography, rivers, coastal ecosystems, sea, estuary, wetlands, indigenous forests, lakes, tanks, flora and fauna. Pre-colonial history of Chennai region – Tamilagam, fishing hamlets, urban settlements, rural areas. Pallava architecture. Historic settlements such as Mylapore, Triplicane, West Mambalam.

UNIT II COLONIAL CHENNAI 11

UNIT III MODERN CHENNAI 11
Urbanisation in Chennai from late 19th century. Political and economic changes from late 19th century/ early 20th century in Chennai. City planning in early 20th century Chennai. Modernity in architecture- office buildings, concrete, Art Deco. Independence and city planning- Gandhi Nagar, Anna Nagar, etc., Modern architecture in Chennai. Urbanisation and Master plans in the 1970s. New typologies such as shopping and office complexes, apartment buildings, etc., The local and the global in late 20th century Chennai. Corresponding architecture of regionalism, postmodernism, material changes in buildings, etc.,

UNIT IV URBAN CULTURE 8
Overview of demographics of Chennai today. Diversity and distinctness of Chennai’s culture and corresponding expressions- art, religious festivals, literature, cuisine, dance, theatre, cinema, politics, geographic differences in culture within Chennai.

UNIT V URBAN ISSUES AND SOLUTIONS 8
Changes in 21st century Chennai- urbanisation, migration, globalisation, growth of IT, new industries and economic opportunities. Corresponding issues- urban poor and housing scenario, traffic issues, encroachment of water bodies and marshlands, waste management issues, etc., Solutions- mass transit, housing schemes, ecological restoration measures, etc.,

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to
CO1 An understanding of the overview of the historic evolution of Chennai city and its urbanism.
CO2 Knowledge about different and distinguishing characteristics.
CO3 An overall exposure to the current issues and characteristics of Chennai.

REQUIRED READING

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AR3020 HISTORY OF NON-WESTERN ARCHITECTURE L T P/S C

OBJECTIVES
- To create awareness about the history of non-Western Architecture
- To give outline knowledge of various non-Western Architectural traditions.
- To inform about colonial influences on non-Western architecture.

UNIT I CHINESE, JAPANESE AND KOREAN ARCHITECTURE

China - Prehistoric history, regional architecture, dynasty architecture, architecture of the general public, imperial architecture, religious architecture, Horizontality, Enclosure, hierarchy, symmetry, influences of Chinese architecture on neighbouring regions, influence of neighbouring regions on Chinese architecture

Japanese - Prehistoric history, regional architecture and architecture of different periods, pagodas, shrines, temples, wooden structures, zen architecture, gardens, castles, imperial architecture, early minimalism, Japanese-Western eclectic architecture, colonial architecture, FLW, Corbusier, Tange’s architecture in Japan.

Korea – Dolmens, Buddhist architecture, hanoks, semi-subterranean houses, Korean forts, pagodas, differences from Chinese and Japanese pagodas, tombs.

UNIT II SOUTH-EAST ASIAN ARCHITECTURE

Historic architecture of Thailand, Cambodia, Laos, Myanmar and Indonesia, Khmer architecture, Buddhist architecture, Dutch architecture of Indonesia, British colonial architecture of Singapore and

UNIT III AFRICAN ARCHITECTURE
Early history – Egyptian, Phoenician, Nubian, Roman architecture, Aksumite architecture, Nigerian dry stone buildings, Islamic and Moorish architecture of north Africa - in the regions of Tunisia, Egypt, Morocco, Great Mosque of Djenné, Tomb of Aksia, Ibwami of Rwanda, Swahili architecture, Colonial architecture of Cape Town, Saint-Louis, Grand-Bassam, Gold Coast, etc.

UNIT IV RUSSIA AND MONGOLIA AND KOREA

UNIT V OCEANIA

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 Familiarity with the architecture of non-Western traditions
CO2 Exposure to colonial influence on non-Western cultures
CO3 Broader awareness of historical processes across the world in the realm of architecture

TEXTBOOKS
1. Banister Fletcher, A History of Architecture, CBS 1999

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OBJECTIVES

- To give understanding about the evolution of form and space in product design.
- To facilitate the interpretation of design concepts in different ways and layers.

UNIT I INTRODUCTION TO PRODUCT DESIGN

UNIT II  PRODUCT DESIGN  12
Selection of the projects is based on the possibility of user interaction leading to innovation. Projects end with a comprehensive presentation through working/ mock up models, design drawing and a report. The project is supported by detailed discussion on various stages in the design process emphasising the complementary nature of systematic and creative thinking. This is achieved by short supporting assignment in following topics: Creativity techniques like brainstorming and synectics to develop creative attitude and open mind, design opportunity, problem perception , Idea Sketching , clustering of ideas for concept development, exploratory mock up models for concept development, evaluation of concepts, final concept selection, concept development, refinement and detailing.

UNIT III  PRODUCT DETAILING  12

UNIT IV  PRODUCT DESIGN PROTOTYPING AND ADVANCED MANUFACTURING PROCESSES  12

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1  An understanding of product design as a discipline.
CO2  Ability to interpret real life situation into design.
CO3  Knowledge about contemporary design process and manufacturing process of design.

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AR3022 DESIGN COMMUNICATION L T P/S C 1 0 2 3

OBJECTIVES:
- To introduce design communication as an important part of an architect’s work.
- To give knowledge about different modes and media for design communication/presentation.
- To give exposure to the current trends in architectural design communication.
- To provide opportunities for experimentation through study and implementation.

UNIT I INTRODUCTION TO DESIGN COMMUNICATION 10
Introduction to design communication as an integral part of the architectural design process. Outline of attributes of architecture that can be communicated and the modes of communication - text, visuals, drawings etc. Brief overview of how design has been communicated through history through popular diagrams and drawings of notable architecture/architects’ works. Design Communication by contemporary architects/visualisers – Diagrams by BIG, Models by Richard Meier, Visualisations by Squint/Opera, Presentations by Heatherwick Studio, Social Media by Malone Maxwell Borson Architects. Analysis of award-winning competition drawings and media. Understanding of popular modes of design communication through exercises based on case studies of architects’ work through first hand study, websites, other collected data etc.

UNIT II COMMUNICATING STUDY, SITE ANALYSIS AND CONCEPT 12
Exercises in design communication involving presenting of study, requirements, site analysis and concept. Exercises can be based on a studio project completed in the previous semester by students themselves or other students’ work. Discussion and dialogue on the various attributes to be communicated and finalising best way to communicate. Use of various modes and media - Software/plug-ins like Modelur, climate consultant etc., Storyboarding and hand drawn art, Combination of hand -drawn and digital techniques of design context and site models. Montage techniques. Concept visualisation sketches, Sketch animation, 2D and 3D Zoning, Form evolution using Rhino, Sketch-up. Block models – Manual, Laser cutting and 3D Printing.

UNIT III COMMUNICATING DESIGN INTENT IN THE DESIGN PRODUCT 13
Exercises in design communication involving bringing out the design intent inherent in the design product. Exercises can be based on a studio project completed in the previous semester by students themselves or other students’ work. Discussion and dialogue on the various attributes to be communicated and finalising best way to communicate. Sheet sizing, scale and composition. Manual sketching and rendering. 2D & 3D Digital Drawings Revit, Sectional Perspective, Exploded


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Axonometry, Hybrid Visualisation, Interactive 3D rendering, Immersive 3D, Presentations in Videos, GIFs, Visualisation overlays on Videos. Projection mapping and interactive 3D printed models, VR Animation, Augmented Reality and Immersive Experiences - exploring design studio projects using any of the tools like Unity 3D, Maya, 3DS Max. Autodesk Live, Fuzor, Shapespark, Unreal Engine, Autodesk Stingray, Steam Unigine, Arki.

UNIT IV DESIGN NARRATIVE AND WRITING 10
Exercises in design communication involving descriptive writing about a studio project. Exercises can be based on a studio project completed in the previous semester by students themselves or other students’ work. Discussion and dialogue on the various attributes to be communicated and finalising best way to communicate. Communicating Design with the help of relevant vocabulary - Design Narratives, Project Description, salient points, key design ideas. Narrative to mix visual and verbal in a composite manner. Putting together everything in different modes- social media, paper, digital, etc.,

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 Awareness of the importance of design communication as a necessary part of architect’s work.

CO2 Knowledge about current trends in design presentation and communication.

CO3 Ability to employ latest technology in expressing design intent and programs.

CO4 Exposure to allied fields that are associated with architectural design communication.

TEXTBOOKS:
3. Hybrid Drawing Techniques by Contemporary Architects and Designers by M. Saleh Uddin, Wiley & Sons, Incorporated, John, 1999

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AR3023 BUILDING AUTOMATION AND CONTROL SYSTEMS L T P/S C

OBJECTIVES:
- To give introduction to automation and management systems in buildings.
- To give knowledge about specific systems in the field of fire safety, security, communication, HVAC, lighting, climate control, etc.,
- To give information about integration of systems with each other and with building construction.
UNIT I  INTRODUCTION TO BUILDING AUTOMATION AND CONTROL SYSTEMS  9
Introduction to and History of Building Automation Systems (BAS). Building Types and Key Requirements. Different systems in BAS which includes HVAC, security and surveillance, communication, fire, lighting systems, climate control, etc. Ideas of intelligent buildings, Human Machine Interface (HMI), facilities management and life cycle costs. The fundamental concepts of building control, and building automation. Control Theory. Building automation topics include device technology (sensors, control elements), direct digital control, control applications, communication systems, and Building Automation Protocols. Role of different stakeholders (Architect, contractor, consultant, application engineer and engineer) in BAS system design.

UNIT II  FIRE SAFETY SYSTEMS  9
Statutory Standards and codes for fire safety. Objective and essential components and working of a Fire Alarm System. Type of detection technology in the Fire alarm system. Basic knowledge on working, design and installation of Fire alarm system. Fire suppression systems. Components, working and installation. various types of technologies currently in use.

UNIT III  SECURITY, SURVEILLANCE AND COMMUNICATION SYSTEMS  6
Introduction to Access Control, Intruder Alarm, Essential Components of each System, and Various types of Technologies employed in the system, Basic knowledge as how they work, are designed and installed. Introduction to CCTV, Perimeter protection system, Essential Components of each System, and Various types of Technologies employed in the system, Basic knowledge as how they work, are designed and installed. Public Address System and other communication systems and their requirements.

UNIT IV  HVAC, LIGHTING, CLIMATE CONTROL  12

UNIT V  INTEGRATED BUILDING MANAGEMENT SYSTEM  9
Overview of various components, technology, sensors, etc., that are common to more than one system. Integrated Building Management System IBMS. Integrated approach in design, maintenance and management system. Current trend and innovation in building automation systems. Impact of Information Technology.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to:

CO1 Outline the various building management systems.
CO2 Choose appropriate fire safety systems for buildings.
CO3 Categorise the various systems of security and surveillance for buildings.
CO4 Demonstrate the basics of HVAC, lighting and climate control.
CO5 Recall the use of integrated building management system.

TEXTBOOKS:
2. National Building Code of India

REFERENCES
1. George Clifford, Modern Heating Ventilating and Air Conditioning
2. Vaughn Bradshaw, Building control Systems
4. James E. Brumbaugh, HVAC Fundamentals
5. Herman Kruegle, CCTV Surveillance,
7. Vivian Capel, Security Systems and Intruder Alarm System,

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AR3024 CONSTRUCTION TECHNOLOGY L T P/S C

OBJECTIVES
- To inform about the technology involved in the construction of buildings, especially situations requiring advanced construction.
- To give familiarity about advanced construction technology in concrete and steel.
- To inform about the construction practices and equipment in different situations.
- To give an overview of construction planning and scheduling.

UNIT I SOIL AND FOUNDATIONS

UNIT II ADVANCED CONSTRUCTION TECHNOLOGY

UNIT III CONSTRUCTION PRACTICE
Modern Construction Materials. Manufacture, storage, transportation and erection of precast component forms. Types of moulds and scaffoldings in construction. Safety in erection and dismantling of constructions. Formwork systems (including slip-form), temporary works and enabling works. Insitu/ field tests for materials.

UNIT IV CONSTRUCTION METHODS AND EQUIPMENT
Choice and use of equipment for different situations and materials. Tractors, bulldozers, shovels dragnines, cableways and belt conveyors, batching plants, transit mixers and agitator trucks for ready mix concrete, guniting equipment, air compressors, welding equipment, cranes and other lifting devices.

UNIT V CONSTRUCTION PLANNING AND SCHEDULING

TOTAL: 45 PERIODS
COURSE OUTCOMES:
On completion of the course, the student is expected to be able to
CO1 Familiarity with advanced construction technology and systems.
CO2 Knowledge about construction practices and equipment.
CO3 Familiarity with construction management, planning and scheduling processes.

TEXTBOOKS

REFERENCES
5. http://www.cmdachennai.gov.in

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AR3025 DATA VISUALISATION AND ANALYSIS

OBJECTIVES
- To give exposure to the importance of understanding Information through visual thinking.
- Enabling skill in exploring the various ways of visualising and analysing data.
- To enable generating innovative diagrams from the collected data to discern and recognise patterns and phenomena.

UNIT I INTRODUCTION TO DATA VISUALISATION

UNIT II OUTLINE OF DATA VISUALISATION TOOLS

UNIT III DATA VISUALISATION IN ARCHITECTURE
Introduction to mapping and data visualisation in architecture. Types of visualisation tools -2D/3D. Architectural design process outline. Various Data collection techniques. Basics sets of architecture and urban design data required. Quantitative and Qualitative data. Spatial and Non-Spatial data. Introduction to functional visualisation of various attributes of buildings -Activity, zoning, matrix, proximity chart, human behaviour, demographics, circulation patterns, etc. Exercises related to above.
UNIT IV ANALYSIS OF ARCHITECTURAL AND URBAN DATA

Overview of recent design approach related to study and design for people and space with help of big data. Analysis and visualisation of data. Quantitative and Qualitative data. Programme, Micro climate, Geospatial Analysis, Energy modelling, Vegetation, User behaviour studies, Sensory analysis, Post occupancy studies, Participatory/Interactive approach etc.

Case studies of Data Visualisation as design process- Works of Rem Koolhaas, UN Studio, FOA etc.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 Knowledge about the importance of data visualisation.

CO2 Familiarity with different methods and techniques of data visualisation.

CO3 Skill in working out simple exercises related to data visualisation in the realm of architecture and urban design.

TEXTBOOKS

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OBJECTIVES

- To introduce the need for heritage and rationale for architectural conservation and to provide familiarity with the history of conservation.
- To give familiarity about various agencies involved in the field of conservation worldwide.
- To give an overview of conservation of architecture and heritage towns of India.
- To give detailed information about the materials and methods of heritage preservation.
- To give an overview of conservations practice and strategies in India.

UNIT I INTRODUCTION TO HERITAGE AND CONSERVATION


UNIT II CONSERVATION IN INDIA

Museum conservation. Monument conservation and the role of ASI, SDA, INTACH. Central and state government policies and legislations. Inventories and projects. Selected case studies of sites such as Hampi, Golconda, Mahabalipuram. Craft Issues of conservation.

UNIT III CONSERVATION MATERIALS, METHODS AND STRUCTURAL SYSTEMS


UNIT IV CONSERVATION PRACTICE


UNIT V URBAN CONSERVATION STRATEGIES


COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1 An understanding of the importance of heritage and scope of conservation.
CO2 Familiarity with issues and practices of conservation through case studies.
CO3 Knowledge about methods for preserving and repairing historic buildings.
CO4 Familiarity with conservation strategies through principles and project case studies.

TEXTBOOKS

6. Publications of INTACH
REFERENCES

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AR3027 TECHNIQUES OF DIGITAL ART

OBJECTIVES
- To give introduction to digital art as a domain.
- To give exposure to different types of and media for digital art.
- To develop skills in basic techniques of digital art.

UNIT I INTRODUCTION TO DIGITAL ART

UNIT II 2D ART
Software and techniques for raster image editing. Editing and creating digital raster images through various kinds of manipulation based on elements and principles for a selected theme. Creating 2D vector art based on elements and principles for a selected theme.

UNIT III 3D ART
Software and techniques for 3D drawing and video. Creating 3D art based on elements and principles for a selected theme.

UNIT IV MIXED MEDIA
Introduction to different types of mixed media in digital art. Project involving mixed media on any theme.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to
- CO1 Awareness of digital art as a domain.
- CO2 Knowledge about the types and media for digital art.
- CO3 Skill in basic techniques for digital art.
TEXTBOOKS

REFERENCES
10. 3DTotal.com, ‘Digital Art Masters’.

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AR3028 PROFESSIONAL SERVICE FIRM: MANAGEMENT AND EXCELLENCE L T P/S C 3 0 0 3

OBJECTIVES
- To introduce the idea of profession, professional and professional service firm.
- To introduce the key areas of attention involved in a professional service firm.
- To inform about ways to maximise the potential of human resource for individual, organisational and societal benefit.
- To give familiarity about the different ways to protect ideas and knowledge.
- To introduce the idea of reflective practice to enable lifelong learning and professional excellence.

UNIT I PROFESSION, PROFESSIONAL AND PROFESSIONAL SERVICE FIRM 9
Definition of profession and professional. Attributes of a profession- unique body of knowledge, standards of entry, code of ethics, service orientation to the profession, sanctioning organisation. Professional service firm. Differences between a professional service firm and business firm, manufacturing firm and other services firm. Brief outline of aspects involved in a professional service firm - ethical and professional vision of firm, legal foundation of firm, form of organisation, organisational structure, financial strategies, project implementation, client relationship, professional conduct, human resource practices, team work, leadership, nurturing of key competencies, innovation and excellence, perception of firm by clientele and public, future vision.
UNIT II  EFFECTIVE PROFESSIONAL  9

UNIT III  HUMAN RESOURCE MANAGEMENT  9

UNIT IV  KNOWLEDGE MANAGEMENT  9

UNIT V  REFLECTIVE PRACTICE  9
Reflective practice as approach to enable professionals use their knowledge explicitly in practical situations, combine action and learning effectively, give flexibility and openness to innovate and evolve. Concept of Reflective Practice. Approaches to address problems. Theory in Use and Espoused Theory. Reflective practice as thinking in action. Ways of generating knowledge to solve issues and problems- Experimentation, Speculation, Imagination, Scientific Method, Statistical Analysis, cycle SECI, Modelling, Mental models and virtual worlds. Framing (tacit framing, Analysing and understanding assumptions and values, reframing, paradigm shifts), Conceptual innovation, Design. New democratic, collaborative and innovative approaches to reflective practice. Social enterprises and entrepreneurship. Literature case studies and first hand studies of practices in different creative disciplines, including architecture, in the above topics.

COURSE OUTCOMES:  
On completion of the course, the student is expected to be able to  
CO1  Knowledge about how to run and maximise the potential of professional services firm.  
CO2  Knowledge about how to protect ideas.  
CO3  Understanding of how to run a reflective practice  

TEXTBOOKS  
REFERENCES
2. Familiarity with the basics of what a professional services firm is.

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AR3029 GREEN BUILDING

OBJECTIVES
- To give introduction to the concept of green building.
- To give exposure to the different systems and organisations associated with green building concept.
- To give knowledge about the various areas/realms of architecture in which green building concepts can be applied.

UNIT I INTRODUCTION TO CONCEPT OF GREEN BUILDING

UNIT II SITE AND RESOURCES

UNIT III ARCHITECTURAL MORPHOLOGY
Building footprint, shape, size and proportion to optimise comfort and energy consumption. Building components such as openings, courtyards, skylights, shading devices, fenestration, etc., Designing for lighting, ventilation and rain within the local climatic context. Case studies.

UNIT IV ENERGY AND MATERIALS
UNIT V  ZERO CARBON BUILDING
Different techniques and methods for zero carbon building. Case studies.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to
CO1  Recall green building concepts and various rating systems.
CO2  Identify sites and resources for sustainable building performance.
CO3  Analyse buildings and their components for sustainable architectural design.
CO4  Examine buildings for their life cycle performance.
CO5  List techniques for design of zero carbon buildings.

TEXTBOOKS
1. GRIHA Manuals
3. Michael Bauer, Peter Mösle, Michael Schwarz, Green Building, Guidebook for Sustainable Architecture, Springer 2010

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AR3030  ADVANCED STRUCTURES

OBJECTIVES
- To give an understanding of the loss of pre-stress and design requirements for determinate pre-stressed concrete beams.
- To provide familiarity with the concept of industrial structures and high rise structures.
- To enable the study of concepts of tensile structures, domes, shells and folded plate

UNIT I  PRESTRESSED CONCRETE
Losses of Prestress. Design requirements. Design of determinate beams.

UNIT II  INDUSTRIAL STRUCTURES
Classification, planning and layout requirements, functional requirements. Types of industrial structures- power plants, bunkers and silos, cooling towers, containment structures, chimneys. Merits. Case studies.

UNIT III  HIGH–RISE BUILDINGS
UNIT IV TENSILE STRUCTURES 10
Concept, development, laws of formation, merits and demerits of pneumatic structures. Basic principles, forms, merits and demerits of cable structures. Case studies.

UNIT V SHELLS, DOMES AND FOLDED PLATES 10

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to

CO1 An understanding of concepts and applications of pre-stressed concrete.
CO2 An understanding of concepts and application of industrial structures and sky scrapers.
CO3 Familiarity with the theory and applications of tensile structures, grids, domes, shells and folded plates.

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AR3031 ARTIFICIAL INTELLIGENCE IN DESIGN PROCESS LT P/S C

OBJECTIVES
- To give knowledge and understanding about the discipline of Artificial Intelligence as a totality and its potential in Architectural Design.
- To give understanding about the relationship between architecture and computing within methodological design process.
UNIT I INTRODUCTION TO AI
Introduction to Artificial Intelligence; Introduction to Internet of Things (IoT), Big Data, Machine Learning (ML), Block Chain, Etc.,

UNIT II CYBERNETICS & MACHINES
Definition of Cybernetics; Cybernetic architecture; Cyberspace; Virtual-Reality; The Architectural Relevance of Cybernetics;

UNIT III DESIGN INTELLIGENCE SYSTEM
Algorithm in Architecture; Data driven/informed process; Multi-Agent Design System; Automation in Design; Swarm Intelligence, Neural Networks, Morphogenetic, Self-Organising, Behavioural; Evolutionary and cognitive aspects;

UNIT IV CONSTRUCTION INTELLIGENCE SYSTEM
Robotic construction, 4d Printer, Real-time Fabrication, Virtual/Augmented Reality, Flying Robots; Human-free construction process;

UNIT V STUDENT SEMINAR
Application of AI in Architectural Projects/by Architects: Zaha Hadid Architects (ZHA), Foster + Partners, Buro Happold, Arup Group, Matias Del Campo, Sidewalk Labs/Delve, Regen Villages, Phil Bernstein, Etc.,

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to:
CO1 Knowledge about artificial intelligence as a domain.
CO2 Familiarity with artificial intelligence in architectural design process.
CO3 Exposure to various intelligence design processes and new trans-disciplinary design methodologies.

TEXTBOOKS:
2. The Routledge Companion to Artificial Intelligence in Architecture, Imdat As, Prithwish Basu, Routledge;
3. Artificial Intelligence and Architecture, From Research to Practice, Stanislas Chaillou, Birkhäuser.

REFERENCES
15. Holmes, Aaron, AI could be the key to ending discrimination in hiring, but experts warn it can be just as biased as humans /03.03.2020 / Business insider, https://www.businessinsider.com/ai-hiring-tools-biased-as-humans-experts-warn-2019-10?IR=T.

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**AR3032**

**SMART CITIES**

**OBJECTIVES**
- To give exposure to the concept of smart cities.
- To give familiarity to different realms in which smart cities concepts operate in practice.
- To give knowledge about case studies relating to smart cities.

**UNIT I**

**INTRODUCTION TO SMART CITIES**

Origin of the term smart cities. Different interpretations of smart cities. Evolution of the term till today. Overview of smart cities as integrating physical planning effectively with other parameters - economy, infrastructure of various types, energy, climate change, urban governance, social aspects, mobility, quality of life, etc., ICT, GIS and remote sensing as tools to enable smart cities.
UNIT II  URBAN PHYSICAL INFRASTRUCTURE AND SMART CITIES
Different types of urban infrastructure – sewage, water, electricity and lighting, mobility of people and goods, parking. Case studies for each as well as for integrated approach.

UNIT III  ECONOMIC, SOCIAL AND CULTURAL ASPECTS AND SMART CITIES
Smart city concepts and city economy. Urban governance and smart city. Smart city concepts in slum area development. Historic core regeneration/preservation and smart city. Case studies for each.

UNIT IV  ECOLOGY, ENERGY AND SMART CITY
Geography of the city. Ecological aspects. Climate change. Flooding patterns. Energy and Sustainability in cities. Incorporating smart concepts to enhance and mitigate positive and negative effects with respect to these areas. Case studies.

UNIT V  SMART CITIES MISSION INDIA
Smart cities in the context of India. Urban projects in India- JNNURM, Smart city mission. Detailed case studies with focus on technology as enabling mechanism.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
On completion of the course, the student is expected to be able to
CO1 Familiarity with the concepts of smart cities.
CO2 Knowledge about different domains/areas in which smart cities can be realised.
CO3 Exposure to smart city practices.

TEXTBOOKS
1. Rajeswari Ray, GIS for Smart Cities, Ane Books 2017
2. Binti Singh and Manoj Parmar, Smart City in India, Routledge 2020
3. Mike Barlow and Cornelia Levy-Bencheton, Smart Cities Smart Future, Wiley 2019
5. Antoine Picon, Smart Cities: A Spatialised Intelligence, Wiley 2015

REFERENCES
1. Mohammad S. Obaidat and Petros Nicopolitidis, Smart Cities and Homes, Morgan Kaufmann 2016.
2. Poonam Sharma, Swati Rajput, Sustainable Smart Cities in India, Springer 2019

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OBJECTIVES

- To introduce the vocabulary, elements and classification of human settlements.
- To give exposure to planning concepts at different scales of settlements.
- To give an understanding of planning addressing current issues.

UNIT I INTRODUCTION TO HUMAN SETTLEMENTS


UNIT II FORMS OF HUMAN SETTLEMENTS


UNIT III RURAL AND REGIONAL DEVELOPMENT IN INDIA

Rural development plans, programmes and policies from case studies. Regional Plan. Area delineation, land utilisation plan, hierarchical system of settlements, their sizes and functions.

UNIT IV URBAN PLANNING AND URBAN RENEWAL


UNIT V ASPECTS IN CONTEMPORARY URBAN PLANNING IN INDIA

Globalisation and its impact on cities. Sustainable planning concepts. New forms of developments, to include self sustained communities, SEZ, transit oriented development (TOD), integrated townships, smart cities. Case studies.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1 Ability to understand morphology of settlements and their generating forces and characteristics.

CO2 An understanding of the role of planning processes in making positive changes to settlements.

CO3 Awareness of planning interventions with respect to the current world.

TEXTBOOKS


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AR3034 ARCHITECTURAL JOURNALISM AND PHOTOGRAPHY

OBJECTIVES

- To give an overview of the domain of journalism, its various aspects and strategies.
- To give particular exposure to architectural journalism.
- To give knowledge about aspects and techniques of architectural photography.

UNIT I INTRODUCTION TO JOURNALISM

Introduction to journalism, key concepts and objectives of journalism. Overview of different types of specialised journalism. Outline of journalism skills: research, reporting, writing, editing, photography, columnists, public relationships, criticism. Introduction to copyright, code of ethics, press laws, Press Council of India.

UNIT II ASPECTS OF JOURNALISM


Introduction to software needed in journalism and photography, video coverage. Understanding the individual demands in the context of newspapers, radio, film, and television. Multimedia/ online journalism and digital developments.

UNIT III ARCHITECTURAL PHOTOGRAPHY AND VIDEOGRAPHY


UNIT IV ARCHITECTURAL JOURNALISM


TOTAL: 45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

CO1 Exposure to the domain of journalism and architectural journalism in particular.

CO2 Skills with respect to architectural photography.

CO3 Knowledge about important themes and works of architectural journalism.

CO4 Ability to critically think, analyse and write about architecture.
TEXTBOOKS
5. M. Harris, 'Professional Interior Photography', Focal Press, 2002

REFERENCES

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