B. COURSE CONTENTS

YEAR 1 / SEMESTER I

1. ARC - 14 - 101 : Architectural Design & Detailing - I : [2-8-0-10/ 150 hours]

UNIT I - Theme & Focus of Design: User activity analysis; fundamentals of anthropometric studies & architectural design process; Study of building components; Development of forms through sketches, models; Case studies.

UNIT II - Basic Components: Behavioral Science; Functionality; Building Materials; Theory of Design; Form Development; Tectonic decisions - Structures, Building Materials, Services; Site Planning; Building Control Regulations; Inclusive Design; Design Communication.

UNIT III - Introductory to Anthropometrics: Study of human dimensions; space requirements for human activities; Detailing for human comfort; Furniture details & layouts.

UNIT IV - Study of Building Components: Understanding components in buildings; Purpose; Applications in buildings; Interrelations; Designs; Materials; Innovations.

UNIT V - Design Exercise: Building Design; Complexity - Designing space for single/double user/s; Typology - Kiosk Design such as Security Cabin, Milk Booth, Photocopy Shop, Flower Shop, Gift Shop, Ticket Booth, Book/ Newspaper Stall, Food Stall, etc.; Site extent - Level site upto 100 m^2.

2. ARC - 14 - 103 : Structural & Construction Systems - I : [2-2-2-5/ 90 hours]

UNIT I - Introduction: Natural & manmade structures of various forms & their structural behavior; Case studies of ant hill, trees, honey comb, shell structure, membrane structure etc.; Building components & overview of their structural behavior.

UNIT II - Structural Concepts: Force, equilibrium of forces; Load transfer in buildings - load bearing & framed structures; Overview of strength of materials - stress & strain, stress-strain diagrams; elastic constants, structural failure, prevention, factor of safety.

UNIT III - Brick Masonry: Brick bonds, walls, piers, footings; Load bearing & non-load bearing walls; Construction details; Earthquake resistance; Structural concepts.

UNIT IV - Stone Masonry: Types - walls, piers, footings, retaining structures; Construction details; Earthquake resistance; Structural concepts.

UNIT V - Openings: Types & uses; Arches & Lintels - classifications, structural concepts; Construction details using brick & stone.

3. ARC - 14 - 105 : Architectural Representation - I : [1-2-3-4/ 90 hours]

UNIT I - Introduction: Unique features of artistic rendering & architectural rendering. Introduction to points, lines application of line weights, meaning of lines, freehand line exercises architectural lettering, dimensioning, perceiving lines & dots from landscapes & builtscapes, line rendering & dot rendering; Principles of design, compositions & aesthetics.

UNIT II - Understanding of Scale & Proportion in Architecture: Construction of plain scale & diagonal scale; Construction of major conic sections - parabola & ellipse.

UNIT III - Understanding of Compositions : Introduction to quadrant system & conventions of rotations; Projections of points & lines; 2D composition with paper, dots & lines/ collage; Freehand sketching of 2D compositions.

UNIT IV - Understanding of Volumes: Projection of solids -3D compositions modeling; Understanding of human proportion in relation with compositions; freehand sketching of volumes, spaces & human figures; Introduction to isometric & axonometric views.

4. ARC - 14 - 107 : Building Materials : [1-0-2-2/ 45 hours]

UNIT I - Stone & Clay: Stone - Classification of rocks, quarrying of stones, characteristics of a good stone, dressing, uses, deterioration & preservation of stones; Clay - classification, composition, manufacturing, properties, products, qualities of clay bricks, terracotta tiles, & clay blocks.

UNIT II - Cement, Mortar & Concrete: Sand - sources, properties, substitutes for Sand; Lime - composition, classification, physical & chemical properties, uses; Cement - types, composition, manufacturing, properties, qualities & applications; Mortar & Concrete - types, constituents, water-cement ratio, properties, qualities, workability applications.

UNIT III - Timber & Timber Products: Classification of commercial timber in India; Structure of timber; Qualities of good timber, seasoning, defects & decay of timber, preservation; Cut sizes & uses of timber, market forms of timber; Timber products - plywood, particle boards & fiber boards.

UNIT IV - Metals & Metal Products: Ferrous & Non-ferrous metals - types, composition, mechanical & physical properties; Uses; Steel & Alloys - composition, mechanical & physical properties, defects & treatment, market forms of steel; Uses.

UNIT V - Other Materials: Glass & ceramics - types, compositions, physical & mechanical properties; Uses; Polymeric material: different types, compositions, physical & mechanical properties; Uses; Paints & varnish - types, characteristics of an ideal paint; Rubber - classifications, uses in buildings.

5. ARC - 14 - 109 : History of Built Environment - I : [1-0-2-2/ 45 hours]

Detailed study & analysis of architectural design fundamentals through significant examples in the light of the following for the periods mentioned in the modules -

Genesis of seed ideas & concepts; Timeline; Socio-political background, key people involved; Climatic & geographic influence; General settlement pattern; Cities & its civic places; Construction technology & material; Design principles; Typology; Evolution; Spatial organization; Form & Detailing.

The examples to represent the following historical styles are suggestive & students are encouraged to explore additional examples for a comprehensive understanding of the respective styles.

UNIT I - Mesopotamia: Sumer - City of Warka & Ur; Ziggurats - e.g. Ziggurat of Ur-Nammu, White Temple; City of Babylon - e.g. Ishtar Gate, Hanging Gardens; Assyria - City of Khorsabad; Palace complexes - e.g. Palace of Sargon; Persia - City of Persepolis; Anatolia - Palace complexes.

UNIT II - Egypt: Typology - tomb complexes, temples, mortuary, cult temples & typical residences; Significance & evolution of Mastabas & Pyramids - e.g. Step pyramid at Sakkara, pyramid at Meydum,

bent pyramid, pyramid complex at Giza; Corridor tombs; Temples - e.g. Temple of Khons, Karnak temple, temple at Abu-Simbel.

UNIT III - Other Civilizations: Overview; Indus Valley Civilization - e.g. Harappa & Mohenjo-Daro, Great Bath, The Granary; Oriental - China & Japan, Temples - e.g. temple of Heaven, temple complex of Horuji; Pagodas; Gateways; Tea houses; Pavilions; Gardens; Central & South America, Maya - e.g. City of Tikal, Inca - e.g. Machu Pichu, Aztec - City of Tenochtitlan.

UNIT IV - Greek Civilization: Aegean, Mycenaean - Types of masonry, Tholoso beehive tombs - e.g. Treasury of Atreus, Gate of Lions; Hellenic - Greek orders, Optical Illusions; City planning of Athens; The Acropolis; Greek temples - e.g. Parthenon, Erechtheion; Agora; Theatres - Theatre at Epidaurus.

UNIT V - Roman Civilization: The Roman orders; Temples - Pantheon; Public buildings & spaces; The Forums- e.g. Forum of Trajan; The Basilicas - The Basilica of Constantine; Thermae - e.g. Thermae of Caracalla; Theatres - e.g. Theatre of Marcellus; Amphitheatre - e.g. Colloseum; Circus - e.g. Circus Maximus; Aqueducts - e.g. Pont du Gard; Triumphal arches, victory pillars, town gateways, bridges, fountains.

6. ARC - 14 - 111 : Principles of Environmental Design : [2-0-0-2/ 30 hours]

UNIT I - Introduction to Environment & Built Environment: Introduction to environment - types & basic components of environment; Ecosystem - structure, functions, classification of ecosystem; Biodiversity & its conservation, loss of biodiversity, hotspots; Ecological pyramids - ecological succession; Relation to built environment, considerations for ecology in historical built environment.

UNIT II - Built Environment: Urbanization - causes & impact of urbanization; Resources - types of resources, depletion of resources - causes & impacts on the environment; Climate change, global warming, greenhouse effect, depletion of ozone layer, Heat Island effect; urban sprawl, urban congestion; Pollutions; Carbon foot print - ecological foot print - carrying capacity; Basics of Sustainable Development - history & advancements till date; Overview of Burtland Commission's report.

UNIT III - Passive & Active Environmental Design: Introduction to Passive Environmental design - Heat flow in environment; Ventilation & Stack effect; Case studies in Indian context - spatial design, openings, courtyards, balconies, building materials & construction techniques; Introduction to Mud & Bamboo architecture, Organic architecture, Earth sheltered buildings. Introduction to Active Environmental Design - for water resources; solid waste management, energy efficiency; Managing construction waste.

UNIT IV - Disaster Management: Necessity; Types, characteristics, causes & impacts; Institutional & Legal arrangement; Disaster prevention & mitigation - risk assessment & vulnerability mapping; Preparedness - forecasting & early warning systems; Plans of action for probable disasters; Relief & Rehabilitation - temporary relief camps; Management of relief supplies; Relocation & reconstruction, repair & retrofitting of buildings & infrastructure; Role of Architect; Architectural Design considerations.

UNIT V - Case Studies for Eco-Friendly Design: Case studies of various contemporary designs done with principles of sustainability; Examples such as Solar Umbrella House, California/ Eastgate Centre, Harare, / California Academy of Life Sciences; Philosophies & works of eco-sensitive architects like - Nari Gandhi, Hassan Fathy, Geoffrey Bawa, Peter Busby, Norman Foster, Eric Corey Freed, R. Buckminster Fuller, Thom Mayne, William McDonough, Glenn Murcutt, Renzo Piano, Frank Lloyd Wright, Ken Yeang and others.

YEAR 1 / SEMESTER II

1. ARC - 14 - 102 : Architectural Design & Detailing - II : [2-8-0-10/ 150 hours]

UNIT I - Theme & Focus of Design: User-activity analysis; context; Functional & aesthetic requirements for development of design programme; Concept & detailed design with focus on load bearing structures using brick, stone; timber, etc.; Development of forms through sketches, models, case studies etc.

UNIT II - Basic Components: Behavioral Science; Functionality; Building Materials; Theory of Design; Form Development; Tectonic decisions - Structures, Building Materials, Services; Site Planning; Building Control Regulations; Inclusive Design; Design Communication.

UNIT III - Form Development: Exploring form in architecture; Importance; Principles of design; Evolution; Formulation & massing of multiple volumes in response to functional spaces; Interrelationship between multiple spaces & masses; Elements; Materials; Treatments; Stability. The Minor Exercise will be represented through conceptual development (sketches, physical & digital models).

UNIT IV - Design Analysis: Exploration & analysis of existing iconic Residential Architecture; Understanding design philosophy & process; Learning from design quality; Literature/book reviews; Architectural critiques.

UNIT V - Design Exercise: Single building for 4-6 users involving multiple activities & spaces; Residence for single family; Complexity of major design - Single building for 4-6 users involving multiple activities & spaces; Typology - Residence for single family; Site extent - Level site upto 500 m2.

2. ARC - 14 - 104 : Structural & Construction Systems - II : [2-2-2-5/ 90 hours]

UNIT I - Introduction: Structural behavior of beams, shear force, bending moment; Theory of simple bending, elementary stress analysis for bending, shear & deflections; Concept of flitch beam; Timber as construction material, properties.

UNIT II - Timber Roofs: Overview; Types & applications; Components, fixing, joinery details; Construction details; Earthquake resistance; Structural concepts; Details for lean-to roof, coupled roof, hipped roof & simple trusses; Application of timber roofs.

UNIT III - Stairs: Overview- Types, applications, various configurations; Timber stairs - components, fixing, joinery details; Structural concepts.

UNIT IV - Timber Floors: Overview - Types & applications; Timber floors - components, fixing, joinery details; Construction details; Earthquake resistance; Structural concepts.

UNIT V - Doors, Windows & Ventilators: Overview - Types & applications; Timber Doors & Windows - components, fixing, joinery details; Structural concepts.

3. ARC - 14 - 106 : Architectural Representation - II : [1-2-3-4/ 90 hours]

UNIT I - Development of Surfaces: Objective of developing surfaces from 3D; Understanding of Sections & development of surfaces including true shapes; Exercises - Isometric views / Free hand sketching of sectioned objects, furniture, etc.; Dot & line rendering.

UNIT II - Perspectives: Introduction to the Perspective Plane & theory of perspectives; Exercises in 1 Point & 2 Point perspectives with different eye levels & station points; Introduction to the theory of Sciography &

application of the same in 2D & 3D drawings; Interpenetration of Solids - basic understanding; Sketching of shadows in complex volumes.

UNIT III - Color: Basics of Color Theory, Free hand rendering of Landscapes & builtscapes including human figures; Exercises; Application of Color in Architectural rendering; Monochromatic & Supplementary color schemes; Relation between color & texture.

UNIT IV - Massing of Volumes: Understanding the spaces & massing of built form; Understanding the positive & negative spaces; Sketching of buildings - understanding massing & forms; Facades - recess & relief models; 3D models for understanding volumes.

4. ARC - 14 - 108 : Building Services - I : [1-0-2-2/ 45 hours]

UNIT I - Water Supply I: Sources of water; Collection & treatment of water from different sources; Drinking water standards; Estimation of water requirement - per capita demand, storage, distribution systems - layout & design considerations.

UNIT II - Water Supply II: Network for building; Components of water supply - selection & sizing; Pumps, pipes & pipe appurtenances; Suction tanks, Overhead tanks; Piping systems - in low, medium, high-rise buildings & residential layouts; Case studies & design problems; Hot water supply systems; Codes & standards; Symbols for representation.

UNIT III - Sanitation: Purpose & Principles; Systems of sanitation; House drainage (sewage, sullage) - collection & disposal fittings for low, medium & high rise Buildings; Community drainage - Self-cleansing velocity; Laying & testing of sewers; Sewers & sewer appurtenances; Pattern of sewage collection systems, Sewage treatment - Primary & secondary treatment; Septic tank, STP, oxidation pond, soil absorption system; Sewage effluent disposal; Rural sanitation; Codes & standards; Plumbing drawing.

UNIT IV - Drainage: Precipitation & run-off; Roof drainage; Site Drainage; Urban drainage; Sub soil drainage; Basement drainage; Storm water drainage system; Types & layout of drainage systems - Drains, materials, workmanship, clearing; Codes & standards; Rain Water Harvesting.

UNIT V - Solid Waste Management: Types of Refuse; Importance of SWM; Segregation, collection, treatment & disposal at different scales & typologies; Recycling; Best practices; Economic benefits.

5. ARC - 14 - 110 : History of Built Environment - II : [1-0-2-2/ 45 hours]

Detailed study & analysis of architectural design fundamentals through significant examples in the light of the following for the periods mentioned in the modules –

Genesis of seed ideas & concepts; Timeline; Socio-political background, key people involved; Climatic & geographic influence; General settlement pattern; Cities & its civic places; Construction technology & material; Design principles; Typology; Evolution; Spatial organization; Form & Detailing.

The examples to represent the following historical styles are suggestive & students are encouraged to explore additional examples for a comprehensive understanding of the respective styles.

UNIT I - Early Christian: Evolution of church- e.g. Church of Lateran & Old; St. Peters, Church of Holy Sepulcher; Byzantine - e.g. Hagia Sophia & St. Marks, Venice; Romanesque: e.g. Pisa Cathedral complex, Italy, Durham Cathedral, Britain.

UNIT II - Gothic: Early & late Gothic churches & regional variations - e.g. Notre Dame, France; Salisbury Cathedral, EngLand; Cologne Cathedral, Germany.

UNIT III - Renaissance: Ideologies & Works of famous architects & sculptors e.g. Brunelleschi, Alberti, Raphael, Michelangelo, Bernini & others; Cathedrals - e.g. St. Peters, Rome & St. Paul's, London.

UNIT IV - Baroque: Ideologies & Works of famous architects & sculptors like Bernini, Carlo Maderno & Borromini; Public spaces & plazas - e.g. St. Peters square, Rome; Fountains e.g. Fountain of four rivers & the Trevi; Rococo - Overview.

UNIT V - Overview of Miscellaneous Periods: Various styles, movements & schools of thoughts in Industrial, Modern & Postmodern era; Influences on the built environment - Neo classicism, Industrial Revolution, Arts & Crafts Movement, Art Nouveau, Art Deco, Expressionism, Modernism, Structuralism, Metabolism, Post Modernism, Minimalism, Hi-Tech, Novelty, New Expressionism, Critical Regionalism, De-constructivism, Blobitecture, Bionic, etc., through ideologies & landmark designs.

6. ARC - 14 - 112 : Principles of Landscape Design : [2-0-0-2/ 30 hours]

UNIT I - Introduction to Landscape Architecture: Importance of nature for human beings; Need & scope of landscape architecture; Integration with architectural design & sustainable development; Role of a landscape architect; Landscape elements - land, vegetation, water, earth & climate; Natural & manmade elements; Principles of landscape design such as - unity, simplicity, variety, balance, proportion, sequence; Application in design

UNIT II - History of Landscape Architecture: Natural & cultural factors of the place; Development of landscape architecture through history in different parts of the world - China, Japan, Europe, Italy, France, England, Persia, Egypt, Greece, Rome; Medieval period in India - Mughal; Modern & Contemporary Landscape architecture.

UNIT III - Hardscape & Softscapes: Hardscapes - pergolas, garden furniture, fences, rocks, masonry, paving & surfacing, roads & parking lots, walks & plazas; Softscapes - Plantation, Turfing, Water features; Design criteria - visual, functional, micro-climatic, ecological, aesthetic; Symbolic aspects.

UNIT IV - Landscape Services & Sustainability: Introduction; Outdoors lighting, surface water drainage, irrigation, soil management techniques; Introduction to sustainable aspects in landscape architecture; Bio swales, xeriscaping, wet land, efficient irrigation by using grey water; Recycling of products.

UNIT V - Introduction to Site Planning: Aspects & representations; Site analysis - identification of elements on site & surroundings; Their impact on site; Site grading, survey maps, slope analysis, site sections, retaining walls, surfacing & paving, fencing & screening; Pedestrian & vehicular circulation; Site furniture; Landscape detailing - landscape constructional details of the following - paving, curbs, steps, roof garden, retaining walls; Landscape specification writing.

YEAR 2 / SEMESTER III

1. ARC - 14 - 201 : Architectural Design & Detailing - III : [2-8-0-10/ 150 hours]

UNIT I - Theme & Focus of Design: Study & analysis of various user types & their activities in public buildings; Development of design programme; Concept & detailed design with focus on RCC structures.

UNIT II - Basic Components: Behavioral Science; Functionality; Building Materials; Theory of Design; Form Development; Tectonic decisions: Structures, Building Materials, Services; Site Planning; Building Control Regulations; Inclusive Design; Design Communication.

UNIT III - Landscape Detail: Importance, exploring & understanding the essence; Detailing process; User analysis; Elements; Functionality & aesthetics; Materials. This Minor Exercise will be represented through conceptual development (sketches, physical & digital models).

UNIT IV - Exploration of Sloping Sites: Exploration & analysis of existing iconic designs on sloping sites; Understanding design philosophy & process; Learning from design quality; Literature/book reviews; Architectural critiques.

UNIT V - Design Exercise: Design of Multi- Functional Building/s for 30 to 40 users; Typology: Art Gallery, Library, Motel, Cultural Centre, Nursery, Kindergarten, Recreational Club, Guest House, etc.; Site extent - sloping site upto 8000 m2; Topography - average slope ranging from 1:5 to1:8.

2. ARC - 14 - 203 : Structural & Construction Systems - III : [2-2-2-5/ 90 hours]

UNIT I - Fundamentals of Reinforced Cement Concrete: History & evolution; Building components; Grade of concrete & steel; Tests for concrete; Reinforcement in RCC structures; Aspects of fire & earthquake resistant RCC design; Working load, factored load; Working stress method & Limit state method; Overview of advancements in concrete technology.

UNIT II - Horizontal Support Systems: Types & concept; Analysis & design of singly reinforced, doubly reinforced sections; Reinforcement for ductile detailing in beams; BIS codes.

UNIT III - Slab & Roof Systems: Types of roof systems based on structural concepts; Analysis & design of one way & two way slabs; Reinforcement detailing; BIS codes.

UNIT IV - Vertical Support Systems: Types of columns & footings; Shear walls; Analysis & design of axially loaded short columns & isolated shallow footings; Reinforcement for ductile detailing; BIS codes; Overview of deep foundations.

UNIT V - Miscellaneous Structures: Types of staircases with design of typical staircase; Overview of water tanks, ramps, retaining structures, floating columns, machine foundations, heavy duty flooring etc.; Materials & methods for water-proofing & damp-proofing.

3. ARC - 14 - 205 : Architectural Representation - III : [0-2-3-3/ 75 hours]

UNIT I - 2D Drafting: Introduction to CAD; Precision drawing & drawing aids, Draw commands for creating shapes; Edit/Modify commands; Annotating in AutoCAD with text & hatching; Layers, Dimensioning; Architectural views & drafting Views; Templates & design center, Blocks, Drafting symbols, Attributes; Extracting data, Plotting (Layouts, Viewports); Office standards & preparation of presentation drawings.

UNIT II - 3D Modelling: Using 3D visualization software to study modeling such as surfaces & solids; Creating 3D compositions.

UNIT III - Rendering & Animation: Understanding rendering techniques using advanced software; Study of light, color, texture, animation, etc.

4. ARC - 14 - 207 : Building Services II : [1-0-2-2/ 45 hours]

UNIT I - Artificial Lighting: Fundamentals; Behavior of light; Quality, light quantity; Lamps & luminaires - characteristics, selection criteria, lumen method; Interior & exterior lighting; Preparation of lighting schemes; Best practices, codes; Case studies.

UNIT II - Building Electrification I: Power generation & transmission; Characteristics; Basics of electrical circuit - lighting & power circuit; Conductor, cables, controls & other components; Wiring methods; Accessories - switches, meters, fuses, circuit breakers, distribution boards.

UNIT III - Building Electrification II: Basic quantification; Electrical drawing, symbols; Power requirement of building - low, medium & high rise buildings; Load estimation; Building substation, transformer, HT, LT units - space requirements, safety measures; Earthing, lightning arrestors; Stand-by power, alternate power; Regulation as per - NBC & other IS codes.

UNIT IV - Mechanical Transport Systems: Elevators - passenger & service, parking; Escalators - basic components, working & operation, types; Travelators; Conveyer belts; Elevator planning fundamentals; Performance indicator, location & arrangement; Installation related civil works; NBC regulations; Current trends; Illustrations & drawings; Case studies.

UNIT V - Fire Fighting & Life Safety: Basic principles, elements & terminologies; Fire-fighting in different building typologies - prevention, evacuation strategies, suppression measures; Fire-fighting services & planning; NBC standards – Fire safety codes & regulation; Primary & secondary case studies.

5. ARC - 14 - 209 : History of Built Environment - III : [1-0-2-2/ 45 hours]

Detailed study & analysis of architectural design fundamentals through significant examples in the light of the following for the periods mentioned in the modules –

Genesis of seed ideas & concepts; Timeline; Socio-political background, key people involved; Climatic & geographic influence; General settlement pattern; Cities & its civic places; Construction technology & material; Design principles; Typology; Evolution; Spatial organization; Form & Detailing.

The examples to represent the following historical styles are suggestive & students are encouraged to explore additional examples for a comprehensive understanding of the respective styles.

UNIT I - Ancient India: Indus Valley Civilization - residences & various public buildings; Vedic villages - e.g. Kaushambi; Mauryan Period - e.g. Pataliputra; Establishment of Buddhist school, its significance & contribution; Ashokan Architecture & edicts; Beginning of cave architecture - e.g. Barabar hills

UNIT II - Buddhist Architecture & Rock Cut Architecture: Stupas - e.g. Sanchi & Amaravathi; Rock cut Temples; Chaityas & Viharas - e.g. Bhaja, Karle, Kanheri, Ajanta & Ellora.

UNIT III - Evolution of Temple Architecture: Early Gupta & Chalukyan temples - rock cut, shrines, defined temple form; Early Gupta - Udaygiri caves, early temples at Sanchi & Tigawa, temples at Deogarh & Bhittargaon; Early Chalukyan: Temple form at Aihole - e.g. Lad Khan & Durga temples; Elements of Indo Aryan (Nagara) temples; Basic elements of a Hindu temple & different temple styles such as Latina, Valabhi, Shekhari, Phamsana & Bhumija.

UNIT IV - Nagara Temples of Kalinga (Odisha) & Chandela (Madhya Pradesh) Dynasties: Kalinga - Types of Deulas - e.g. Mukteshwara, Lingraj, Jagannath & Sun temple at Konark; Chandela - Principles of shikhara & urushringa; Overview of Khajuraho group of temples; Kandariya Mahadev at Khajuraho.

UNIT V - Solanki & Jain Architecture: Solanki (Gujarat, Rajasthan & parts of Central India) - e.g. Saas Bahu temple at Gwalior & Sun Temple at Modhera; Jain Temples - e.g. temples at Ranakpur & Mt. Abu; Gujarat - Adalaj, Palitana, Somnathpur; Architecture of Rajasthan - Jaipur, Udaipur, Jodhpur, Jaisalmer, Bikaner; Forts, palaces, public buildings & town planning.

6. ARC - 14 - 211 : Principles of Climatic Design : [2-0-0-2/ 30 hours]

UNIT I- Introduction to climatic design: Energy use & its implications. Introduction to various elements of climate & their impact on global, local, site & building context. Introduction to Micro (site) climate – effects of local factors, Landscape elements & any other elements in site. Introduction to urban heat isLand effect.

UNIT II- Impact of climate on design: Climate classifications in India. Study of climate conditions on a macro & micro level. Understanding climate zones & their influence over design guidelines for Warm & humid climate, Hot & dry climate, Composite climate & Cold climate.

UNIT III- Bioclimatic & low-energy design: Understanding the sun path & shading devices, orientation of building, openings- sizes, position. Study of Bioclimatic design & Low-energy design. Examples of Low-energy projects & discussion on solar architecture.

UNIT IV- Integrated passive design: Cooling & Heating: Understanding the psychometric chart. Daylighting & envelope design; Study of different passive cooling & heating strategies in buildings; Ventilation, courtyards, wind towers, stack effect & chimney.

UNIT V- Introduction to simulation software: Introduction to computer simulation for climatic design, software like Climate Consultant, HEED, Ecotect or related advanced software. Design of a space using simulation software with the application of principles of climatic design.

7. ARC - 14 - 213 : Elective - I : [0-0-2-1/ 30 hours]

The creative electives provide an opportunity to express talents which are different from architecture but related to imagination, visualization & creation. They offer hands-on experience of unique ingenuity & workmanship. The essence of creative domain can be achieved by exploring different materials, techniques, processes; developing creative products; finishing & presenting the product for the concepts evolved. Outcome will be through portfolio & presentations.

a) ARC - 14 - 213.1 : Metal Art

Overview- significance, scope & purpose; material types, source, composition, properties, tools & equipment, techniques, processes, finishing; applications – sculpture, wall art, garden art, sign art, accessories etc.

b) ARC - 14 - 213.2 : Hospitality Art

Overview- significance, scope & purpose; typologies - hotels, motels, resorts, clubs, bars, restaurants etc.; visualizer activities - arrangements, theme oriented setting decorations, food presentations etc.; professional appearance, body language & conversation, table etiquettes & housekeeping operations.

c) ARC - 14 - 213.3 : Clay Art

Overview- significance, scope & purpose; material types, source, composition, properties, tools & equipment, techniques, processes, finishing; applications. Utilitarian/ Non-utilitarian products, pottery, sculpture, wall art, garden art, sign art, accessories etc.

d) ARC - 14 - 213.4 : Wood Art

Overview- significance, scope & purpose; classification , selection , types, source, composition, properties, tools & equipment, techniques, processes, finishing; applications – Utilitarian / Non-utilitarian products, sculpture, wall art, sign art, engraving, fixtures, accessories etc.

YEAR 2 / SEMESTER IV

1. ARC - 14 - 202 : Architectural Design & Detailing - IV : [2-8-0-10/ 150 hours]

UNIT I- Theme & focus of design: Study, analysis & utilization of Non-Conventional Systems (alternative building technologies). Understanding, exploration & development of design programme, concepts & detailed design with focus on Stabilized Mud Blocks, Bamboo, Ferro-cement, etc. in urban &/or rural context.

UNIT II- Basic Components: Behavioral Science; Functionality; Building Materials; Theory of Design; Form Development; Tectonic decisions: Structures, Building Materials, Services; Site Planning; Building Control Regulations; Inclusive Design; Design Communication.

UNIT III- Gateways & Thresholds: Importance, Exploring & Understanding the essence; detailing process; User analysis; Elements; functionality, aesthetics; Materials. This Minor Exercise will be represented through conceptual development (sketches, physical & digital models).

UNIT IV- Design Analysis: Exploration & analysis of iconic Eco-sensitive Architecture; Understanding design philosophy & process; Learning from design quality, Literature/book reviews; Architectural critiques.

UNIT V- Design Exercise: Building Design. Complexity of design: Site planning involving multiple buildings; Detailing of any one building with alternative technology. Typology: Co-operative Societies, Vocational Training Centers, Rural Residential Schools, Bus Stations, Veterinary Centers, Temporary Shelters, Labour Camps, Ayurveda Centers, Naturopathy Centers, SOS Villages, Horticultural Centers, Ashram etc. Site extent: Flat site upto 8000 m2.

2. ARC - 14 - 204 : Structural & Construction Systems - IV : [2-2-2-5/ 90 hours]

UNIT I- Introduction: Need for alternative building materials & technology: Mud construction, bamboo technology, Ferro cement etc. Comparative studies with conventional Building Materials. Environmental benefits, energy aspects & cost effectiveness.

UNIT II- Ferro Crete, Fiber reinforced concrete, Filler slabs: properties, applications & construction techniques. Structural concepts with practical exposure.

UNIT III- Mud Architecture: Mud as a construction material. Various construction methods - COB, Rammed earth, Adobe, Daub, Stabilized mud blocks (SMB), compressed stabilized mud blocks (CSMB): Application, Construction techniques. Structural concepts with practical exposure.

UNIT IV- Finishes: Wall finishes, floor finishes, roof finishes, water proofing, insulations – thermal & acoustical. False ceilings. Paneling.

UNIT V- Miscellaneous materials & techniques: Shoring, underpinning, scaffolding, formwork, recycled materials, sustainable techniques, eco-friendly materials.

3. ARC - 14 - 206 : Architectural Representation - IV : [0-2-3-3/ 75 hours]

UNIT I- Site Modelling: Introduction to BIM modeling, advantages; Creation of Terrains, Landscape elements.

UNIT II- Building Modelling : Building elements like walls, floors, roofs, doors, windows, openings, stairs, ramps, railings, curtain walls, structural elements such as columns, beams, slabs, foundations, etc.; Creating elevations, sections, 3d view; Working with grids for framed structures; Massing, creating masses & modification.

UNIT III- Customization: Creating families: Using components, creating new types & new families.

UNIT IV- Documentation: Creating schedules, materials takeoff.

UNIT V- Presentation: Rendering views, Creating walk- through, Print layouts.

4. ARC - 14 - 208 : Building Services - III : [1-0-2-2/ 45 hours]

UNIT I- Fundamentals of Ventilation & Air Conditioning: Ventilation: Objectives, methods, air changes, comfort ventilation, standards; Mechanical Ventilation. Air Conditioning: Body comfort-psychometrics; Refrigeration Cycle – Compression & Absorption Cycle, Components of air conditioning, Parameters considered for air conditioning, concept for air based & water based cooling systems.

UNIT II- Air Conditioning Systems: Types; Air conditioning equipment – residential small units- water cooled & self-contained- air-cooled- cooling tower. Principles of load estimation- sources of heat- cooling & heating loads- estimation of load; Thermal insulation; Air distribution- ducts- outlets- duct sizing; Equipment selection – Zoning. Energy conservation techniques.

UNIT III- Acoustics I: Physics of sound - Sound propagation; Sound Measurement; Sound in enclosed space – Properties & behavior; Acoustical Defects; Constructional measures; various sound absorbing material & its applications. Acoustical properties of building materials, Sound insulation; Room acoustics: Reverberation time - control; design for listening room; acoustical requirements; Effects of noise - Environmental noise, Impact noise, Sound Transmission – airborne & structure borne noise, STC , Noise control techniques in different building types.

UNIT IV- Acoustics II: Acoustical design for performance spaces- drama hall, music, speech, cinemas, open air theatre, workplaces, education spaces, & other acoustically sensitive environments; Design of Theaters & Concert Halls, recording rooms- open air theatres; Designing of stage, seating & false ceiling design, Sound amplification systems; Acoustical treatment materials, Case studies; Calculations & designing of acoustical treatment of various spaces.

UNIT V- Contemporary Building Services: Intelligent Buildings: Concept & use; Sensors – working & application in – HVAC, Fire protection systems, security & safety systems & general energy efficiency. Building management / automation systems: principles, working & integration in building design, IBMS; Reticulated Gas Systems. IT Services: Communication systems, CCTV, Wireless systems; digital systems.

5. ARC - 14 - 210 : History of Built Environment - IV : [2-0-0-2/ 30 hours]

Detailed study & analysis of architectural design fundamentals through significant examples in the light of the following for the periods mentioned in the modules –

Genesis of seed ideas & concepts; Timeline; Socio-political background, key people involved; Climatic & geographic influence; General settlement pattern; Cities & its civic places; Construction technology & material; Design principles; Typology; Evolution; Spatial organization; Form & Detailing.

The examples to represent the following historical styles are suggestive & students are encouraged to explore additional examples for a comprehensive understanding of the respective styles.

UNIT I- Evolution of South Indian Temples: Different Dynasties of early medieval South India; Vesara & Dravida Styles; Durga Temple, Lad Khan Temple at Aihole, Cave temples at Badami, Chalukyan Architecture at Pattadakal- Virupaksha Temple, Haveri, Hanagal, Banvasi.

UNIT II- Pallava & Pandya Dynasty: Rock cut Architecture- mandapas, monolithic temples (Rathas); Pancharathas & Shore temple at Mamallapuram; Kailasanatha temple & Vaikuntha Perumal Temple at Kanchipuram. Development under Pandya Dynasty- Development of Temple Citadel & Gopuram; e.g at Tiruvannamalai & Chidambaram.

UNIT III- Chola Dynasty & Madurai Dynasty: Development of Chola style & capital, Influence from Chalukyan style; Brihadeshwara Temple at Tanjore & Gangai Konda Cholapuram, Temples at Kumbakonam; Temple Architecture under Madurai Dynasty: development of Prakaarams & spaces in Temple, example of Madurai Meenakshi Temple.

UNIT IV- Hoysala, Vijayanagara & Nayaks: Vesara style; Chennakeshwara Temple at Belur, Hoysaleshwara Temple at Halebeedu, Keshava temple at Somnathapur; Vittala Temple & Virupaksha temple at Hampi, Settlement pattern of Hampi; Temple towns of Kumbakonam, Kanchipuram, Srirangam, Madurai & Rameshwaram.

UNIT V- Kerala & South Canara: Temple complexes, temple towns, Basadis & palaces at various historical settlements such as- Udupi, Karkala, Moodabidri, Sringeri, Barkur, Kollur, Suchindram, Padmanabhapuram, Thiruvananthapuram, Kanyakumari, Thrissur, Palakkad, Calicut, Wayanad, Ernakulam, Alleppey.

6. ARC - 14 - 212 : Principles of Sustainable Design : [2-0-0-2/ 30 hours]

UNIT I- Introduction: Concepts of Reduce, Reuse & Recycle; Environmental Legislations ; Climate change Protocols & Conventions ; MoEF Guidelines & Notifications; Overview of policies & development regulations governing sustainability issues; Economic approaches of measuring sustainable development; Project Life Cycle; Economic & environmental costs of green buildings.

UNIT II- Passive Systems: Resource optimization, Design methodologies- site & building level, Multiuser, Multi-functionality, Adaptability, & flexibility; Building technologies, materials & detailing; Spatial considerations; Components; Interior optimization; Site & building maintenance.

UNIT III- Energy Systems: Energy, Thermodynamics & Building Physics; Heat transfer, ventilation & insulation of buildings; Design strategies; Active Energy Systems in Buildings: HVAC, Electrical, Mechanical Building Systems, ECBC, BEE, LEED & GRIHA; Solar Passive Energy Design systems; Measuring energy efficiency; Simulation through the use of computer based applications.

UNIT IV- Water Management: Management of natural water sources; Designing for water conservation – traditional & modern; Techniques of water management- natural & manmade; Reduction of water consumption, Reuse of resources & recycling of waste water; Rain water harvesting; Considerations at site, Landscape & building level.

UNIT V- Waste Management: Types; Waste minimization; Segregation; Recycling waste as alternative material for buildings, Landscape & other products; Processing; Study of innovative practices; Specifications & construction methods for using recycled waste- agricultural, industrial, municipal, domestic; Demonstrative architecture & Landscape using waste.

7. ARC - 14 - 214 : Elective - II : [0-0-2-1 / 30 hours]

The creative electives provide an opportunity to express talents which are different from architecture but related to imagination, visualization & creation. They offer unique experience of ingenuity & creativity. The essence of creative domain can be achieved by exploring different technology, techniques, processes, concepts, compositions. Outcome will be through portfolio & presentations.

a) ARC - 14 - 214.1 : Creative Photography

Overview- principles, recent advancements; significance, scope & purpose; types, composition, tools & equipment, technology, techniques, processes, presentation; categories-themes, location, objects, patterns, light & shade, nature, still photography, actions & expressions, details, culture, panorama, frames, metaphor etc..

b) ARC - 14 - 214.2 : Creative Writing

Overview- Definition, Description, significance, scope & purpose; techniques. Types – prose, poetry, plays, lyrics, speeches, etc.; Factors of study: plot & situation, themes, dialogue, structure, character, voice, description, expression, interpretations, metaphor, point of view etc.

c) ARC - 14 - 214.3 : Creative Fashion

Overview- Definition, Description, significance, scope, purpose, tools & techniques, materials; types; Basics of human anatomy. Pattern making – methods, tools. Taking measurements, preparing patterns - Drawing fashion figures, Fashion poses, rendering details. Garment construction: Stitching the garment for the patterns made.

d) ARC - 14 - 214.4 : Creative Gardening

Overview- Definition, Description, significance, impact, scope & purpose; tools & techniques, materials; types; Basics of plants & horticulture; site situation & appropriate themes, elements of gardening, execution & detailing, maintenance.

YEAR 3 / SEMESTER V

1. ARC - 14 - 301 : Architectural Design & Detailing - V : [2-8-0-10/ 150 hours]

UNIT I- Theme & focus of design: Study, analysis & utilization of Contemporary Structural Systems in Hi-tech Architecture; Understanding, exploration & development of design programme, concepts & detailed design with focus on Steel.

UNIT II- Basic Components: Behavioral Science; Functionality; Building Materials; Theory of Design; Form Development; Tectonic decisions: Structures, Building Materials, Services; Site Planning; Building Control Regulations; Inclusive Design; Design Communication.

UNIT III- Temporal Architecture: Importance, Exploring & Understanding the essence; detailing process; User analysis; Elements; functionality, aesthetics; Materials. This Minor Exercise will be represented through conceptual development (sketches, physical & digital models).

UNIT IV- Design Analysis: Exploration & analysis of works of iconic Hi-tech Architecture; Understanding design philosophy & process; Learning from design quality, Literature/book reviews; Architectural critiques.

UNIT V- Design Exercise: Building Design. Complexity of design: Multi-storied building/s or large span structures. Focus on building services as an integral part of the design & construction process. Typology: Transport Hubs, Shopping Malls, Hotels, Hospitals, Media Houses, Broadcasting Stations, Sports Facilities, Apartments, etc. Site extent: Up to 8000 m2.

2. ARC - 14 - 303 : Structural & Construction Systems - V : [2-2-2-5/ 90 hours]

UNIT I- Introduction: Steel as a construction & structural material, steel sections, load cases & combinations. Limit State Method (LSM) of design, design criteria, applications.

UNIT II- Metal Building components: windows, doors, stairs, collapsible gates, rolling shutters, railings, BIS Codes.

UNIT III- Frame & Roof systems: Steel stanchions, girders, trusses: Characteristics, types, components, selection, applications, structural sizing, fabrication & erection. Castellated beam, Portal frames, Steel connections. Analysis & Design of simple trusses.

UNIT IV- Curtain wall: Characteristics, types, components, selection, applications, structural sizing, connections.

UNIT V- Advanced Systems: Space frames; Pre-engineered buildings, fire protection. Overview: tall structures, large span structures.

3. ARC - 14 - 305 : Working Drawing & Detailing - I : [1-2-3-4/ 90 hours]

UNIT I- Overview: Working Drawing, Estimation & Specifications; Liaison drawings; Standards, guidelines for execution of works, Units of measurements; Writing specifications; Methods of estimation; Rate analysis of relevant items.

UNIT II- Centre line drawing, Excavation drawing, Foundation details & Floor Plans

UNIT III- Roof Plan including roof drainage, Stair room plan.

UNIT IV- Sections, Elevations; Wall sections; Section through stairs & toilet is mandatory.

Note: All Modules to include drawings & details; estimation & specifications.

4. ARC - 14 - 307 : Project Management : [1-0-2-2/ 45 hours]

UNIT I- Introduction : History; Stages involved; Project life cycle analysis; Role & responsibilities of project manager; Areas of project management; Co-ordination of various teams involved in the project; Scheduling; Classification; Methods; Controlling & Life cycle curves; Work breakdown structure.

UNIT II- Project Management through Networks: Network techniques; Interrelationship of events & activities; Dummy activities; Types of networks; Rules of drawing a network; Fulkerson's rule.

UNIT III- Project management techniques: Program Evaluation & Review Technique; & Critical Path Method; Time Estimates; Networking with PERT models; Probability analysis.

UNIT IV- Precedence Networks for Construction Projects: Representation of Nodes; Logic of Precedence diagram; Rules for drawing; Forward pass & backward pass calculations.

UNIT V- Time-Cost Relationship: Total Project Costs; Cost curve; Optimization of Cost through Network Contraction & steps involved; Cost control & cash flow; Case studies- Application of knowledge & Understanding of project management tools.

5. ARC - 14 - 309 : History of Built Environment - V : [1-0-2-2/ 45 hours]

Detailed study & analysis of architectural design fundamentals through significant examples in the light of the following for the periods mentioned in the modules –

Genesis of seed ideas & concepts; Timeline; Socio-political background, key people involved; Climatic & geographic influence; General settlement pattern; Cities & its civic places; Construction technology & material; Design principles; Typology; Evolution; Spatial organization; Form & Detailing.

The examples to represent the following historical styles are suggestive & students are encouraged to explore additional examples for a comprehensive understanding of the respective styles.

UNIT I- Islamic Architecture in India: Overview; Development of various building typologies & incorporation of indigenous elements, development of construction systems & elements; Integration of Islamic planning principles into urban settings; Various dynasties & their influence: Slave, Khilji, Tughlaq, Sayyid & Lodi; Significant examples for each dynasty.

UNIT II- Provincial Islamic Style: Development of provinces & evolution of regional architecture; Geographic, social, cultural, political influences; M&u, Bengal, Gujarat, Avadh, Bihar, Bhopal, Jaunpur, Deccan (Gulbarga, Bidar, Golconda, Bijapur), Tipu's dynasty; Significant examples for each province.

UNIT III- Mughal Architecture: Development of Mughal Architecture by various rulers- Babur, Humayun, Akbar, Jahangir, Shahjahan & Aurangazeb; Geographic, social, cultural, political influences; Incorporation

of local styles, skills, materials & elements; Development of Settlements, Building typologies & Gardens; Study of significant examples at Delhi, Agra, Sikri, Kashmir.

UNIT IV- Colonial Architecture- British: Overview, Evolution of Indo-Saracenic style of Architecture, fusion of Indian regional architecture with European styles; Development of various typologies like Forts, Bungalows, Cantonments, Public buildings, Transportation nodes, Institution, Industries & Commercial buildings; Architectural examples from prime British settlements of Calcutta, Madras, Bombay & New Delhi.

UNIT V- Colonial Architecture- Others: Imperial power in various places of India; French-Pondicherry; Dutch- Coromandel & Malabar; Portuguese-Goa. Influence on Local architecture & settlements; Development of various typologies like Forts, Ports, Bungalows, Public buildings, Religious buildings, Commercial buildings & Markets.

6. ARC - 14 - 311 : Principles of Urban Design : [2-0-0-2/ 30 hours]

UNIT I- Introduction: Introduction to Urban Design; Terminologies; Stake holders & their role in the process of Urban Design; Urban Design as Multidisciplinary field; Necessity & benefits of quality urban design; Scope, strategies, levels, legislation & scale of Urban Design.

UNIT II- People's Perception: Users and activities in a city and their analysis. Behavioral studies and user needs. Socio-cultural and socio economic aspects. Different zones and activities in an urban area. Memory and mental mapping, the Five Elements in a city. People-centric design and public participation.

UNIT III- Anatomy of an Urban Area: Urban morphology & urban character; Elements & aspects of Urban Design; Built & Unbuilt spaces; Buildings, public spaces, streets & transport; pedestrianisation & street scape; movement pattern; services; safety & sensitive urban development – defensible spaces. Nature and urban design - open spaces; Environment & urban design.

UNIT IV- Urban Design Process: Survey techniques; Evolution analysis; Townscape analysis; Perceptual structure; Permeability study (privacy & accessibility) & visual analysis. Constraints & possibilities; Designing in a context and site planning; Articulation of spaces; Multi-functionality, flexibility, adaptability; Generating alternatives; Formulation of issues for intervention.

UNIT V- Application of Urban Design: Examples of good urban design; Urban design in history, aspects of heritage and historical continuity; Applications of urban design principles in existing developments as well as in news proposals; Theories & protocols of Urban Design -New Urbanism; Case studies of modern & contemporary urban interventions.

YEAR 3 / SEMESTER VI

1. ARC - 14 - 302 : Architectural Design & Detailing - VI : [2-8-0-10/ 150 hours]

UNIT I- Theme & focus of design: Study & analysis of various latest technologies in large scale Architecture; Understanding, exploration & development of design programme, concept & detailed design with focus on Prefab.

UNIT II- Basic Components: Behavioral Science; Functionality; Building Materials; Theory of Design; Form Development; Tectonic decisions: Structures, Building Materials, Services; Site Planning; Building Control Regulations; Inclusive Design; Design Communication.

UNIT III- Non-linear Designs: Importance, Exploring & Understanding the essence; detailing process; User analysis; Elements; functionality, aesthetics; Materials. This Minor Exercise will be represented through conceptual development (sketches, physical & digital models).

UNIT IV- Design Analysis: Exploration & analysis of works of iconic High-tech Architecture; Understanding design philosophy & process; Learning from design quality, Literature/book reviews; Architectural critiques.

UNIT V- Design Exercise: Campus Design /Building Complex Design. Complexity of design: Large scale Institutional / Commercial / Industrial / Housing / Public use project of diversified activities with focus on horizontal & / or vertical circulation & grid planning. Typology: Campus, Housing, Institutions, Government complexes/offices, Multi-Level Car Park. Site extent: Upto 20000 m2.

2. ARC - 14 - 304 : Structural & Construction Systems - VI : [2-2-2-5/ 90 hours]

UNIT I- Introduction to Prefab: Types, Necessity, Advantages & disadvantages, Modular coordination: Grid systems, layout. Code provisions. Structural concepts with examples.

UNIT II- Precast Concrete: Types, Necessity, Code provisions. Structural concepts with examples. Introduction to pre-stressed concrete: Techniques, systems, Structural concepts.

UNIT III- Substructure & support system: Precast foundations, Types: slab, column, beams, Necessity, Code provisions. Structural concepts with examples, joinery details, transportation & erection.

UNIT IV- Roof & wall systems: Wall panels, roof systems, joinery details, transportation & erection.

UNIT V- Precast Components: stairs, toilets, doors, windows, furniture units, composites : Types, joinery details, transportation & erection; Dry wall construction.

3. ARC - 14 - 306 : Working Drawing & Detailing - II : [1-2-3-4/ 90 hours]

UNIT I- Staircase & its components.

UNIT II- Electrical layout with furniture; Circuit drawing; Conduit drawing; Voice & data; Fixture mounting heights etc.
UNIT III- Kitchen & Toilet details; Sanitary & plumbing; Rain water harvesting; water tank & septic tank as per calculations.

UNIT IV- Detailing of architectural elements. Door &window: Details, installation & hardware. Railing details. Wall finishes & colour scheme.

UNIT V- Site development details; Paving, Site drainage, compound wall, gate, etc.

Note: All Modules to include drawings & details; estimation & specifications.

4. ARC - 14 - 308 : Research Techniques : [1-0-2-2/ 45 hours]

UNIT I- Introduction to research: Domain of Architectural Research; Understanding the nature of research in architecture- Need & significance; Objectives; Characteristics; Ethics; Concepts of theory; Research methods in Architecture.

UNIT II- Research Process: Types of Research; Research methods & Research methodology; Research Process; Review of literature, research statement; Research design – need, components, considerations.

UNIT III- Data Collection & Sampling: Primary data; methods of data collection ; survey & observation; Questionnaires - types, aspects, sequence, Observation- types, characteristics, advantages, limitations etc., recording observations; Secondary data- sources, characteristics; Other Methods of Survey - visual, use of mechanical devices etc.; Sampling - need, significance, methods, classification, characteristics, determining sample size, time, event sampling etc.

UNIT IV- Data Analysis: Overview of measuring & scaling techniques; Processing & analysis of data - descriptive & inferential; graphical representation of analysis.

UNIT V- Report, Paper & proposal writing: Purpose, characteristics, guidelines, steps, format, structure, contents, presentation, referencing style, ethical issues: plagiarism etc.

5. ARC - 14 - 310 : Contemporary Built Environment : [1-0-2-2/ 45 hours]

Detailed study & analysis of architectural design fundamentals through significant examples in the light of the following for the periods mentioned in the modules –

Genesis of seed ideas & concepts; Timeline; Socio-political background, key people involved; Climatic & geographic influence; General settlement pattern; Cities & its civic places; Construction technology & material; Design principles; Typology; Evolution; Spatial organization; Form & Detailing.

The examples to represent the following historical styles are suggestive & students are encouraged to explore additional examples for a comprehensive understanding of the respective styles.

UNIT I- Industrial Revolution & Pre-Modern Era: Industrial Revolution & its impact on architecture; Great world expositions- London (1851)& Paris (1885); Chicago School of thought; Development of skyscraper – works of Louis Sullivan; Development of architectural theories- Arts & Crafts Movement; Art Noveau, Art Deco; Expressionism; De Stijl movement; Cubism; Organic Architecture & works of Frank Lloyd Wright & Antonio Gaudi; Works of other significant architects.

UNIT II- Modernism: Development of Rationalism & Functionalism; Bauhaus; Principles of Modernism; International style; Schools of thought; Ideas & works of Great Masters: Le-Corbusier, Walter Gropius, Mies Van Der Rohe, Frank Lloyd Wright, Alvar Alto, Oscar Niemeyer & others; Case studies from across the world

UNIT III- Post Independent India: Overview; Development of new state; Role of Government for infrastructure development; Influences of various movements & works of Great Masters- Le Corbusier, Louis Kahn, Joseph Allen Stein, Laurie Baker & Otto Koenigsberger; Language & works of first generation architects of Independent India - Achyut Kanvinde, CPWD & Habib Rahman, B.V. Doshi, Charles Correa, Raj Rewal, Anant Raje, Uttam C. Jain, Hansmukh Patel, Nari G&hi & others.

UNIT IV- Post Modern Era: Reaction to Modernism; Theory of Post Modernism & expression through significant works; impetus to other concurrent theories- Structuralism, Metabolism, Minimalism, Hi-Tech, Novelty, Critical Regionalism; Exploring principles of various theories through significant examples .

UNIT V- Contemporary Architecture: Current trends & theories in Architecture- Hi-Tech, De-constructivism, New Expressionism, Blobitecture, Green Architecture, Bionic Architecture; Design philosophies & works of contemporary architects; Case studies from across the world; Contemporary architecture in India.

ARC - 14 - 312 : Principles of Housing & Economics : [2-0-0-2/ 30 hours]

UNIT I- Overview of housing : Concept of shelter, Timeline, Dynamics of housing- users, need, supply & dem&, providers, economic forces, terminologies; migration, urbanization, scale, scope, types & ownership; construction industry, current trends, realty sector.

UNIT II- Housing Issues: Significance in National Development; Urban & Rural housing in India: statistics, problems-slums, shortage etc., Issues, Challenges; Current scenario; Planning principles & policies; Dem&, Role of different institutions; Stake holder analysis, current typologies, appropriate housing requirements, best practices.

UNIT III- Housing legislations: National & State Housing Policy, Development control regulations, Acts & Bye laws, Strategies, Government & non-governmental agencies, Competent authorities, Schemes- PPP, SRA, Redevelopment, Sites & services etc.

UNIT IV- Housing Economics: Concepts, issues, aspects; Land & housing economics- valuation, rent, sinking fund, development cost; sources of finance, market characteristics, key constraints, Agencies & institutions, Real estate, Low cost housing, affordable housing; Incremental housing; housing finance in India – sources, characteristics, finance agencies.

UNIT V- Case Studies: Exploration & analysis of different housing schemes; Study of user profiles, provision, relevance, planning- physical, administrative, socio-cultural, sustainable, financial; future forecasts & trends.

YEAR 4 / SEMESTER VII

1. ARC - 14 - 401 : Urban Context Studio : [2-8-0-10/ 150 hours]

UNIT I- Theme & focus of design: People-centric, context intensive public-use projects demanding comprehensive Understanding of the urban framework.

UNIT II- Basic Components: Behavioral Science; Functionality; Building Materials; Theory of Design; Form Development; Tectonic decisions: Structures, Building Materials, Services; Site Planning; Building Control Regulations; Inclusive Design; Design Communication.

UNIT III- Streetscape: Importance, Exploring & Understanding the essence; detailing process; User analysis; Elements; functionality, aesthetics; Materials. This Minor Exercise will be represented through conceptual development (sketches, physical & digital models).

UNIT IV- Precinct Analysis: Exploration & analysis of trendsetting Urban Design works; Understanding urban design theories & processes; Learning from design quality; Literature/book reviews; Urban Design critiques.

UNIT V- Design Exercise: Context Design. Complexity of design: Master planning, Precinct morphology & Building Detailing; Detailed study & analysis of the existing urban fabric. Formulation of strategies for intervention. Development of Design program for Civic Architecture. Typology: Large scale public use projects: Commercial Zones, Mixed-Use Developments, Waterfront Developments, Heritage Zones, Redevelopment Projects, Civic Centers, Housing Schemes, Transit Oriented Developments, Recreational Precincts, Sites &Services Schemes etc. Site extent: Precinct upto 20,000 m2 with an influence zone of 40,000 to 60,000 m2.

2. ARC - 14 - 403 : Interior Design & Detailing : [2-2-2-5/ 90 hours]

UNIT I- Introduction to interior design: History, styles; Behavioral Science: Nature & role of social, physical & built environment; Environmental psychology: behavior, psychology, perceptions, preferences, etc.; Basic components- Functionality, Services, Inclusive Design; Basic elements of design for evolution of creativity - dot, line, plane, volume 2D & 3D. Basic principles of design - Axis, symmetry, balance, focus, rhythm, harmony, unity, variety, contrast, hierarchy, scale & proportion, movement, emphasis, dominance, fluidity, articulation & order.

UNIT II- Concept & theme Development: Enclosures & envelops to formulate the volumes, response to functional spaces; Functionality: Spatial Organization & Planning; Derivation of quantitative aspect of spaces based on User-Activity Analysis, furniture / equipment, Anthropometry, Ergonomics, Layout, Circulation, etc.; qualitative aspects based on ambience.

UNIT III- Technical decisions- Constructional details & Material specification- Exploration & selection responding to functionality & aesthetics; Decisions for aesthetics: Color, textures, patterns, surface finishes, ornamentation, furnishings, accessories, interior Landscaping, etc. with reference to visual comfort & ambience in the interiors.

UNIT IV- Services - Mechanical & Environmental System: HVAC, electrical, firefighting, sanitary & plumbing, security, telecommunications, lifts, escalators, lighting & acoustical systems etc. responding to functionality & aesthetics.

UNIT V- Design & Detailing: Broad Typology: Residential/ Commercial / Retails / Offices/ Institutional/ Hospitality/ Recreational/ Sports/ Healthcare/ Others. Site extent: Ranges from 200 m^2 - 600 m^2.

3. ARC - 14 - 405 : Thesis I - Inquiry : [1-2-3-4/ 90 hours]

Thesis process will give opportunity to students to harness their research abilities on identifiable domain & demonstrate the research as application for a design project in the same identifiable manner. The Thesis Process assessing research abilities on identified domain & demonstration of research as application on design project. Process of thesis will be in two stages: Domain Research & Design Project- Research Paper, Thesis research will further continue in preparing the base work for the design project in eighth semester. Base work will involve literature survey for identified parameters, secondary case studies, primary guidelines, identification of primary case studies & site, preparation of process of case studies, & site studies. Secondly, to prepare the guidelines & checklist for case studies & site studies. The process for Thesis I: Inquire will include: Subject Description, Identification of domain, Fundamentals of design domain,

Identification of project, its scale & complexity, Identification of scope of work, User activity analysis, Identification of parameters of Thesis & Prioritization, Selection of focus. Research focus - Research shall involve selection of the broad area of study, defining the scope of study, finalization of the methodology, data collection, analysis, interpretation, & research paper writing.

4. ARC - 14 - 407 : Professional Practice & Management : [1-0-2-2/ 45 hours]

UNIT I- Introduction: Architect's Act 1972; Architectural Profession, Code of Conduct & Ethics, Acts & Legislation, Duties & Liabilities, Role & Responsibility, Nature of Profession, Regulatory bodies, Professional bodies

UNIT II- Architectural Competitions: Classification, benefits & drawbacks, methods, rules & regulations, Appointments & Duties of Assessors & Adviser. Withdrawal of Competition.
Architectural Copyrights: meaning, importance & precautions.

UNIT III- Tenders: Definition, Types, Conditions, Tender Notice, Documents, EMD; Tendering process. Contract: Definition, Types, Contract agreement, necessity, contract document.

UNIT IV- Arbitration & Conciliation: Arbitration & Conciliation Act 1996; Nature, Appointment, Conduct, Powers & duties; Procedure & awards.

UNIT V- Practice & Management: Types, Office set-up & administration, Registration, Practice Procedure; Expansions, Collaborations, Global practice. Coordination with supporting consultants; Task allocation – Work plans, monitoring the plans, review meetings, record keeping, Accounting, Human resources. Ways of getting works, types of works. CoA's Conditions of Engagement & Scale of Charges.

5. ARC - 14 - 409 : Elective - III : [1-0-2-2/ 45 hours]

The set of electives give an opportunity to explore the prime fields of specializations in the profession of built environment, which will help in identifying interest for higher studies &/ or focus of dissertation & thesis. The theoretical inputs & practical exposure in these fields will enable the students to enhance their knowledge base.

a) ARC - 14 - 409.1 : Advanced Landscape Design

UNIT I- Introduction to Urban Landscape design: Introduction to Urban Landscape design & its influence on physical & visual environment; Hierarchy of Urban open spaces, elements of urban Landscape, recent trends in concepts & approaches to urban Landscape design.

UNIT II- Site planning & services: Landscape detailing; softscapes & hardscapes, Techniques of Site grading & site drainage in different site conditions; advance Landscape services, advance soil management techniques; parking layouts.
UNIT III- Landscape Detailing: Detailing of various elements of Landscape; Application of Landscape design principles, details for projects of moderate complexity; Master planning for large developments like Technology parks, Mixed Use developments, Institutional & Industrial campuses etc.

UNIT IV- Sustainability & innovation in Landscape: Sustainable aspects in Landscape architecture, sustainable irrigation techniques, Landscape in interior spaces, Sustainable softscapes & hardscapes, innovation in Landscape architecture, Vertical farming, green roofs, etc.

UNIT V- Introduction to Landscape conservation: Ecology & Landscape design, Landscape conservation & Environmental Landscapes. Study of famous Landscape architects across the world, their philosophy & design techniques.

b) ARC - 14 - 409.2 : Advanced Acoustics & Illumination

UNIT I- Acoustical materials: NRC, TL; acoustical detailing for walls, false ceiling, etc.; control of reverberation time. Insulation materials- application, construction detailing.

UNIT II- Acoustical detailing & design of Lecture halls, Theatre, Multi-purpose halls, Recording studios, Open-air theatres, etc.; Sound reinforcement systems.

UNIT III- Daylighting: Daylight factor, analysis & design of openings, daylight prediction techniques, control of glare.

UNIT IV- Artificial Lighting systems: Design issues; Lighting for specific purposes; Interior lighting: Ambient, Task & Accent lighting- scallops, wall washers, luminous ceiling, cove lighting, signage lighting, etc.; Exterior lighting: street, public spaces, heritage buildings, Landscape, sports grounds, façade lighting, etc.

UNIT V- Detailing & specification of lighting for Interior spaces: Library, Retail Interiors, Residential, Restaurants, Auditoriums, Institutions, Museums, Stage & Event Lighting, etc. Detailing & specification of lighting for Exterior spaces: Landscapes, street, public spaces, heritage buildings, sports grounds, façade lighting, etc.

c) ARC - 14 - 409.3 : Advanced Building Services

Analysis & Design of Building Services in large scale projects of various building occupancy: Materials/equipment, Approximate Estimation, Costing, Thumb Rules, Codes, Space Requirements, Safety, Layouts, Detailing, Distribution Systems, Installations, Phasing, Capacity Optimizations & Current Practices & Innovations.

UNIT I- Water supply & Fire Fighting.

UNIT II- Sewage Disposal & Solid Waste Management.

UNIT III- Electrical Services.

UNIT IV- HVAC

UNIT V- Vertical Transportation

d) ARC - 14 - 409.4 : Advanced Structures

UNIT I- Pneumatic structures & Membrane structures: Introduction to pneumatic structures & membrane structures. Evolution of pneumatic structures. Basic structural theories to analyze pneumatic structures & membrane structures. Types, advantages & disadvantages of structural systems. Maintenance of pneumatic structures. Practical application in architectural design. Case studies & documentation.

UNIT II- Marine structures & floating structures: Introduction to different types of marine structures. Structural & architectural aspects in analysis & design of marine structures. Types of loads on marine structures. Construction & Maintenance techniques in different marine structures & floating structures.

UNIT III- Cable suspended structures & tensile structures: Introduction to cable suspended structures & tensile structures. Structural behavior of cable suspended structures & tensile structures. Load transfer in cable suspended structures. Advantages & disadvantages, practical application of cable suspended structure & tensile structures. Construction techniques of cable suspended structures. Introduction to tensegrity in structures. Case studies & documentation.

UNIT IV- Advanced Substructures: Introduction to advanced substructures (foundation & underground structures) Foundation- Raft & pile foundation. Structural analysis of these footings. Stability of structure. Soil structure interaction. Advantages & disadvantages of the structures. Characteristics of underground structures, types of underground structures (natural caves, constructed caves, earth beam, urban tunnels etc.) Construction techniques of foundations & underground structures.

UNIT V- Advanced Materials: Study of different types of advanced materials (Graphene, alloys, plastics, foam concrete, fiber reinforced concrete etc. Characteristics & properties of advanced materials in detail. Application of these materials in different types of buildings. Advantages & disadvantages. Introduction to composite structures. Structural behavior of composite structures. Characteristics of composite structures.

6. ARC - 14 - 411 : Elective - IV : [2-0-0-2/ 30 hours]

The set of electives give an opportunity to Understanding various issues concerning the built environment. Students will debate & brainstorm about unique logics for socially relevant design matters, including perceived arguments & essential decision making. The methods of inquiry to explore these subjects will assist the students in critical thinking in Design studies.

a) ARC - 14 - 411.1 : Vastuvidya

UNIT I- Introduction: Planning, designing & construction aspects of traditional Architecture in India- evaluation with the Understanding of context- relevance.

UNIT II- Concepts of Vastuvidya; Definition; Resource materials; Roles & duties of Silpis evolutionary nature of the discipline, basic unit of measurements- purushapramanam. Hastham. Padmam, angulam & yavam; vertical proportioning & Thalam concept.

UNIT III- Concept of Vastu: basic geometry, town planning; Planning, design & construction of temples & halls; secular buildings; Case studies. Investigation of Land: tests for suitability & determination of cardinal direction.

UNIT IV- Classification of villages & towns; types of planned settlements, Landuse patterns; position of temples & other uses, street patterns; Planning of residential buildings, Evolution of residential types from *Vastupurusha Mandala*.

UNIT V- Concept of Mandala, technology in Vastuvidya, classification of materials, brief description of the characteristics & uses of *sila, istaka, daru, loha, mrilsna, sudha*; Assembly & joinery; Construction methods- F*oundations. Walls, columns, utharam & roof structure, the system* of proportional measurements & thumb rules.

b) ARC - 14 - 411.2 : Architectural Journalism

UNIT I- Overview – Definition, Significance, scope, purpose, structure, principles, techniques, processes, mediums, study of potential readers, contemporary architectural journalism.

UNIT II- Documentation: study & analysis – Photo journalism, Book reviews Electronic media; check list, observations, field studies, interviews, questionnaires; Post occupancy evaluation, public perception, designer's opinions.

UNIT III- Writing techniques – Styles, format, purpose, medium, frequency, clear structure, coherent & distinctive look, visual appearance, graphic design, genres, image, descriptive & analytical reports.

UNIT IV- Ethics, laws & legislations – Plagiarism, Intellectual property rights, Disclaimers, copyright, author's rights, patents & royalties, trade mark, legal boundaries, libel & invasions of privacy, permissions, references & credits.

UNIT V- Editing & Publishing – Proof reading, Editing techniques, Page make up, Layout, color scheme, Font, Abstract, Pictures, Ads ,News, Photo editing - Book previews, Publishing – Print & Electronic.

c) ARC - 14 - 411.3 : Spatial Narratives

UNIT I- Introduction: Concepts of spatial narratives in built environment; significance; Terminologies; Physical expression of socio-cultural aspects; Environmental Psychology; Cognitive mapping; Defensible spaces, perceptions, association to a space.

UNIT II- Elements: Leading to a perception & interpretation of built & urban space; Development of experiential quality; Interrelationships between a space & its user; Delineation of space; Stimulation of activities; Time scale & temporal transformations

UNIT III- Indian architecture & spatial narrative: Factors affecting the process of experiencing Indian architecture, its complexities, & spatial narrative; Impact of socio-cultural aspects; Religious complexes, civic buildings & fortified settlements.

UNIT IV- Urban space & spatial narrative: Experiencing & perceiving urban spaces; Methods of comprehension; Spatial order; Sequence of experiencing a space; Understanding multi-layered information system in an urban space.

UNIT V- Exploring spatial narratives: Case studies; Learnings from architectural reviews; Development of personal philosophies through primary experience; Critical analysis of experience through writings, visuals & sketches; Comparisons of interpretations.

d) ARC - 14 - 411.4 : Disaster Management

UNIT I- Introduction: Disaster Management & its necessity; Types, characteristics, causes & impacts; Natural disasters, Manmade disasters, Epidemics; Institutional & Legal arrangement; NDMA; Financial arrangement; Role of Architect at all stages of Disaster Management.

UNIT II- Disaster Prevention & Mitigation: Risk Assessment & Vulnerability Mapping; Long-term measures; Review & revision of building bye-laws & codes; Hospital Preparedness; Retrofitting; Mitigation strategies, Trigger Mechanism; Capacity building; Awareness programs. Architectural Design considerations.

UNIT III- Preparedness: Forecasting & Early Warning Systems: Plans of action for probable disasters; emergency, medical, casualty management systems; Resources needed; Training, Simulation & Mock Drills; Partnerships for Mitigation & Preparedness; Audit of buildings & infrastructure; Architectural Design considerations.

UNIT IV- Response: Role of various agencies; St&ard Operating Procedures (SOPs); Levels of Disasters; Incident Comm& System (ICS); First & Other Key Responders; Medical Response; Information & Media Partnership; Search & rescue; Architectural Design considerations.

UNIT V- Relief & Rehabilitation: Temporary Relief Camps; Management of Relief Supplies; Provision of Intermediate Shelters; Relocation & reconstruction, repair & retrofitting of buildings & infrastructure; Socio-cultural-economic considerations; Capacity building for self-help construction; training & awareness programs. Architectural Design considerations.

YEAR 4 / SEMESTER VIII

1. ARC - 14 - 402 : Thesis II - Project : [2-15-3-18/ 150 hours]

The objective of stage-II is to develop design abilities for demonstration of research & base work studies done in Stage-1for the identified domain. These abilities are to be demonstrated in an architectural design project. Design Development will have contents such as form development, stress on focus, development of spaces, aesthetics, services, Landscape, sustainability, barrier free etc. It will be represented through various mediums such as sketches, conceptual drawings, design drawings, technical drawings, models & report. The complete Thesis Project will be guided by Individual Guide & Institutional Panel. The outcomes will be progressively evaluated by Independent Experts. The student will be allowed to offer his work for all levels of evaluation only after the respective level of work is approved by the Guide & Institutional Panel. The process for Thesis II- Project will include – Description, Case Study, Site Study- Analysis & Inferences, Development of specific Design Guidelines; Design Program & Area Requirements, Conceptual Development, Design Development, Final Design, Presentation.

2. ARC - 14 - 404 : Seminar : [1-2-0-3/ 45 hours]

To develop the investigative skills of students, through researching one of the topic areas covered in the course. To allow students to discuss ideas & findings in class with their fellow colleagues & the course instructor, hence creating a motivating environment for learning. To develop the capacity of the students to work either in group or individually undertaking research in a given subject relating to architecture, presenting the observations verbally & graphically, to explore & Understanding the essence of a design. Acknowledge, appreciate & convey the meaning of quality designs. Identify & study the working of various systems of architecture. Approach, investigate & highlight the various socially relevant issues of design through seminars.

3. ARC - 14 - 406 : Elective - V : [0-2-0-2/ 30 hours]

The set of electives give the students an opportunity to explore the prime fields of specializations in the profession of built environment, which will help them in identifying their interest for higher studies &/ or focus of their dissertation & thesis.

a) ARC - 14 - 406.1 : Tall Buildings

UNIT I- Introduction: Classification; History & evolution; Significant works; Planning criteria; Codes & Byelaws; Construction techniques; Current Innovations.

UNIT II- Structural Systems & Forces: Horizontal & vertical forces; Structural Systems; Seismic considerations; Wind loads; Wind behaviour around tall buildings, Design of building envelope; Wind tunnel tests.

UNIT III- Building Services: Service Core, Service Floors; Provisions for-plumbing, electrical supply, HVAC, firefighting, surveillance & vertical transportation.

UNIT IV- Socio-Cultural & Economic Concerns: Impact on urban infrastructure & civic amenities; Health impact; Psychological impact; Community living & shared spaces, Ownership, management, maintenance.

UNIT V- Environmental Concerns: EIA; Resource management; Sustainable practices; Bioclimatic designs; Vertical green neighborhood; Energy efficiency.

b) ARC - 14 - 406.2 : Conservation Studies

UNIT I- Introduction: Definition, types, need; principles, ethics & value; tangible & intangible components, Degree of Intervention; Evaluation & assessment; Documentation; Procedures & techniques; Concepts & prevailing practices in conservation, restoration, retrofitting, rehabilitation, consolidation, protection, adaptive reuse.

UNIT II- Architectural Conservation: Preservation & conservation philosophies; Pioneers & societies in field of conservation; International Charters; International approaches from UNESCO, ICCROM, GETTY foundation, etc.; National approaches: A.S.I., State Archeology, INTACH, Urban Art Commission, Heritage Commissions, local bodies, etc.; Techno legal provisions, codes & byelaws for interventions.

UNIT III- Assessment of Building Condition: Understanding of original building conditions; Documentation of current conditions- non-destructive survey methods, environmental monitoring, simple & sophisticated analytical methods; Types & causes of damages; Damage to building components & structural systems - superstructure & substructure; Location & degree of damages - defect monitoring methods, their impact - diagnosis of failure & damages.

UNIT IV- Preservation Techniques In Architectural Conservation: Analysis of problem; Types , Degrees & Limitations for intervention; Levels of intervention- Structure, building complex, precinct & heritage zone; Provision of solutions for repair & replacement of components; Restoration (in case of living monuments), preservation, reconstruction & maintenance. Sequence & phasing; Materials & methods; Detailing & finishing.

UNIT V- Case Studies in Architectural Conservation: Examples of iconic conservation projects; Heritage zones; Conservation strategies- documentation, analysis, techniques, interventions & outcomes; Models of preservation, reconstruction & adaptive reuse. Influences & benefits - Physical, contextual, political, social, cultural, economic, ecological, tourism, technological, material, spatial & visual.

c) ARC - 14 - 406.3 : Industrial Environments

UNIT I Introduction: Classification; History & evolution; Types, Scales, locations, , significance & impact- Socio-Cultural & Economic, urban infrastructure, civic amenities, Health impact, Psychological impact, Ownership, management. Scope for Architectural & Inter-professional services.

UNIT II- Standards: Environmental concerns - EIA; Resource management; Sustainable practices; Bioclimatic designs; green neighborhood; Energy efficiency. Acts & legislations- Agencies, pollutions control; Codes & Byelaws, Plant & industry standards.

UNIT III- Design criteria: Planning criteria- Master plan, Site plan, plant layout; Phasing & Future expansion; Space planning for man, material & machinery; Safety & hygiene concerns; amenities, facilities; form, massing, enclosure, materials, detailing, aesthetics, Landscapes, parking.

UNIT IV- Technical systems: Structural Systems, Construction techniques; Current Innovations. Services- Site, Building & Plant, firefighting, security & surveillance, transportation, waste management.

UNIT V- Case Studies: Exploration & analysis of different industrial environments ; Study of plant systems, spatial organizations, design interventions, technical provisions, relevance, impacts - physical, administrative, socio-cultural, sustainable; future forecasts & trends.

d) ARC - 14 - 406.4 : Urban Development

UNIT I- Theories for urban development: Evolution of urban settlements; Objectives, scope & role of urban design; Urban design theories; Urban planning models & policies; Urban form, morphology & character; Concepts of users, activities, place & space

UNIT II- Best practices for quality urban design & development: Contextual design sensitivity; Sustainable practices in urban design. Exploring quality urban design in history; Principles of New Urbanism & its application; People-centric strategies for urbanization; Safety, health & inclusiveness in development guidelines.

UNIT III- Groundwork for effective urbanization: Master plans, LAND uses & Zoning; Infrastructure in urban areas; Urban services & ecological footprint in urban growth; Transportation, movement networks & pedestrianization; Housing issues; Urban Landscape studies.

UNIT IV- Multi-disciplinary forces: Inter-professional processes & legislations for Understanding urbanization ; Role of various related disciplines for formulating urban development strategies; LAND economics & financial characteristics for urban development; Urban governance & management; Social, cultural, economic influences on urban growth; Project management & implementation.

UNIT IV- Urban dynamics: Concept of time-scale & growth of urban areas; Temporal design & permanence of urban transformations; Gentrification, peri-urbanization & impact on urban development; Concepts of decentralization & growth corridors; Trends & movements in Urban design; Strategies for smart cities.

4. ARC - 14 - 408 : Elective - VI : [0-2-0-2/ 30 hours]

These electives offer an option to explore possible broader avenues in the field of design & creativity with architecture as the foundation & base qualification. The varied fields give an insight into the outreach of architecture into related, yet unique professions. The student will explore the specific domains through h&s-on workshops with experts from the relevant fields. This exposure is envisaged to give the students an opportunity to Understanding & experience the systems of design & implementation in these special fields. Outcome will be through portfolio & presentations.

a) ARC - 14 - 408.1 : Product Design

To Understanding the design, development & challenges of product development. To develop skills to conceptualize, create & market an appropriate product. Customer Needs, Terminologies of Ergonomics – Biomechanics, Comfort zone - Elements of comfort Analysis & designing product based on ergonomics, materials, working parameters & visual perception for product. General awareness of the role of ergonomics in work effectiveness & efficiency. Creativity & uniqueness in design. Visual composition, theory of Colours, function & character. Product impact through design – aesthetics & functionality, Concept Generation - Selection – Testing, Product Specifications, Study of materials & finishing, Market survey, Product Data Management, Software for designing, Virtual Design & Manufacturing Proto Typing Product Planning & Marketing Product Analysis & Cost Optimization.

b) ARC - 14 - 408.2 : Graphic Design

To understand and develop ideas for creating signs, symbols, signage, logos, etc.; Characteristics of signs and Symbols; Types and uses; Tradition and Symbols; Environmental graphics; Role of graphic symbols, signage and universal languages; Typography overview, choosing a typeface, typographic- treatment, considerations in signage for non and low sighted people; other graphic elements, color, layout, signage graphic process; Developing trademarks, Corporate logos, comprehensive corporate identity programs; signage Brand promotion – including packaging design, ad-making for print & electronic media; hardware system shape, connotations of form, sign mounting and size considerations, sign lighting, materials and codes , electronic message displays, stock sign hardware systems, coatings and finishes; sign planning: contract, obtaining information, design, construction, work plan, prototypes, tenders, specifications, on-site management and completion.

c) ARC - 14 - 408.3 : Digital Design

Advanced Modeling Software: Developing parametrically controlled complex form generation with real time geometric manipulation using software like Rhino/Grasshopper/MAYA, etc.; MEP Design & Documentation: Mechanical: Modelling for HVAC systems; Creating accurate 2D & 3D drawings for site installation. Electrical: Modelling the placement of light fixtures, creating circuits & wiring diagrams; Understanding power systems. Plumbing: Modelling to design functional & effective plumbing systems; Building Simulation Software: Analysis of data like solar exposure, material costs, resource consumption & acoustic response; Visual analysis of shadows & solar profiles. Simulation of lighting & shadows to analyze energy data to calculate daylight factors; Solar insolation; Inter-zonal adjacencies; Overall energy requirements; Structural Engineering Software: Use of structural design software like Cype CAD/ Stadpro/ Autodesk Advance Steel, etc. for modelling the structure in 3D; Analyzing, designing & detailing as applicable to concrete & steel structures.

d) ARC - 14 - 408.4 : Set Design

To Understanding the design, development & challenges of Set Design for performing arts, cinema & electronic media. Development of skills to conceptualize, create spaces & environments; Understanding & designing within the visual frames. Principles of design: Visual composition, theory of Colours, function & character. Study of materials & finishing, Reuse, recycle, Management, Cost Optimization; Support Systems- Lighting, sound, cinematography, graphics & man power, mechanicals, air-conditioning, equipment, fire safety, workshops Studio work will include introductory exercises in sketching & design; Principles of Design: Understanding the principles of design & how they are applied to work in the performing arts. Studio work will include in-class exercises include experimenting with models & perspective sketches. Applications of Design: In-class work on individual projects & presentations.

YEAR 5 / SEMESTER IX

1. **ARC - 14 - 501 : Practical Training - I :** [24 Weeks/ 960 hours]

Every student must work in an Office of an experienced Architect registered with the Council of Architecture/Governing body of any other country (if undertaking training outside India)as a full-time trainee for a period of 24 calendar weeks in the Ninth Semester (excluding Viva-voce) from the date of commencement of training. The student should involve himself/herself in various aspects of work in an office like working drawings, presentation drawings, quantity & cost estimation, site supervision, etc.; Student has to prepare & submit: Building Appraisal Report, Building Audit Report, Technical Report & Training Report as per the Training Manual.

YEAR 5 / SEMESTER X

1. **ARC - 14 - 501 : Practical Training - II :** [24 Weeks/ 960 hours]

Every student must work in an Office of an experienced Architect registered with the Council of Architecture/Governing body of any other country (if undertaking training outside India) or trained professional of the relevant field as a full-time trainee for a period of 24 calendar weeks in the Tenth Semester (excluding Viva-voce) from the date of commencement of training. The student should involve himself/herself in various aspects of work in an office like working drawings, presentation drawings, quantity & cost estimation, site supervision, etc.; Student has to prepare & submit: Product Report, Pedestrian Movement Report, Vehicular Movement Report & Training Report as per the Training Manual.