37. FOURTH SEMESTER SYLLABUS

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IV	I (a)	19AR04001	Architectural Design 4		10		10	250	250		500

Course Overview:

Contextual response, Understanding site topography and emphasis on Design detailing

- To encourage students to study the context and elements of built and un- built spaces in an observable setting to develop a holistic understanding of the aspects that influence the built environment.
- To equip students to design multi space/ multi-functional spaces up to two storeys of moderately complex nature emphasizing the process of design through developing concepts, project briefs, Site analysis, Circulation diagram, Function, Form, Structural system. To familiarize with a systematic approach in designprocess
- To create an understanding of architecture on slopingsites
- To create an awareness of Building rules/National Building code of India / Universal design standards /otherregulations.
- Special emphasis on architectural design detailing and constructability of the designintent.
- **Sustainable design objectives:** To create an awareness of the sustainable design principles considering Climate, Materials, Natural Lighting, ventilation and its influence on building envelope

Course Outcomes:

Upon completion of the course, the student should have:

- An understanding of functional aspects of built environment and formulating appropriate response
- An understanding the site context and reciprocate in a sustainable and environment friendly approach.
- An understanding of design outcomes with an emphasis on architectural designdetailing

Major Project

Design of a built environment (Built up area not exceeding 1000 SQM) where different user groups interact such as school, day care center, primary health center, nursing home, hostel, motel etc. through a systematic design approach with a focus on design development process. The design possibility on a sloping site may be explored.

Emphasis may be given on:

- Response to the Site, context and socioculturalaspects
- Analysis of relationship between thespaces
- Analysis of interactions among usergroups
- Analysis of site topography and formulation of appropriate response based on siteslope
- Structural Systems in the builtforms
- SustainableapproachessuchasRainwaterharvesting,passivecoolingtechniques,useof

low embodied energy materials etc.

- Climatic responsivedesign

Minor Project

Architectural appraisal/ appreciation of architectural elements/ building. Preparation of a report incorporating analysis, documentation, inferences and conclusion.

Time bound project

- Short duration of (one week) projects to boost the imagination/innovation and speedy decision making- such as Design of kiosk/bus shelter/exhibition pavilion/, saloon, internet cafe or other buildings/ spaces of similarnature
- Site visit to buildings under construction/completed (Detailed site visit reportpreparation)

Reference:

- Cross, N. (1984). *Developments in design methodology*. John Wiley &Sons.
- De Chiara, J. and Crosbie, M. (2001). *Time-saver standards for building types*. New York:McGraw-Hill.
- Heath, T. (1984). *Method in architecture*. Chichester: John Wiley &Sons.
- Johnston, D. and Gibson, S. (2008). *Green from the ground up*. Newtown (CT): TauntonPress.
- Lynch, K. (1962). *Site planning*. Cambridge, Mass.: The MITPress.
- Miller, S. (1995). *Design Process: A Primer for Architectural and Interior Design*. New York: Van NostrandReinhold.
- Roth, L. (1993). *Understanding Architecture: Its Elements- History, and Meaning*. IconEditions.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								CA	University Exam		Total
				T	S	W/L			Jury	Written	
IV	I (b)	19AR04002	Building Materials and Technology 4	1	3		4		100	100	

Course Overview:

The subject primarily aims at developing understanding in use of appropriate construction technique and material in building design based on feasibility of technology, physical properties (like density & specific gravity, strength, thermal properties), aesthetic value, socio-cultural impacts and relevance, socio-economic factors, Ecological footprint etc.

The course introduces the technological aspects of a building design from the perspective of functional building component where use of natural and artificial materials is discussed based on their application. Each material would be taught in a manner such that its application would be discussed in a sequential manner, starting from foundation level, followed by plinth & others (sill, lintel, sunshades, window/door openings, walling material, as a floor & flooring) and culminating at roof and parapet wall. Construction technology and appropriate materials for structural systems, roofing, enveloping and interior finishes shall be considered under this subject from simple examples to complex.

Course Outcomes:

Upon completion of the course, the student should:

- develop necessary decision-making skills in using appropriate construction technologies and materials while designing buildings, based on understanding of their potentials and properties.
- develop the skill to represent various construction techniques as well as materials through drawings supporting their buildingdesign.

Module 1: RCC Structures I

Learning Strategies:

- Lecture on RCC and framedstructures
- Site visits to understand framedstructures
- Detailed drawings of RCC slabs anddetails

Module Contents:

- Introduction to framed structures. - Concrete floors, walls, beams andcolumns.
- Types of Concrete constructions – Plain Concrete, Reinforced Concrete, High density concrete, polymer concrete, High strength concrete, light weight Concrete, Ready mix concrete, Shotcrete, Vacuum concrete, Limecrete, Glass concrete, Asphaltconcrete,
- Reinforced cement concrete: Reinforcements used in RCC – Suitability & performance - Reinforcement details of RCC elements like column, beam, lintel, slab, waist slab etc. BIS specification. Details of construction joints, expansion joints in buildings – Method of construction – Filling of joints – Waterproofing.
- Steel Reinforcement: Hot rolled bars, CTD bars, TMT bars, Welded wire fabrics; Steel for Pre-stressed Concrete; Structural steel; Stainless steel and steelalloys
- RCC Shuttering, Scaffolding – advances inpractice.

Module 2: RCC Structures II

Learning Strategies:

- Lecture on various types RCC slabs & Structuralmembers
- Site visits to construction sites during variousstages
- Drawing studios on representation of different RCCSlabs

Module Contents:

- RCCone-wayslabandone-waycontinuousslabs:Principlesandmethodsofconstruction.
- RCCtwo-wayslabandtwo-waycontinuousslabs:Principlesandmethodsofconstruction.
- RCC cantilever slabs, sloping slab and waist slabs: Principles and methods ofconstruction.
- Waffle slabs and coffer slabs -Principles.
- Post tensioned and Pre-Cast concrete – Principles and methods of construction - floors, slabs, structural members.

Module 3: Vertical transportation

Learning Strategies:

- Lecture on various types lifts and theirapplications
- Site visits to construction sites during variousstages
- Drawing studios on lifts and other relatedsystems.

Module Contents:

- Lifts – Calculation of requirements and number of lifts considering quality and quantity of services
- Details of construction of lift shaft, lift pit, lift car – machine room etc. Standard sizes – Lifts of various types such as machine room less, passenger, goods, hospitaletc.
- Modern development in the field of vertical transportation – sky lobby concept, double decker lifts etc.
- Escalator – Different types – provision to be made during construction – installation of escalator. Escalatordetails.
- Travellator – Functions andtypes

Module 4: Roofing

Learning Strategies:

- Lecture on different types of roofing materials, application andrelevance.
- Site visits to construction sites during variousstages
- Drawing studios to understand fixingsystems.

Module Contents:

- Introduction to roofing materials, desirable properties and climate relatedaspects.
- Roofing Tiles – clay and cement tiles, different types - properties and method offixing.
- Light roofing materials - Galvanised iron sheets, asbestos cement sheets, corrugated aluminum sheets,
- Sandwiched aluminum panels, PVC sheets and other light roofs like glass fiber reinforced plastic sheets, bituminous sheets with accessories, shingles etc. and method of theirfixing.
- Tensile membraneroofing.

List of drawings for Jury (Minimum 7 sheets)

- Beam with reinforcementdetails
- Cantilevered beam with reinforcementdetails
- Waist slab with reinforcementdetails
- Expansion joints and construction joints with water proofingdetails
- One way and two-wayslabs
- Cantileveredslab
- Lifts – with machine room and without machineroom
- Roofing with fixing details – tiles, shingles, light roofing materialsetc.
- Tensile roofing – fittings anddetails

Reference:

- Ching, F. (1975). *Building construction illustrated*.VNR.
- Lyons, A. (1997). *Materials for architects and builders: an introduction*. London: Edward Arnold (Publishers)Ltd.
- McKay, W. (1981). *Building construction*. London:Longman.
- Ramchandra, S. (1984). *Design of steel structures*. Delhi: Standard BookHouse.
- Rangwala S. C. (1997). *Engineering materials*. Charotar Publishing House,India.
- Shetty, M. (2007). *Concrete technology*. Ram Nagar, New Delhi: S.Chand.
- Varghese, P. (2005). *Building materials*. New Delhi: Prentice-Hall of India Pvt.Ltd.
- Relevant BIS Code Pertaining to Materials ofConstruction

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IV	I (c)	19AR04003	Professional Skill Enhancement 4			4	2	50	50		100

Course Overview:

This course intends to provide/ enhance the soft skills in order that students perform well in their academics and beyond. These skills are intended to support the student to perform better in her/his core subjects and also build up robust performance through hands-on workshops and laboratory training. This course is subdivided into two categories – Mandatory and Optional. Mandatory courses help in preparations for respective semester subjects. The optional category helps students to take personal initiatives to develop in specific areas that can widen their horizon of their understanding of architecture and also initiate action at the society level. There are also options to work on competitive exercises alongside other similar institutions.

Course Outcomes:

Upon completion of the course, the student should:

- be given an exposure of varied skills that can bring in confidence in handling their core subjects such as workshops, communication skills, computer applicationsetc.
- be able to develop team spirit and interpersonal skills to manage complexsituations.
- be able to cope with stress and develop multi-taskingcapabilities.

Module 1: Computer Applications 2

Learning Strategies:

- Computer lab sessions guided byexperts
- Group discussions and Interactivesessions
- Prepare presentation drawings, generating 3D and renderedviews.

Module Contents:

- To comprehend tools and systems for 3d modelling inCAD
- Develops and draws various architectural volumes, forms and surfaces through 2DCad
- Convert and draw 2D architectural drawings to 3Dforms

Module 2: Social Initiatives or any other co-curricular activities

Learning Strategies:

- student initiatedactivities
- hands on workshops, competitionsetc.

Module Contents:

- Optional content to be developed by each institution in order to help students to take part in activities that involve larger groups and facilitate peerlearning.
- The activities could be student initiated societal activities or participation in NASA or similar student led group initiatives which has an academic content aswell.

Reference:

- Cadfolks (2018). *AutoCAD 2019 for Beginners*. 1st ed.Kishore.
- Omura, G. and Benton, B. (2018). *Mastering AutoCAD 2019 and AutoCAD LT 2019*. 1st ed.Sybex.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								CA	University Exam		Total
				T	S	W/L			Jury	Written	
IV	II	19AR04004	History of Architecture 4	2			2	50		100	150

Course Overview:

The subject principally aims at sensitizing the students towards understanding architecture as a product of historic evolution along the timeline through socio cultural and political changes as well as technological advancements. This course also intends to expose the students to detailed studies on how ideological and technological advancements drastically influenced the transformation of architecture in the modern times till contemporary era around the world andIndia.

Course Outcomes:

Upon completion of the course, the student should:

- Be able to relate and identify built forms through socio cultural, climatic, political, economic influences in respective geography andtimeline
- Possess skill to formally (visually and theoretically) analyse and appreciate architectural works
- Be able to use a theoretical base developed from architectural history in their designprocess
- Be exposed to plethora of contemporary architecture practices inIndia

Module 1: World Architecture in modern times

Learning Strategies:

- Lecture on evolution of architecture in various geographies around the World (industrial and post-industrialtime)
- Lecture/ discussion on major changes and influences during industrialera
- Model making/ Drawing exercises on significant architecture works around the World during theera
- Create theoretical and philosophical understanding of modernism, structuralism and industrialization in relation to people-built forms and way oflife.
- Each lecture will have Pre- requisite readings and each module will have to specify self-learning component in the lectureplans.
- This module requires a minimum of four one-hour lectures to be included in the lectureplan.

Module Contents:

- Introduction to industrialization and industrial era, mode of production, use of technology and resultant changes in built forms, its design, material andquality
- Prominent art/ architectural movements during industrial era, modern movements, art and craft movement Avant grademovements
- Major 'isms' in industrial and post-industrial era, modernism, structuralism, cubism, minimalism, brutalism, tropicalModernism
- Analyzing works of major architects- Louis Sullivan, Peter Behrens, Antoni Gaudi, Victor Horta,
- Analyzing works of major architects- Adolf Loos, Walter Gropius, Mies van der Rohe, Frank Lloyd Wright
- Analyzing works of major architects- Le Corbusier, Alvar Aalto, Louis Kahn, GeoffreyBawa

Module 2: Post Modern and Contemporary Architecture

Learning Strategies:

- Lecture/ discussions on Post Modern and ContemporaryArchitecture
- Create theoretical and philosophical understanding of Post-modernism, Post-structuralism and Contemporary trends in architecture in relation to people-built forms and way oflife
- Each lecture will have Pre- requisite readings and each module will have to specify self-learning component in the lectureplans
- This module requires a minimum of four one-hour lectures to be included in the lectureplan
- Drawing/ Model making exercises on various significant architecturalworks

Module Contents:

- Introduction to postmodernism, post-structuralism, postmodernism inarchitecture
- Biomimetics / Biomimicry, discussing works/ideas of Michael Pawlyn, Antonio Gaudí, SantiagoCalatrava
- Introduction to Contemporary Architecture andtrends
- Discussing works of Robert Venturi, Peter Eisenman, Frank Gehry, ZahaHadid
- Discussing works of Rem Koolhaas, Daniel Libeskind, Bernard Tschumi, ShigeruBan

Module 3: Indian Architecture in modern times

Learning Strategies:

- Lecture on chronological evolution of modern architecture in various geographies within India
- Lecture/ discussion on observation of changes andinfluences
- Drawing exercises on various significant architecturalworks
- Each lecture will have pre-requisite readings and each module will have to specify self-learning component in the lectureplans
- Note for Unit 1: Emergence of new typologies examples considered are Clock towers, Town halls, Hill stations, Civil lines, Clubs, Gymkhanas, Hotels, Parks, Gardens, Bungalows, etc. Also, introduction to building regulations (Building laws, ASI, PWD,MES)
- Reference for Unit 2 and 3 Terminology- Jon Lang, A Concise History of Modern Architecture in India

Module Contents:

- **Colonial Architecture 1**: Introduction to Colonialism and its impact on built form in different regions | Emergence of New Typologies | Colonial style in India under Portuguese - Goa - Goan Houses, The Basilica of Bom Jesus. | Dutch - Malabar Coast Kochi - Mattancherry Palace/Dutch Palace
- **Colonial Architecture 2**: French - Pondicherry – characteristics of buildings in French Colony | English - Calcutta (The Victoria Memorial), Mumbai (Chattrapathi Shivaji Terminus/Victoria terminus) and Delhi (Rashtrapathi Bhavan/ Old Viceroy'sHouse)
- **Evolution of Modern Architecture in India post- Independence 1**: First- and Second-generation Modernist architects (1947-80) | Modernist Architecture or that influenced by Modernisme.g.Golconde
- **EvolutionofModernArchitectureinIndiapost-Independence2**:workandinfluenceofLe

Corbusier and Louis Kahn | Habib Rahman, Hasmukh Patel, Anant Raje, Achyut Kanvinde, Otto Koenigsberger, Joseph AllenStein

- **Evolution of Modern Architecture in India post- Independence 3**: Evolution of Post-Modernist Architecture (1975-1995): Alternate practices and Critical regionalism- works by Laurie Baker, Nari Gandhi, etc.|
- **Evolution of Modern Architecture in India post- Independence 4**: Early and later works by Charles Correa, BV Doshi and Raj Rewal | Changes in practice PostLiberalization

Reference:

- Curtis, W. (1987). *Modern architecture since 1900*. London: Prentice HallPTR.
- Frampton, K. (1980). *Modern architecture*. London: Thames &Hudson.
- Ghirardo, D. (1996). *Architecture after modernism*. London: Thames andHudson.
- Jencks, C. (2012). *The Story of Post-Modernism*. Hoboken: John Wiley &Sons.
- Lang, J. (2010). *A concise history of modern architecture in India*. Ranikhet: PermanentBlack.
- Lang, J., Desai, M. and Desai, M. (2000). *Architecture and independence*. Delhi: Oxford University Press.
- Mehrotra, R. (2011). *Architecture in India*. Mubai:Pictor.
- Nuttgens, P. (1983). *The Story of Architecture from antiquity to the present*. H.F. UllmannPublishers.
- Pawlyn, M. (2011). *Biomimicry inarchitecture*.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IV	II	19AR04005	Theory of Structures 4	2			2	50		100	150

Course Overview:

The course primarily aims at giving an overview of possibilities of Concrete as structural material and its applications in Architectural design. It focuses on understanding of the various structural systems, designs and theory of RCC structuralmembers.

Course Outcomes:

Upon completion of the course, the student should:

- Be able to develop basic skill to choose an appropriate structural system and technique in RCC from variouspossibilities.
- Be able to determine an approximate determination of member sizes of structural members to enhance their Architecturaldesign.
- Be able to understand the possibilities and limitations ofRCC.
- Be able design a single storey RCC framed and load bearingstructures.

Module 1: Basic design concepts of RCC, Structural planning, Limit state method, Design of beam.

Learning Strategies:

- Lectures on the below contents by presentation and discussion on Architectural projects to make students understand structures in the context ofArchitecture.
- Lectures by using analogies and case study on failures to explain structural designconcepts.

Module Contents:

- Introduction to Concrete: Brief history, Advantageous and disadvantageous. Overview, concept and its application of Plain cement concrete, Reinforced cement concrete, important properties of concrete andsteel.
- Pre stressed concrete, Precast concrete, Fiber reinforced concrete and Ferrocement concrete.
- Basic design concepts of RCC – Steps involved in construction, Roles and responsibilities of designers, Design considerations, Concept of Analysis and design, Overview of Design philosophies – Working stress method, Ultimate load method, Limit state method, Codes and specifications, Loads and load combinations. Permissible stresses-factor of safety-assumptions.
- Limit state method: Concepts-assumptions –characteristic strength and load, partial safety factors- limit states-limit state of collapse –limit state of serviceability. Code recommendations for limitstates.
- Introduction to R.C.C beams, behavior of R.C.C beams, types of beams, effective span, size of beam, covers toreinforcement.
- General design procedure, Design of Singly reinforced beams, Doubly reinforcedbeams.

Module 2: Design of slabs and Design of staircase

Learning Strategies:

- Lectures by using analogies and case study on failures to explain structural designconcepts.

Module Contents:

- Slabs: Introduction to slabs, Behavior ofslabs
- General design procedure, Design of one-wayslabs.
- Design of two-wayslabs
- Design of Flat slab (conceptonly).
- Staircase:Classificationandbehaviorofstaircasebasedonspanning–spanningtransversely – (slab cantilevered from spandrel beam or wall, doubly cantilevered from central spine beam, supported between two stringer beams), spanning longitudinally. (Theory only).
- Design of Staircase, straight singleflight.

Module 3: Structural patterns, approximate load calculations. Design of foundation and columns.

Learning Strategies:

- Lectures on the below contents by presentation and discussion of a single or double bay single storeybuilding.
- Lectures by using analogies and case study on failures to explain structural designconcepts.

Module Contents:

- Structural patterns: – Introduction, Defining the structural grids – Orthogonal and radial grids, Complex or irregular grids, Integration of Structural, spatial and contextualpatterns
- Approximate load calculation: - Contributory area method, Dead load and live load calculations at the base ofcolumn.
- Soils and Foundations: -Bearing capacity of soil, Criteria for selection of foundation. Types of foundation and its behavior – Shallow foundation – Isolated, Combined, Strip, and Raft. Deep foundation – Pile. (Theoryonly)
- Design of isolated footing subjected to axial compressiveloads.
- Compression members: - Proportioning of columns, effective length of the column, loads on columns, slendernesslimits.
- Design of short column subjected to axialloads.

Reference:

- Relevant IS codes. (I.S 456, I.S 875, SP16)
- ParkRandPauloyT,Reinforcedconcretestructures,JohnWiely&sonsInc.
- PurushothamanP,Reinforcedconcretestructuralelements-Behaviour,Analysis and Design, Tata McGraw Hill publishing companyLtd.
- UnnikrishnaPillaiS.&D.Menon,Reinforcedconcretedesign,TataMcGrawHill Publishing companyLtd.
- Mallick S.K., Reinforced concrete, Oxford & IBHPublishingcompany.
- VargheseP.C.,LimitstatedesignofReinforcedconcrete,PrenticeHallofIndiaPvt Ltd.
- Ashok.K.Jain,Reinforcedconcrete-Limitstatedesign,NewChand&Bose.
- S.S Bhavikatti, Design of Reinforced concrete structures, I.K.International Publishinghouse Pvt.Ltd
- Prestressed Concrete Structures by P.Dayaratnam
- Precast concrete, Materials, Manufacture, Properties and Usage,M.levitt
- Structural Competency for Architects, Hollee HitchcockBecker
- Dr. Shah, V. and Dr. Karve, S. (n.d.). *Illustrated design of Reinforced Concretestructures*.
- Subramanian, N. (n.d.). *Design of Reinforced concretestructures*.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								CA	University Exam		Total
				T	S	W/L			Jury	Written	
IV	II	19AR04006	Building Services 1	2			2	50		100	150

Course Overview:

Services are the lifeline systems of any built form making it functionally habitable. They also make them efficient, comfortable and safe. Building services essentially include fluid systems, electrical & energy systems, lighting systems, HVAC systems, security systems etc.

This course as the first of the 3 courses in Building services is intended to give the students an overview of the plumbing systems at various levels, their architectural considerations and their coordination with other services.

Course Outcomes:

Upon completion of the course, the student should:

- develop an understanding about the importance of services in buildings and its coordination in the builtenvironment.
- be able to critically understand various water supply, sewerage and drainage systems in our built environment.
- be able to conceptualise and integrate such services into small scale buildings. (up to G+2) and produce a schematic drawing for thesame.

Module 1: Importance of Building Services - Water supply & Sanitation

Learning Strategies:

- Lectures on the history and relevance of Building services and broad overview of different systems.
- National and International study reports on the topic – Based on Literature studies from LEED, IGBC,GRIHA.

Module Contents:

- Introduction to building services, Historical overview of development of water/ sewerage systems - (Mesopotamia, Indus, Roman,Egyptian)
- Importance of water supply and sewerage. - History of Sanitation with respect to human civilization, Importance of Health, Hygiene, Cleanliness, Waterborne, Water-related, and Water based Epidemic diseases, Conservancy system to water carriage system – importance of conserving water carriage system (watershed management, groundwater recharge, reservoir formation, means of conserving river, streams, canals, aqueductsetc.)
- Urban sanitation – Load on system, types of waste management system, Government schemes related to thetopic
- Rural sanitation - Load on system, types of waste management system, Government schemes related to thetopic

Module 2: Water Supply for Urban Area

Learning Strategies:

- Lectures on different aspects of Water supplysystems.
- Site visits to understand the systems on water treatmentplants.
- Market surveys to familiarize materials, fittings and equipment.

Module Contents:

- Sources and Quality of water, impurities in water and its treatment. - Quality of supply for different uses as per national and international standards, Water treatment plant, Treatment of water for different uses, filtration, softening, disinfectionetc.
- Water demand calculations; norms and standards, Quantity of water for differentusages,
- Water storage – private and public, overhead tank, andsump.
- Water distribution system (Gravity, pumping, combined) and Distribution networking (Dead-end, radial, grid iron, ring at city/ neighborhood overview, Guidelines for laying of water mains,distribution.)
- Water distribution systems- gravity system, hydro-pneumatic systemetc.
- Water pipe materials, apparatus, joints, fixtures and valves - Material of construction like GI, PPR, PB, CPVC, Composite pipes, Copper, Flow control Valves – Gate valve, Globe valves, butterfly valves, Pressure Reducing valves &station. (at an urbanscale)

Module 3: Domestic Water Supply

Learning Strategies:

- Lectures on different aspects of Water supplysystems.
- Case studies to understand the buildingsystems
- Market surveys to familiarize materials, fittings andequipment.
- Applications of knowledge water supply and sewage design
- Preparation of drawings excluding hydraulicdesign

Module Contents:

- Principles of water supply in domestic buildings. - Basic considerations in supply ofwater
- Water supply in low-rise and multi-storeyed buildings - basic considerations - design of storage tanks, fire demand, head loss, direct and indirect supply, design considerations for plumbingshafts.
- Hot-cold water supply network and connections, solar water heatingsystems
- Pipe materials, fixtures, joints, equipment - Water supply piping – hot, cold, flushing water, piping in sunken areas, false ceiling areas. (at a domesticscale)
- Roof top water drainage, Storm Water treatment, disposal systems and Rain water harvestingsystems.

Module 4: Domestic Sewage System

Learning Strategies:

- Lectures on different aspects of Sewagesystems.
- Case studies to understand the buildingsystems
- Market surveys to familiarize materials, fittings andequipment.

Module Contents:

- Principles of domestic sewer systems norms and standards - Basic considerations in disposal of waste water (hygienic considerations, head loss, networking/pipe system (domestic and public)etc.)
- Components of sewer conveyance network, Calculation for Gradient and slope in sewage disposal.
- Connection of house drainage to public sewer - Inspection chamber, intercepting trap, man holesetc.
- Various sanitary fixtures and its connections, Sewage disposal to septic tank, cess pool, soak pit, design of septictank.
- Types of traps used and waterseal.

Reference:

- Plumbing Engineering by Dr. SubhashPatil
- International Plumbing Code by Indian CodeCouncil
- Modern Plumbing by E. KeithBlankerbaker
- Plumbing Basics by Dr. RickPeters
- Building Construction Illustrated by Dr. F.D.KChing
- Building Construction by SushilKumar
- Building Construction by B.CPunmia
- Building Construction byRangwala
- Mechanical and Electrical Equipment for Building by Walter T.Gondzik
- Birdie, G. S. and Birdie J. S. Water Supply and Sanitary Engineering, Dhanpat Rai Publications,2010

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
				T	S	W/L		CA	University Exam Jury	University Exam Written	Total
IV	I (c)	19AR04007	Site Planning & Landscape Design	1	2		3	75	75		150

Course Overview:

- The subject primarily aims to introduce the students about site planning and landscape architecture and to imbibe the importance of integration of landscape design with architecturaldesign.
- The course introduces the natural and man-made components of landscape that generate the decisions in the planning of any site, and the role of landscape architecture for the judicious co-existence of man with nature and its patterns and systems. This course shall have a direct application in the design studio of the same semester as well as subsequent semesters for site planning and landscape design of the respective designassignments.

Course Outcomes:

Upon completion of the course, the student should:

- be equipped to site planning process and its significance; establishing relationship between site characteristics and designrequirements.
- Understand the elements of landscape, principles of landscape design and its application in the landscape design of unbuilt environment of thesite.
- Understand road layout and grading in slopingsites
- Understand of environmental issues and application of site planning and landscape design in addressing thesame.

Module 1: Elements of landscape and Site Analysis

Learning Strategies:

- Lectures
- Studio exercise: Site analysis (of the site dealt in Architectural Design studio-IV) leading to site suitability/zoning

Module Contents:

- Introduction of landscape architecture and need for integration of landscape design with architecturaldesign
- Natural elements of landscape: land, water,vegetation
- Landform studies: Contours, ridges, valleys, watershedetc.
- Man-made elements of landscape: Built elements, Services,etc.
- Other aspects like cultural, historic, social, environmental, visualetc.
- Study of natural systems: topography, hydrology, geology, wind patternsetc.
- Slopeanalysis
- Study of co-existence of natural systems with man-madeelements
- Influence of natural manmade and other elements on site leading to site analysis & site suitability.
- Landform modifications like cutting, filling, terracingetc.
- Basics of grading, road layout in sloping site and roadgrading.

Module 2: Hardscape and Softscape design

Learning Strategies:

- Lecture on principles of landscapedesign
- Design studio using elements and principles of Landscape Architecture – minorproject
- Market study of hardscape materials andsystems

Module Contents:

- Principles of landscapearchitecture
- Study of hardscapematerials
- Study of vegetation: trees, groundcovers, shrubsetc.
- Different types of plants used in tropical landscape, its purpose and appropriate usage in relevant context (avenues, shading, borders, focal pointetc.)
- Association of hardscape and softscapeelements
- Vertical gardens and terracelandscaping
- Minor design project applying principles of landscape design, hardscape and softscape elements. Eg: plazadesign

Module 3: Site specific planning and Planting design

Learning Strategies:

- Lecture on site planning based on site analysis andsuitability
- Lecture on Hierarchies of openspaces
- Group discussion on current environmental issues and application of site planning and landscaping in addressing thesame
- Presentation on landscape design projects to enable students do site planning anddetailing

Module Contents:

- Site planning based on site analysis andsuitability
- Hierarchy of openspaces
- Preparation of plantingplan
- Major project: Landscape design (Preferably S4 AD project) with site plan and plantingplan.
- Study of relevant landscape design projects necessary forstudio.

Jury requirements

1. Any relevant market study (may be individual/ group on hardscape materials, plantingetc.)
2. List ofdrawings(minimum):
    - Minor project: Landscape layout plan, sections, views etc. Emphasis to be given on application of principles of landscape design, appropriate usage of hardscape materials &planting.
    - Majorproject:
        - Site analysis andsynthesis
        - Landscape layout plan (an understanding of hardscape materials used in design is required)
        - Sections, views etc. necessary to explain thedesign
        - Plantingplan

Reference:

- Bose, T.K. and Choudhary, K. Tropical Garden Plants in Colour. Horticulture and Allied Publishers. 1991.
- Dee, C. Form and Fabric in Landscape Architecture: A visual introduction, UK: SponPress.2001.
- Grant.W. Reid, Landscape Graphics: From concept sketch to presentation rendering: Watson-Guptill,1987
- Hackette Brian, Planting Design, NY: McGraw Hill Book Co. Inc.1979
- Jellicoe, G. & Jellicoe, S. The Landscape of Man, London: Thames andHudson.1991.
- Laurie, M. An Introduction to Landscape Architecture, NY: American Elsevier Pub.CoInc.1975.
- Lyall S. Designing the New Landscape. UK: Thames & Hudson.1998.
- Lynch, K. Site Planning, Cambridge: The MIT Press.1962
- McHarg I. Design with Nature. NY: John Wiley & Co.1978.
- Motloch, J. L. Introduction to Landscape Design, US: John Wiley andsons.
- Simonds, J.O. Landscape Architecture: The Shaping of Man's NaturalEnvironment
- Steven Storm, Kurt Nathan, Jake Woland; Site Engineering for Landscape Architects: John Wiley & Sons Ltd,2009
- Charles Harris, NicholasTimesaver standards for landscape architecture: McGraw Hill Book Co. Inc.1998
- Grant.W. Reid. From concept to form in landscape design; John Wiley & Sons,2007

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
								CA	University Exam		Total
				T	S	W/L			Jury	Written	
IV	II	19AR04008(A)	Elective Theory I: Applied Ergonomics	2			2	50		100	150

Course Overview:

- To expose the students to the requirements of designing for the human comfort in accordance withanthropometry.
- The students will have knowledge of ergonomics and its applications in design including designing for the physically challenged and theelderly.

Course Outcomes:

Upon completion of the course, the student should:

- Be capable of designing inclusivespaces.

Module 1: Introduction to Human Function, Ergonomics and Design

Learning Strategies:

- Assignment based on activities of students in a collegecampus

Module Contents:

- Human being in the manmade world and importance of ergonomics, Gross humananatomy.
- Introduction to Anthropometrics, static and dynamicanthropometrics.
- Ergonomics of the physical environment - for spaces in residence andworkplace.
- Muscles and work physiology, Static and Dynamic work including maximumcapacity.

Module 2:Disability, Ageing and Inclusive Design

Learning Strategies:

- Case studies of child and old age friendly spaces

Module Contents:

- Built environment for the physically handicapped, Ramp, toilets and corridor design, Spatial Requirements for wheelchairmovement.
- Public spaces for differentlyabled.
- Design issues in the design of old age homes and publicplaces.
- Criteria to be considered when designing for the visuallyimpaired.
- Designing for children – school, home,play.

Module 3:Environmental Ergonomics

Learning Strategies:

- Case studies on inclusive design of workenvironments.

Module Contents:

- Problems of maintaining human comfort, activity and health in stressfulenvironments.
- Biomechanics. Bio transducers and nervous system including theirlimitations
- Environmental Condition including, thermal, illumination, noise andvibration.
- Environmental stressors- Controls and Displays, hot and coldstress
- Occupational hazards in work environment, Visual stress, Postural Stress, Stress due to commuting.

Reference:

- Chaira, J. D. and Callender, J. H. (1987). *Time Savers Standards for Building Types*. Singapore: McGraw-Hill.
- Crosbie, M. J. and Watson, D. (2005). *Time Savers Standards for Architectural Design: Technical data for Professional Practice.* 8th Ed. The McGraw-HillCompany
- Yutaka TochiharaTadakatsuOhnaka. *Environmental Ergonomics - The Ergonomics of Human Comfort, Health, and Performance in the ThermalEnvironment*

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total
IV	II	19AR04008(B)	Elective Theory I: Art Appreciation	2			2	50		100	150

Course Overview:

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

Course Outcomes:

Upon completion of the course, the student should:

- Have an understanding and appreciation of art as basic and varied human creation related to cognition andexperience.
- Be aware of important art productions in the West andIndia.
- Be Sensitive towards collective and individual cultural productions as unique expressions of historical and geographiccontext.

Module 1: Introduction to Art and Vocabulary of art

Learning Strategies:

- Art appreciation of a selected work on the basis of elements and principles of design, cultural and regionalcontext.

Module Contents:

- Definition, need and role of art. Art, reality, perception, representation, Concept of beauty andaesthetics.
- Categories of art in terms of media andtechnique.
- Introduction to the vocabulary of art constituted by elements (line, shape, form, space, colour, light, value,texture).
- Principles of design (unity, variety, harmony, rhythm, balance, proportion, emphasis, contrast,movement)
- Introduction to theories: Golden proportion, Theories of scale and proportion, Vitruvian theory, Modular man.
- Art evaluation andcriticism

Module 2: Art timeline

Learning Strategies:

- Lectures and discussions.

Module Contents:

- Timeline of art from the beginning of western art to the birth of modernart.
- Important works from the following movements will be understood and appreciated in terms of their form, content and context: Modern art – Impressionism, Post Impressionism, Fauvism, andExpressionism.
- Abstract/ Non Objective art, Cubism,Dadaism,
- Surrealism, Futurism, Constructivism, Suprematism, DeStijl,
- Abstract Expressionism, Pop art, Opart.
- An introduction to Contemporaryart

Module 3: Indian Art

Learning Strategies:

- Examining a selected traditional art piece on a differentmedium.

Module Contents:

- Outline of art in India over history. Important works from the following art traditions and movements will be understood and appreciated in terms of their form, content and context: Indus Valley art, Hindu, Buddhist and Jainart.
- Mughal and Rajput miniature art, art during the colonialperiod.
- Indian folk arts – Warli, Madhubani, Kalamkari,Tanjore.
- Kalighat, Patachitra, Gond,Phad.
- Modern Indian art and contemporary directions inIndia

Reference:

- Fred, S. Kleiner, 'Gardener's Art through Ages', Wadsworth Publishing,2012.
- Bernard S. Myers, 'Understanding the Arts', Holt Rinehart and Winston Inc,1964.
- H.H. Arnason, 'History of Modern Art', Thames and Hudson,1977.
- ParthaMitter, 'Indian Art', Oxford University Press,2001.
- Edith Tomory, 'A History of Fine Arts in India and the West', Orient Blackswan,1989.
- Peter and Linda Murray, 'The Penguin Dictionary of Art and Artists', Penguin,1989.
- E.H. Gombrich, 'The Story of Art', Phaidon,2002.
- E.H. Gombrich, 'Art and Illusion', Phaidon,2002.
- 'Indian Art since the early 1940s- A Search for Identity', Artists Handicrafts Association of Cholamandal Artists Village,Madras,1974.
- A.K.Coomaraswamy, Fundamentals of Indian Art, Historical Research Documentation Programme, Jaipur,1985.

Sem	Subject Group	Course Code	Subject	Hours/week			Credits	Marks			
									University Exam		
				T	S	W/L		CA	Jury	Written	Total

IV	**II**	**19AR04008(C)**	**Elective Theory I: Traditional Architecture of Kerala**	**2**			**2**	**50**		**100**	**150**

Course Overview:

- To inculcate an appreciation of ancient principles used in Architecture and planning, their development over a period of time and its evolution under changing Socio-cultural environment ofKerala.

Course Outcomes:

Upon completion of the course, the student should:

- develop an understanding of the influence of planning principles in traditional Kerala architecture.
- impart an understanding about temple architecture and town planning inKerala.

Module 1: Introduction to Kerala traditional Architecture principles- Vastu

Learning Strategies:

- Introduction to Kerala traditional Architecture through understanding the principles of Vastushastra

Module Contents:

- Philosophy of Brahmanda andPindanda
- Basic concepts of Vastu shastra – Universe, Prakrithi and Purusha, Vastupurusha, Mandala, Padams, Padavinyasam, Sutrams and Marmams their significance in physicalplanning
- Selection of Sites, Sectors and their significance in planning – fixing cardinal direction– planning principles
- Ayadi formula, concept of veethi – 4 veethi and 9 veethi concept in planning – minimum width of veethi and its relation to Habitable space -
- Measurements basic Unit- Anthropometrics - Matrangulam – Horizontal and vertical measurements - Manangulam or Standard Angulam – Its significance in physical aspect – Actual measurement based on modernscales

Module 2: Evolution and study of traditional building typologies in Kerala

Learning Strategies:

- Case study and analysis of residential building typologies inKerala

Module Contents:

- Design of Buildings- concept ofAaroodham
- Unit house - kettu, Sala- Naming of Salas – Design ofSalas
- Different proportions - Gunavistaram, Ishtadeergham –Concept of Pariantham and its relation with Ayadiformula
- Introduction to Dvisala and Trisala- Nalukettus- Itscharacteristics

- Positioning of Nalukettu in Kshetrakhandam - size of Nalukettu w.r.to Kshetrathandam and vice versa in 4 veethis and 9veethis
- Difference between kettu and Koottikkettu - Higher forms of residences - Ettukettu, Pathinarukettu

Module 3: Influence of traditional principles in temple and town planning

Learning Strategies:

- Through Site visits and lectures imparting planning principles of design of temples andtowns

Module Contents:

- Planning of Temples –Talamanan and its use in Iconography- Basic module and its relation to the temple planning – Anthahara, Madhydhara and Bahirhara oftemples
- Design of Mahakshetram – Panchaprakarams and its relation to the module. Design of Sanctum, Gopuram and other ancillaryunits
- Planning of towns and villages with respect to thetemple
- Basic principles of Padavinyasam and veethi nirnayam and the adaptation in town planning - System planning principles followed in townplanning
- Locational aspects of planning – Characteristics of towns with respect to location, activity, roadpattern
- Villages planning in Ekakudumbaka Gramam and BahukudumbaGramam.

Reference:

- Dr. Balagopal T.S. Prabhu, 'A Text Book ofVastuvidya'
- Dr. Aashaltha Thampuran, 'Traditional Residential Architecture of MalabarCoast'
- Dr. Balagopal T.S. Prabhu,'Manushyalayachandrika'
- Chennasa Narayanan Namboodirippad, 'TantrasamuchayamSilpabhagam'