B.ARCH

BACHELOR OF ARCHITECTURE

[5 YEAR FULL TIME UNDER GRADUATE DEGREE PROGRAM]

RECOGNISED BY THE COUNCIL OF ARCHITECTURE, NEW DELHI

REGULATIONS, CURRICULUM AND SYLLABUS

2019 – 2020 Batch (New Syllabus)

CHOICE BASED CREDIT SYSTEM

(CBCS)

FACULTY OF ARCHITECTURE

KARPAGAM ACADEMY OF HIGHER EDUCATION
(Deemed to be University Established Under Section 3 of UGC Act 1956)
Pollachi Main Road, Eachanari Post, Coimbatore – 641 021. INDIA

19ART101	HISTORY OF ARCHITECTURE I							SEMESTER-I
Marks	Internal	40	External		60	Total	100	Exam Hours	3
Instruction Hours /week	L	2	T	0	P/S	0		Credits	2

COURSE OBJECTIVE:

- To Gain the understanding of the Architecture from the prehistoric age
- To gain knowledge of the ancient civilization of the World
- To gain knowledge of the ancient civilization of the India
- To gain knowledge of the Light of its Social fabric, Relevance design principles
- To gain knowledge of the construction materials and methods.
- To gain knowledge on the different architectural features of Dravidian Architecture

COURSE OUTCOME:

1. An understanding about the spatial and stylistic qualities associated with architecture.
2. An understanding of the diversity of architecture in India a
3. An understanding to appreciate particular culture, symbolic, spatial and material qualities
4. An understanding about architecture and cities as givers of meaning and continuity.
5. An Understanding about the Dravidian Style by case studies
6. An Understanding about the West Asian Architecture by case studies

UNIT -I INTRODUCTION – BEGINNING OF ARCHITECTURE

Relevance of history- The old stone age- The middle stone age- The new Stone Age. Development of shelterCatalhuyuk, Indus valley Civilization(Harappa and Mohenjo-Daro) West Asia- The evolution of Sumerian and Persian cultures-Outline of architectural character- Ziggurat at Urnammu- Palace of Sargon, Palace at Persepolis

UNIT- II INTRODUCTION TO SOUTH INDIAN ARCHITECTURE- DRAVIDIAN STYLE

Brief history of South India and temple architecture of temple towns -Dravidian Order - Rock cut and structural temples under Pallavas: Shore temple, Mahabalipuram and Kailasanatha temple, Kanchipuram.

UNIT -III DRAVIDIAN ARCHITECTURE

Development of Vimana, Walled enclosures Gopurams under Cholas- Brihadeeswara Temple Thanjavur ,Darasuram Temple-Kumbakonam, Pandya-Evolution of form of Gopuram-Complexity in temple plan due to complexity in ritual – Meenakshi Amman temple, Madurai, Sri Villiputhur Andal temple.

UNIT- IV DRAVIDIAN – VIJAYANAGARA, NAYAK - STYLES.

Vijayanagara- Addition of mandapas-eg-Someshwara temple, Kolar city Karnataka. Nayak- Temple cities, addition of Gopurams to existing temples-Thousand pillared mandapas..

UNIT -V INTRODUCTION TO WEST ASIAN ARCHITECTURE.

Outline of architectural character and evolution of pyramids in Egypt-Great Pyramids of Cheops.Architectural characteristics of Egyptian temples-Ammon,Karnak, temple of Ramses. Greek-Outline of architectural character – Orders in architecture-Doric, Ionic ,Corinthian, acropolis, Athens, Parthenon, Erecthion, theatre Epidaurous.

SUGGESTED READINGS :

1. Sir Banister Fletcher, A History of architecture, CBS publications(Indian Edition)20th - Edition 2002.
2. Archana Venkatesan, Crispin Branfoot‘ In Andal’s Garden” -Marg’s quarterly publications.
3. George Mitchell ,Indira Viswanathan Peterson ’The great Temple of Thanjavur” -Marg’s quarterly publications.
4. Christopher Tadgell, ’The history of Architecture in India-From the dawn of civilization to the end of Raj’-Phaidon 2002.
5. Burton Stein,’ A history of India’, John Wiley & Sons 2010.
6. K.A NilakantaSastri,’A History of South India: From the prehistoric Times to the fall of Vijayanagara’-Oxford University press, 2007.
7. S.Llyod and H.W.Muller, Ancient Architecture; History of world architecture-Series, -Phaidon press,London,2004.

19ART102	MATHEMATICS IN ARCHITECTURE								SEMESTER-I
Marks	Internal	40	External			60	Total	100	Exam Hours	3
Instruction Hours /week	L	2	T	0	P/S	0	Credits			2

COURSE OBJECTIVE:

- To develop analytical skills needed for problem solving a
- To develop creative thinking as well as an understanding of Geometry
- To develop the application of mathematical concepts in architecture.
- To develop the skill of Parametric architecture
- To develop the Skill of programming by Mathematical Approach
- To develop an understanding of platonic solids through physical model making

COURSE OUTCOME:

1. Student will be trained on the basis of the topics of Mathematics necessary for effective understanding of architecture subjects.
2. Students will understand the advanced level applications by using coordinate geometry
3. Students will understand the Statistical charts and variance for applications in architecture
4. Students will develop the skill and understating of Area & volume calculations for Applications in Architectural design
5. Students will understand the historical applications of mathematics and use of it in current context
6. Student would have an understanding of the basics of parametric design concept in architecture

UNIT- I CO-ORDINATE GEOMETRY

Points, vectors and coordinate systems – Vector Algebra – Points vs Vectors – Rotation about an arbitrary axis – Parametric, Implicit and Explicit Equations – Lines – Parametric equations of lines – Implicit equation of lines – Distance from a point to a line – Conic sections – Parametric equation of conics.

UNIT – IIBASIC STATISTICS

Arithmetic Mean, Median, Mode, Standard Deviation and Variance – Graphical display of data in statistics through charts and graphs such as bar charts, histograms etc

UNIT- IIIAREA AND VOLUME CALCULATIONS

Surface Area and Volume Calculations for simple 3D objects such as cube, cuboid, cylinder, cone, sphere, pyramid, prisms and their frustrums.

UNIT – IVGEOMETRY IN ARCHITECTURE

Ratio and Systems of proportion – definition and derivation of golden ratio – Fibonacci series. Geometry of Muqarnas. – Making models for understanding the dimensions .

UNIT- V PLATONIC SOLIDS

Geometry of Platonic Solids. (Concept and Application). Physical modeling of simple and complex geometric forms. - Making models for understanding the dimensions.

SUGGESTED READINGS :

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi,41st Edition, 2011.
2. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), New Delhi, 7th Edition, 2009.
3. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., New Delhi, 11th Reprint, 2010.
4. Greenberg M.D., "Advanced Engineering Mathematics", Pearson Education, New Delhi, 2nd Edition, 5th Reprint, 2009.
5. Gupta S.C and Kapoor V.K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, New Delhi, 9th Edition,1996.

19ART103	ENVIRONMENTAL STUDIES							SEMESTER-I
Marks	Internal	40	External		60	Total	100	Exam Hours	3
Instruction Hours /week	L	2	T	0	P/S	0		Credits	2

COURSE OBJECTIVE:

- To create the awareness about environmental problems among people.
- To develop an attitude of concern for the environment.
- To motivate public to participate in environment protection and improvement.
- To understand the renewable and Non – renewable resources
- To gain knowledge about Biodiversity and Conservation
- To understand the primary concept of Social impact & Pollution

COURSE OUTCOME:

1. Student will be able to master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. Student will master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
3. Student will know to appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Student will able to relate the environmental studies to the city planning strategies and Architecture
5. Student will be able to understand about the biodiversity and the conservation techniques
6. Student will be able to know methods to mitigate pollution

UNIT I INTRODUCTION - ENVIRONMENTAL STUDIES & ECOSYSTEMS

Environment Definition, Scope and importance; Ecosystem, Structure and functions of ecosystem. Energy flow, Food chains and food webs, Ecological succession. Classification of ecosystem. Forest ecosystem, Grassland Ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT II NATURAL RESOURCES - RENEWABLE AND NON-RENEWABLE RESOURCES

Natural resources - Renewable and Non – Renewable resources. Land resources and land use change, Land degradation, soil erosion and desertification. Forest resources - Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water resources - Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water. Use of alternate energy sources, growing energy needs, case studies. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT III BIODIVERSITY AND ITS CONSERVATION

Levels of biological diversity - genetic, species and ecosystem diversity.Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value. Bio-geographical classification of India. Biodiversity patterns (global, National and local levels). Hot-spots of biodiversity. India as a mega-diversity nation. Endangered and endemic species of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT IV ENVIRONMENTAL POLLUTION

Definition, causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution. Nuclear hazards and human health risks. Solid waste management and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Case studies.

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT

Concept of sustainability and sustainable development. Water conservation - Rain water harvesting, watershed management. Climate change, global warming, ozone layer depletion, acid rain and its impacts on human communities and agriculture. Environment Laws (Environment Protection Act, Air Act, Water Act, Wildlife Protection Act, Forest Conservation Act).

SUGGESTED READINGS :

1. Anonymous. 2004. A text book for Environmental Studies, University Grants Commission and Bharat Vidypeeth Institute of Environmental Education Research, New Delhi.
2. Anubha Kaushik., and Kaushik, C.P. 2004. Perspectives in Environmental Studies. New Age International Pvt. Ltd. Publications, New Delhi.
3. Arvind Kumar. 2004. A Textbook of Environmental Science. APH Publishing Corporation, New Delhi.
4. Daniel, B. Botkin., and Edward, A. Keller. 1995. Environmental Science John Wiley and Sons, Inc., New York.
5. Mishra, D.D. 2010. Fundamental Concepts in Environmental Studies. S.Chand& Company Pvt. Ltd., New Delhi.
6. Odum, E.P., Odum, H.T. and Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
7. Rajagopalan, R. 2016. Environmental Studies: From Crisis to Cure, Oxford University Press.
8. Sing, J.S., Sing. S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand & Publishing Company, New Delhi.
9. Singh, M.P., Singh, B.S., and Soma, S. Dey. 2004. Conservation of Biodiversity and Natural Resources.Daya Publishing House, New Delhi.
10. Tripathy. S.N., and Sunakar Panda. (2004). Fundamentals of Environmental Studies (2nd ed.). Vrianda Publications Private Ltd, New Delhi.
11. Verma, P.S., and Agarwal V.K. 2001. Environmental Biology (Principles of Ecology). S. Chand and Company Ltd, New Delhi.
12. Uberoi, N.K. 2005. Environmental Studies. Excel Books Publications, New Delhi.

19ARP111	ART APPRECIATION AND MODEL MAKING								SEMESTER-I
Marks	Internal	60	External			90	Total	150	Exam Hours	6
Instruction Hours /week	L	1	T	0	P/S	3			Credits	3

COURSE OBJECTIVE:

- To introduce the vocabulary of art and the principles.
- To inform students about the various art forms through the ages within the cultural contexts.
- To develop presentation skills, visual expression and representation
- To Improve the imaginative thinking and creativity
- To develop the knowledge of Visualization by simple Two- & Three-dimensionalexercises
- To develop the art skill by hands on working with various mediums and materials.

COURSE OUTCOME:

1. Student will understand the vocabulary of art and form principles
2. Student will understand to appreciate the art forms and analyse and apply the concept in architecture
3. Student will gain mastery in sketching, visualizing and expression through manual drawing, sensitized to culture, craft and context.
4. Student will gain Skill Development in Handling Materials and in Making Products and models.
5. Student will gain knowledge about various mediums of presentation
6. Student will gain deep understanding about the art Appreciation and essence of the Aesthetic value

UNIT-I INTRODUCTION TO ART

Definition of art – need for art – role of art – art reality, perception, representation – categories of art In terms of media and technique – appreciating : form, content and context

UNIT- II VOCABULARY OF ART

Introducing the vocabulary of art constituted by elements (line, shape, form, space, colour, light, value, texture) and principles (Unit, variety, harmony, rhythm, balance, proportion, emphasis, contrast, movement)

UNIT- III APPRECIATING ART – BEGININGS ,MODERN ART AND AFTER

Important works from the following art traditions will be studied and analysed in terms of their form , content and context Prehistoric Art – Egyptian and Mesopotamian art Greek and Roman art – Medieval art – Renaissance and Baroque art – Neoclassicism – Romanticism - Realism

Appreciating art through the study of art production in the west over history from modern art till the present. Important works-19th and early 20th century – Impressionism - post Impressionism – Fauvism – Expressionism - Cubism – Dadaism – Surrealism – abstract art – Futurism – Constructivism – Suprematism – De Stijl – Abstract Expressionism – Pop art – Op art – new forms and media of art

UNIT -IV BASICS OF DRAWING ANDGRAPHIC DESIGN

Introduction to history of Graphic Design – Visual perception theory (Gestalts) – Principle of Compositions – Colour Theory – Type Design and Typography (Layouts / Format / Calligraphy) – Environmental Graphics (Signage / Logo / enhancing the built environment) – Exercises in environmental graphic design, color and composition

UNIT -V PAINTING-CULTURE - CRAFT - TECHNOLOGY

Introduction to Art / Artists' / Movements and Styles before and after industrial revolution and its implication on design and architecture – Mediums, Techniques and Tools (Water colours / Posters / Acrylic / Inks / Brushes / Knives / Mixed Media) - Exercises using various techniques and mediums- Material exploration (Wood / Metal / Clay / Printing) - to be Explored as Workshop Modules - Print Making / Wood Carving / Clay Sculpting / Casting / Sheet Metal etc.,

SUGGESTED READINGS :

1. Peter and Linda Murray, “The Penguin Dictionary of Art and Artist”’ Penguin books 1989.

Artist Handicrafts Association, “Indian Art science the early

1. Ching Francis, “Drawing a Creative Process”, Van Nostrand Reinhold, New York, 1990.
2. Alan Swann, “Graphic Design School”, Harper Collins, 1991.
3. Envisioning Architecture – an analysis of drawing , Iain Fraser & Rod Henmi, 1991

Moivahuntly, “The artist drawing book”, David & Charles, U.K., 1994

19ARS121	ARCHITECTURAL DESIGN- I								SEMESTER-I
Marks	**Internal**	**200**	**External**			**300**	**Total**	**500**	**Exam Hours**	**6**
Instruction Hours /week	**L**	0	**T**	0	**P/S**	10			**Credits**	**10**

COURSE OBJECTIVE:

- To provide a comprehensive introduction to the discipline of Architectural Design Fundamentals
- To develop the skill in Visual Arts.
- To encourage creative thinking and design analysis by various Exercises
- To develop the dialogue & Communication visually & Verbally
- To develop the graphic thinking ability and provide a platform for graphical representation.
- To develop an understanding of the design process and develop aesthetic judgment.

COURSE OUTCOME:

1. Student will understand the qualities of different elements as well as their composite fusions.
2. Student will be able to engage and combine the elements of design in spontaneous as well as intentional ways in order to create desired qualities and effects.
3. Student will develop these required skills – observation / analysis / abstractions / interpretation / representations / expressions through models and drawings
4. Student will be able to develop the confidence to communicate effectively by explaining their own design product
5. Student will develop the art of Design Communication through his expression
6. Student will understand with whole design process from the concept tot the final product.

UNIT- I DESIGN DEFINITION:

Design Thinking: What is Design? Changing Role of the Designer; Route map of the Design Process; Components of Design Problems; Measurement, Criteria & Judgment in Design; Types and Styles of Thinking – Creative thinking, Guiding Principles.

UNIT - II BASIC ELEMENTS OF DESIGN

Introduction to Elements of design. -Properties, qualities, and characteristics of (i) line, (ii) direction, (iii) shape, (iv) size, (v) texture, (vi) space (vii) time and motion (viii) value and (vii) colourExploration in mixed media & collage to convey a specific theme and meaning.Analytical Studies to be undertaken in two and three dimensions using various materials and tools.

UNIT - III PRINCIPLES OF DESIGN:

The principles of design relationships/ Composition – Unity & Harmony, Balance, Scale & Proportion, Contrast and Emphasis, and Rhythm. -Exploration in mixed media & collage to convey specific theme and meaning.-Analytical Studies will be undertaken in two and three dimensions using various media.

UNIT- IV DESIGN EXCERCISES AND MODEL:

Design thought process – Sketching various process designs- Subjective – Objective – priciples of design – oriented design –design context – Shape grammer – Fluidity – Parametric – Biomimicry etc -evolution of design – model making

UNIT - V INTRODUCTION TO ARCHITECTURAL DESIGN:

Lecture introduction into the discipline of architecture, highlighting fundamentals that contribute to the complex totality that constitute a work of architecture: Placing Architecture (Site, Orientation, Climate, City and Landscape); History & Precedent; Materials & Construction; Representation and Realization

SUGGESTED READINGS :

1. Owen Cappleman& Michael Jack Jordon, Foundations in Architecture: An Annotated Anthology of Beginning Design Project, Van Nostrand Reinhold New York, 1993.
2. Charles Wallschlacgerm& Cynthia Busic-Snyder, Basic Visual Concepts and
3. Principles for Artists, Architects and Designers, McGraw Hill, New York 1992.
4. Ching, F.D.K., “Design Drawing”, Van Nostrand Reinhold, 1998

19ARS122	BUILDING MATERIALS								SEMESTER-I
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	5			**Credits**	**4**

COURSE OBJECTIVE:

- To provide an understanding of the building materials
- To develop the knowledge of construction detailing.
- To develop basic knowledge of the various components of a built structure.
- To develop the knowledge of the Material properties
- To develop the Knowledge of the techniques in material usages
- To develop an understanding of the design executionmethods

COURSE OUTCOME:

1. Students will learn about the properties of various building materials
2. Students will understand the properties of stone, brick and its usage through drawing
3. Student will be able to recognize the apt usage of materials through proper research
4. Students will be able to understand and submit drawing plates comprising of technical plan, elevation and section along with sketches and details.
5. Student will be able to understand the technical details and construction details of the subject
6. Students will gain knowledge in cost and availability by their field Survey and Site visits

UNIT- I SOIL ANDSTONE

Soils: Formation – grain size distribution – soil classification systems - earth -
Stone: Classification of rocks - Building stones - their uses –physical properties - brief study of tests for stone – deterioration - preservation of stone - various stone finishes - cutting and polishing of granites.

UNIT- II BRICKS AND CLAY PRODUCTS – MATERIALS

Bricks - brief study on manufacture of bricks – properties and uses - suitability - types of bricks - uses in buildings, structural tiles, ceramics, terracotta – properties and uses

UNIT – III BUILDING COMPONENTS

Functional requirements of a building and its components
Type of building-Load bearing- Framed structure-Sub structure , Superstructure-Typical Section of a building-Foundation-Plinth -Lintels- Arches- corbels – coping- roofing types- wall types-floor types – partition types etc

UNIT- IV BUILDING MATERIALS- MARKET STUDY-SITE STUDY

Introduction to basic building materials- Observation of work at site – mixture ratio – material standards – material sample collections from market – Market study – local materials – imported materials – assignments – Introduction to bill of quantities – small material volume- basic – calculations

UNIT- V ADVANCED BUILDING MATERIALS

Introduction to modern building materials- current developments- new material innovations-material sample collections

SUGGESTED READINGS :

1. Arora S.P. and Bindra S.P., "Text book of Building Construction", Dhanpat Rai & Sons, New Delhi, 2012.
2. KlansDukeeberg, Bambus – Bamboo, Karl Kramer Verlag Stuttgart Germany, 2000.
3. National Building Code Of India 2005- Part 6 Structural Design- Section 3 Timber and Bamboo.
4. Francis D.K. Ching, Building Construction Illustrated John Wiley & Sons 2000
5. Kumar, S.K., "Building Construction", 19th Ed., Standard Publishers Distributors, 2001
6. Allen, E. and Iano, J., "Fundamentals of Building Construction: Materials and Methods", Wiley, 2004
7. Mehta, M., Scarborough, W. and Armpriest, Diane, "Building Construction: Principles, Materials and Systems", Pearson Prentice Hall, 2008
8. WB Mckay Building construction, Vol 1,2, Longman UK 1981.

19ARS123	ARCHITECTURAL GRAPHICS								SEMESTER-I
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	3			**Credits**	**3**

COURSE OBJECTIVE:

- To make them understand the nature of geometrical forms in terms of drawing plane and solid projections.
- To make them understand the representation of 2 dimensional and 3 Dimensional forms
- To make them understand the plans, sections, isometric and axonometric drawings of forms
- To develop the skill of doing perspectives
- To develop the Skill of technical Architectural Representation
- To develop the Skill of creating measure drawings

COURSE OUTCOME:

1. Student will be able to understand the 2 dimensional & the 3dimensional perspective of the objects
2. Student will be able to construct the 3d views and perspective drawings of the buildings.
3. Student will be able to draw the perspective drawings with sciography
4. Student will be able to do Architectural Rendering
5. Student will be able to do architectural detailed drawing for a smaller scale project.
6. Student will be able to do read and Do a technical Architectural Drawing

UNIT 1 GEOMETRICAL DRAWING – PLANE GEOMETRY -REPRESENTATION

Introduction to fundamentals of drawing/ drafting – Construction of Lines, Planes, form – grade of pencils and usage- Understanding the scale with units and dimensions – Construction of plane, object – Hollow and solid geometry – Development of surfaces and multifaceted forms – Understanding the graphical representations of arrows, lettering techniques, composition etc – Lineweights,Line type etc

UNIT- II GEOMETRICAL DRAWING – ORTHOGRAPHIC PROJECTION

Isometric, Axonometric, Oblique and multiview orthographic projections to scale of various forms- Simple and complex objects- straight, curvilinear etc – Sections, Elevations of solid geometry – hollow objects etc

UNIT- III PERSPECTIVE DRAWINGS WITH SCIOGRAPHY AND RENDERING

Introduction to perspective projections of buildings – One point perspective, Two point perspective, Three point perspective, - Cone of Vision –scientific method and short cut method -Introduction to Sciography – Plan sciography,elevationsciography, perspective sciography-Light source Shade and shadow of the object- rendering

UNIT- IV ARCHITECTURAL DRAWING & REPRESENTATION

Introduction to Architectural drawings – composition of various drawings- list of drawings-Title blocks -dimensioning – scale drawings- details – representations – arrows – stairs – material hatches etc

UNIT- V ARCHITECTURAL DRAWING AND DETAILING

Detailed drawing to scale-Drawing of small scale Floor plans- Ground floor , First floor,Roof plan, Site plan,Column layout and centre line drawing ,sections, elevations with sciography,staircase representation etc

SUGGESTED READINGS :

1. Francis D. K. Ching; Design Drawing; John Wiley & Sons; 2010
2. Rerdow Yee; Architecture Drawing - A Visual Compendium of Types & Methods; John Wiley & Sons; 2012
3. John Montague; Basic Perspective Drawing - A Visual Approach; John Wiley & Sons; 5th edition 2010.
4. Mo Zell; The Architecture Drawing Course - Understand the principles & master the practices; Thames & Hudson; 2014
5. Tokyo Musashino Academy of Art - Introduction to Pencil Drawing, Graphic - Shaw Publishing Co. Ltd., Japan, 1991.
6. Francis D. K. Ching, Architectural Graphics, Van Nostrand Rein Hold Company, New York, 1964,2002
7. Griffin, A.W. and Brunicardi, V.A., "Introduction to Architectural Presentation Graphics", Prentice Hall, 1998
8. Ciriello, M., "Architectural Design Graphics", McGraw-Hill, 2002

SEMESTER-II

19ART201	HISTORY OF ARCHITECTURE II								SEMESTER-II
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**3**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	0			**Credits**	**2**

COURSE OBJECTIVE:

- To Gain the understanding of the Architecture in the chronology 400B.C to 800 A.D
- To understand the social Fabric, Relevance, Design Principles & Construction materials and Methods.
- To understand about the Buddhist Architecture
- To Gain knowledge in Chalukyan Architecture
- To understand about evolution of Roman Architecture
- To understand about evolution of Gothic Architecture

COURSE OUTCOME:

1. Student will understand the various Architecture features and its outcome due to various social, political and economic upheavals, and its response to the cultural and context.
2. Student will understand about the spatial and stylistic qualities associated with Buddhist architecture.
3. Student will understand about the spatial and stylistic qualities associated with Chalukyan architecture.
4. Student will understand about the spatial and stylistic qualities associated with Roman, Romanesque and Gothic architecture
5. Student will understand the Styles and Details of Gothic Architecture
6. Student will expertise in Spatial understanding of historical places by Sketching& reading

UNIT-I BUDDHIST ARCHITECTURE

Hinayana and Mahayana Buddhism – Interaction of Hellenic and Indian ideas in North India- Architectural Production during Ashoka's rule- Ashokan Pillar, Saranath, and Rock cut caves at Barabar, Sanchi Stupa. Salient features of a chaitya hall and vihara,Rock cut architecture in the western and Eastern ghats-Karli,Viharas at Nasik,Ranigumpha, Udaigiri, TaktiBahai,Gandara

UNIT-II CHALUKYAN ARCHITECTURE

Overview of The Chalukya style- 'cradle of Indian architecture' -origination- karnatakaEg.Aihole and badamiPattadakal and Mahakut

UNIT-III EVOLUTION OF EUROPEON ARCHITECTURE :ROMAN

Outline of architectural character: Roman Orders (Doric, Ionic, Corinthian, Tuscan and composite)-Building Systems-Use of arches, Vaults and columns; Building Typology: Religious Buildings- Temple(Pantheon);Civic Buildings-Baths(Thermae of Caraculla),Theatres (Colloseum) Circus (Circus Maximus) Palace (Forum Romanum);Engineering works-Aqueducts, bridges.

UNIT-IV ROMANESQUE

Factors influencing architecture-Building systems-Use of arches, vaults, columns, piers, buttresses and roofs. Outline of architectural character of Italy, France and England-Examples: Pisa complex, Italy Abbey aux Hommes, Caen, Toer of London.

UNIT-V GOTHIC

Outline of architectural architecture-Evolution of vaulting and development of structural systems-examples: Notre Dame, Paris-Westminster Abbey, Hampton court palace, London, Doges Palace, Venice, Milam Cathedral.

SUGGESTED READINGS :

1. Suraj Vashishth- Buddhism art and architecture.-Cyber tech Publications.
2. SharminKhan,History of Indian architecture-Buddhist Period-CBS publications.
3. Sir Banister Fletcher, A History of architecture, CBS publications (Indian Edition) 20th Edition 2002.
4. Francis D.K.Ching et al; A global history of Architecture ,John Wiley's sons, 2nd edition 2010.
5. Leland M Roth;' Understanding Architecture:Itselements,history and meaning:-West view press,3rd revised edition 2014.
6. S.Llyod and H.M Muller, 'Ancient Architetcure:History of world architecture' –Series, Phaidon Press,London,2004

19ART202	CONCEPT OF BUILDING STRUCTURES								SEMESTER-II
Marks	Internal	40	External			60	Total	100	Exam Hours	3
Instruction Hours /week	L	2	T	0	P/S	0			Credits	2

COURSE OBJECTIVE:

- To gain understanding of basic structural form of any building
- To gain understanding of structural details of various materials and techniques
- To gain understanding about the theoretical aspects and the component aspects involved in a building
- To gain understandingabout the R.C.C structures
- To gain understanding about the Steel building Structures
- To gain understanding about Structural Mechanics

COURSE OUTCOME:

1. Student will understand the concepts of action of forces on a body and should be able to apply the equilibrium concepts.
2. Student will understand the basic geometric properties and the behavior of materials under effect of forces
3. Student will understand the various structural components of the building and its usage for strength of the structure.
4. Student will understand about the Reinforced structures structural system and ability
5. Student will understand about Steel Structures in Architectural Design
6. Student willrelate to various building structural components

UNIT- I STRUCTURAL SYSTEM

Types of Structural Systems- load bearing – masonry – R.C.C and steel structures etc

UNIT - II BASIC STRUCTURAL CONCEPTS AND MATERIALS

Various types of load in buildings – live load , dead load, wind load etc- earth quake and seismic leaod and combination – general properties of structural material- steel – concrete – R.C.C – wood – brick – stone etc

UNIT - III R.C.C BUILDING COMPONENTS

Structual specification – Beam -Slab- Column – Footing – Staircase

UNIT - IV STEEL BUILDING COMPONENT

Types of structural steel – properties- rolled steel sections – tension members -compression members etc

UNIT- V STRUCTURAL MECHANICS

Resolution – force – cocepts of stress and strain – tensile stress- compressive and shear stress – bending movement and shear force for various loads and support conditions

SUGGESTED READINGS :

1. R.K.Bansal – A text book on Engineering Mechanics, Lakshmi Publications, Delhi, 2005.
2. R.K.Bansal – A textbook on Strength of Materials, Lakshmi Publications, Delhi 2007.
3. P.C.Punmia, Strength of Materials and Theory of Structures; Vol. I, Lakshmi Publications, Delhi 1994.
4. S. Ramamrutham, Strength of Materials – Dhanpatrai& Sons, Delhi, 1990.
5. W.A.Nash, Strength of Materials – Schaums Series – McGraw Hill Book Company, 1989.
6. R.K. Rajput – Strength of Materials, S. Chand & Company Ltd. New Delhi 1996.

19ART203	THEORY OF ARCHITECTURE								SEMESTER-II
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**3**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	**0**			**Credits**	**2**

COURSE OBJECTIVE

- To introduce architecture as a discipline and to sensitize the students to the various functional aspects of architecture
- To make them understand the meaning of Architecture and its visual aesthetic sense
- To introduce the students to the ordering elements, principles of architecture
- To gain Knowledge about the organization principles of Form and Space
- To gain Knowledge about the theoretical aspects of Design
- To gain knowledge and understand the vocabulary of the architectural language through the analysis of selected buildings.

COURSE OUTCOME:

1. Student will understand on the definition of architecture; elements of architectures of form.
2. Student will be exposed to the principles of architecture and applications of the same in buildings and spaces.
3. Student will understand the meaning of character and style of buildings with examples.
4. Student will understand on ideologies and philosophies of architectures of contemporary
5. Student will understand about the theoretical aspects of Architectural Design
6. Student will gain Knowledge in the Vocabulary of the Architectural Terms and language

UNIT- I INTRODUCTION TO DESIGN AND ARCHITECTURE

Definitions of Design, Architecture-context for architecture as satisfying human needs-functional, aesthetic findand psychological –architecture as a discipline-introducing the various functional aspects of architecture: site, structure, skin, services, use, circulation etc.

UNIT- II ORDERING ELEMENTS

Point, line, plane, form, shape, motif, pattern, light, color, texture – understanding the elements with respect to architecture- Detailed study of the visual and emotional effects of geometric forms and their derivatives: sphere, cube, pyramid, cylinder and cone

UNIT- III PRINCIPLES OF ARCHITECTURE

– Transformation of forms, Articulation of forms – mass-space/solid-void effects, articulation of edges, corners, surfaces -Proportion, scale, balance, rhythm, axis, symmetry, hierarchy, datum, unity, harmony, dominance with respect to architecture

UNIT- IV ORGANISATION OF FORM AND SPACE

Spatial relationships: space within space, interlocking spaces, adjacent spaces, space linked by a common space - spatial organization: centralized, linear, radial, clustered, grid -form-space relationships-

UNIT- V CIRCULATION AND ORGANISATION

Circulation as organizing element: building approach, building entrance, configuration of the path, path space relationship, form of circulation space

SUGGESTED READINGS :

1. Francis D.K.Ching, Architecture-Form, Space and Order, Van Nostrand Reinhold Company, New York, 2007.
2. Simon Unwin, Analysing Architecture, Routledge, London, 2003.
3. Yatin Pandya, "Elements Of Space Making", Mapin Publishing Pvt. Ltd, 2014.
4. V.S.Pramar, Design Fundamentals in Architecture, Somaiya Publications Pvt. Ltd., NewDelhi,1997-3rd edition.

19ARP211	COMPUTER APPLICATION -I								SEMESTER-II
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	3			**Credits**	**3**

COURSE OBJECTIVE:

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

COURSE OUTCOME:

1. Student will be able to express using digital tools in the realm of visual composition, drafting, 3D visualization and rendering
2. Student will be able to draw measured drawings using the software
3. Student will be able to detail the building components using the software
4. Student will be able to produce accurate drawings faster using the software
5. Student will be able to give a rendered image of the Architectural Design by software
6. Student will be able to conceptualize. visualize and Produce digital drawings at ease

UNIT- I SIMPLE APPLICATIONS

Creating technical documents and reports, Specifications with simple calculations- Area , volume etc, Presentations with graphics. – Charts – tables- Statistics-estimations

UNIT – II SKETCHING TOOLS

Introduction to Sketch up models – Simple Buildings – Material Application– Vray rendering

UNIT – III COMPUTER AIDED DRAFTING

Introduction to 2D application – Plan ,section, elevation drawings,3D applications

UNIT – IV IMAGE EDITING AND ANIMATION

Introduction to image editing- color enhancement

UNIT- V ADVANCED PROGRAMMING

Simple Programming laguages.

SUGGESTED READINGS :

1. Deke McClelland, 'Photoshop 7 Bible Professional Edition', Wiley John & Son INC, New York, 2000.
2. Aouad, 'Computer Aided Design guide for Architecture, Engineering and construction', Sponprocess, 2012.
3. Mohammed Saleh Uddin, 'Digital Architecture – 3D Computer Graphics from 50 top designers', 1999.
4. Scott Onstott, 'AutoCAD 2015 and AutoCAD LT 2015 Essentials', AutoDesk Official press, 2014.
5. Fiorello. J. A., 'CAD for Interiors beyond the basics', Wiley publications, 2011.
6. Ryan Duell and Tobias Hathorn, 'AutoDesk Revit Architecture 2015: No Experience Required', AutoDesk Official Press, 2014.

19ARS221	ARCHITECTURAL DESIGN - II								SEMESTER-II
Marks	**Internal**	**200**	**External**			**300**	**Total**	**500**	**Exam Hours**	**6**
Instruction Hours /week	**L**	0	**T**	0	**P/S**	10			**Credits**	**10**

COURSE OBJECTIVE:

- Understanding a Simple Design Programme and the Components of the Design Problem.
- Investigate and Acquire the Knowledge to address the various aspects of the Design Problem and Process
- Develop Ability to Communicate Design Ideas throughout the Design Stages with multiple media.
- Ability to conceptualize a design idea by Sketching and other techniques
- Ability to do a frame work of Design methodology
- Ability to understand the process of Design and deliver the Architectural Design with Technical Drawings

COURSE OUTCOME:

1. Student shall understand the basic functional aspect of designing simple building type and its relevant spatial organization.
2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project
3. Student will be able to transform the theoretical ideas to the tangible output of design.
4. Student will be able to understand the space organization, space- volume design approach
5. Student will be able to research, Analyse and Deliver a Architectural Design.
6. Student will be able to Communicate effectively through the design ideas

UNIT- I

Design Process: Basics: Drawing skills, Conventions, Abstraction and Expression; Application: Analysis, Exploration, Discovery and Verification; Communication: Process, Individual Design, Team Design, and Public Design. Evolution from Program and Conditions to Concept & Design - Graphical Representation of the Process.

UNIT - II

The study of space standards and anthropometrics related to each problem. Anthropometry as related to physically handicapped and elderly persons is required to be studied. Different Techniques shall be used for presentation.

UNIT - III

Design Strategies and Methods. Designing in Context; Design & Function; Constituents of Design; Working with materials and Structures; Arriving at Ideas. Methods: Nature & Geometry as generators; Music and Mathematics as models; Precedent; Responses to Site; Generative Processes. Traditional Methods, New Methods, The Three Stage Process – Divergence, Transformation, Convergence; Choosing Design Strategies.

UNIT - IV

Horizontal movement - single bay - passive energy type spaces. Design Exercises shall be simple functional units with universal access compliance such as : Toilet for a physically handicapped person. Hostel room, bed room, kitchen, Shop, Workshop, pavilions, snack bar;

UNIT- V

The problems involve simple space organization. Design Exercises shall be multiple spaces and understanding their inter-relationships, such as : Residence, petrol bunk, fire station, police station, Cottage for an elderly couple.

The basics of building anatomy from parapet to foundation and an overview of the different building materials shall be explained at the beginning of the design studio.

SUGGESTED READINGS :

1. Joseph De Chiara, Michael J Crosbie, Time Saver Standards for Building Types, McGraw Hill Education; 4th edition, 2014..
2. Joseph De Chiara, Julius Panero, Martin Zelnik, Time Saver Standards for Interior Design and Space Planning, McGraw Hill 2011.
3. Ernst Neuferts Architects Data, Blackwell 2012.
4. Ramsey et al, Architectural Graphic Standards, Wiley 2008.

19ARS222	BUILDING MATERIALS AND CONSTRUCTION- I								SEMESTER-II
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	5			**Credits**	**4**

COURSE OBJECTIVE:

- To provide an understanding of the construction materials
- To provide an understanding of the construction methods through construction detailing
- To develop basic knowledge of the various components of a built structure.
- Ability to understand by field study on all Topics
- Ability to understand the Traditional & rural materials
- Ability to gain Knowledge about the techniques of Rural Construction

COURSE OUTCOME:

1. Student will gain Knowledge of properties and construction methods of brick, clay products and timber products.
2. Student will be able to detail structural and nonstructural components of simple buildings using the above materials.
3. Student will understand to integrate knowledge of properties and construction methods of basic building materials in the design of simple projects.
4. Student will understand about the Bamboo construction techniques.
5. Student will be able to gain advanced knowledge about Timber Roof Constructions.
6. Student will understand the building construction techniques of the traditional / rural houses.

UNIT – I BUILDING SECTION AND COMPONENTS

Typical section for load bearing and R. C. C structures

UNIT – II TRADITIONAL RURAL MATERIALS

Introduction to rural building concepts - Bamboo, thatch, tile, strawbale etc- properties- uses – traditional techniques of construction

UNIT – III MUD, STONE & LIME

Mud- wall- flooring-plastering- mud bricks etc-Stone- Wall- Floor-Foundations-Lime- Plastering- adhesive - properties- uses – traditional techniques of construction

UNIT – IV BAMBOO

Bamboo- types-techniques- Wall- Roof -Floor- Furniture – bamboo joints -properties- uses – traditional techniques of construction etc

UNIT- V TIMBER-ROOFING AND JOINERY

Timber truss- lean to, King post, Queen post, closed couple etc-Joinery – Windows, Doors, Furniture, column etc-Roofing materials and techniques-madras terrace- Mangalore tiles – Pot tiles- properties- uses – traditional techniques of construction

All units – material Sample Collections and Site Visit and detailed drawings

SUGGESTED READINGS :

1. Don A. Watson, 'Construction Materials and Processes', McGraw Hill, 1972.
2. W.B. McKay, 'Building Construction', Person India, Vol, 1 2013,Vol II, 2012.
3. S.C Rangwala 'Building Construction' Charotar Publishing House, India, 2016.
4. S.K.Sharma, 'A Text book of Building Construction', S. Chand & Co Ltd., New Delhi, 1998.
5. S.K. Duggal, 'Building Materials', New Age International Publishers, 2016.
6. R.J. S. Spence and D.J. Cook, 'Building Materials in Developing Countries', John Wiley and sons 1983.
7. S. C. Rangwala, 'Engineering Materials', Charotar Publishing House India, 2015.
8. Roy Chudley, Roger Greeno, 'Building Construction Handbook', Routledge, 2010.

19ARS223	MEASURED DRAWING AND DOCUMENTATION								SEMESTER-II	
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	3			**Credits**	**3**

COURSE OBJECTIVE:

- To involve students in a number of exercises that will help them develop the skill of representation in advanced drawing techniques
- To make them understand the measured drawing method
- To make them understand to document buildings of architectural interest
- To understand and Develop the skill of measured drawing of Sections & Elevations
- To understand and develop the set of Architectural working drawings
- To develop them in making the working drawings for the Site Execution

COURSE OUTCOME:

1. Student will be able to construct and draw detailed architectural working drawings
2. Student will understand the 3d views and perspective drawings of the buildings.
3. Student will understand the detailed specifications of a small construction drawing
4. Student will learn to Collect the building data and document accordingly
5. Student will develop the skill of making anArchitectural Working Drawing
6. Student will develop skill of reading an Interior working Drawing

UNIT- I MEASURED DRAWING- INTRODUCTION

Introduction to fundamentals of measured drawing, line value, lettering, drawing representation- pen and ink presenations, methods and technique of measuring objects by measuring tape –photographs – aesthetic components and details- collection of various architectural working drawings, detailed drawings of Joinery, column layout etc

UNIT- II MEASURED DRAWING- SMALL SCALE BUILDING

Excercises and assignments involving measured drawing(Plans , sections, Elevations with sciography,schedule of joinery,column layout, architectural working drawings, Perspective etc) of small spaces such as shops, resdential layout, Villas,Kiosk,café etc

UNIT- III MEASURED DRAWING- SMALL SCALE BUILDING- INTERIORS

Excercises and assignments involving measured drawing of small spaces (Plans, Sections, elevations, Isometric view etc) such as Kitchen Interiors, bed room inteiors, toilet interiors etc to specific scale- detailings in larger scale etc

UNIT- IV & V DETAILED DOCUMENTATION OF A BUILDING

Site visit- Measured drawing of a built structure -Documentation of a complete building of a special interest in terms of history, building Construction- architectural excellence or technology- use of various color codes-collection of data-information and importance of the building -in terms of construction technique- detailing, climate etc- report writing and inference

SUGGESTED READINGS :

1. Francis D. K. Ching; Design Drawing; John Wiley & Sons; 2010
2. Rerdow Yee; Architecture Drawing - A Visual Compendium of Types & Methods; John Wiley & Sons; 2012
3. John Montague; Basic Perspective Drawing - A Visual Approach; John Wiley & Sons; 5th edition 2010.
4. Mo Zell; The Architecture Drawing Course - Understand the principles & master the practices;

SEMESTER-III

19ART301	HISTORY OF ARCHITECTURE – III								SEMESTER-III
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**3**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	0			**Credits**	**2**

COURSE OBJECTIVE:

- To Gain the understanding of the Architecture in the chronology after 1000 B.C
- To understand the social Fabric, Relevance and Design Principles
- To understand various Construction materials and Methods used in different architectural styles
- To understand about the Italian Architecture
- To Gain knowledge in Northern Renaissance & Baroque Architecture
- To understand about evolution of Islamic &Mughal Architecture

COURSE OUTCOME:

1. Student will understand the various Architecture features and its outcome due to various social, political and economic upheavals, and its response to the cultural and context.
2. Student will understand about the spatial and stylistic qualities associated with Italian architecture.
3. Student will understand about the spatial and stylistic qualities associated with Northern Renaissance & baroque architecture.
4. Student will understand about the spatial and stylistic qualities associated with Islamic architecture
5. Student will understand the Styles and Details of Mughal Architecture
6. Student will expertise in Spatial understanding of historical places by Sketching& reading

UNIT- I ITALIAN RENAISSANCE

Renaissance-Introduction, Italian Renaissance-three Phases-Early Renaissance(ALberti-S.Andrea,Brunelleschi-Cathedral of Florence,Pazzichapel,Basillica San Lorenzo),High Renaissance (Bramante-Santa Maria delleGrazie)Late Renaissance (Michel angelo,Palladio-St.Peter's Basilica, Villa Capra La Rotonda)

UNIT- II NORTHERN RENAISSANCE AND BAROQUE.

Northern Renaissance-Introduction; Characteristics of English Renaissance-Works of Sir Christopher Wren,Inigo Jones. Baroque-Features and elements of Baroque-St.Paul's Cathedral, Palace of Versailles, Winter Palace in Saint Petersburg.

UNIT- III INTRODUCTION TO ISLAMIC ARCHITECTURE&EARLY ISLAMIC ARCHITECTURE IN INDIA

Brief history of Islam-Islamic architecture of the world as rising from Islam as a socio-cultural and political phenomenon. Evolution of building types in terms of forms and functions. Principles and characteristics of Islamic architecture - to include aspects of religion, geometry, structure, materials, decoration, light.

UNIT- IV REGIONAL ISLAMIC ARCHITECTURE

Early political history of Islam in India. Evolution of Islamic architecture under the Delhi Sultanate Slave, Khaji,Tughlaq, Sayyid and Lodi dynasties. Study of important monuments. Early Islamic architecture of Punjab.

UNIT-V PROVINCIAL STYLES- MUGHAL ARCHTECTURE

Development of Provincial styles in different regions-
Punjab,Jaunpur,Bengal,Gujarat,Malwa,theDeccan(Bijapur,Golconda,Bidar and Gulbarga)-Important examples of each styles. Development of Mughal style under differenet rulers- Political History of the Mughals. Mughal architecture and urbanism under Humayun, Akbar, Shahjahan and Aurangzeb. Study of important monuments. Outline of Post Mughal Islamic architecture. Outline of architecture related to Islam in Tamil Nadu.

SUGGESTED READINGS :

1. Francis D.K.Ching 'A global history of Architecture '-John Wiley's sons, 2nd edition 2010
2. Spiro Kostof-A history of Architecture-Setting and Rituals, -Oxford university, Press London,1986
3. Sir Banister Fletcher, A History of architecture, -CBS publications (Indian Edition) 20th Edition 2002.
4. Percy brown, 'Indian Architecture (Islamic Period)'-Taraprevala and Sons, Bombay, 2014.
5. Robert Hillenbrand, 'Islamic Architecture-Form, Function and Meaning,'-Columbia University Press, 2004.
6. RomilaThapar,'Thepenquin history of early India',-Penguin,2015.
7. G.K.Hraskar- The great Ages of world architecture-Dhanpat Rai Publications
8. Sharmin Khan, History of Islamic Architecture-Delhi sultan,Mughal and Provincial periods-CBS publications

19ART302	DESIGN OF STRUCTURES- I								SEMESTER-III
Marks	Internal	40	External			60	Total	100	Exam Hours	3
Instruction Hours /week	L	2	T	0	P/S	0	Credits			2

COURSE OBJECTIVE:

- To understand the concepts and design of structures in architecture
- To understand the different structural materials used for various buildings with calculations
- To understand about the Footing Calculations& Applications
- To understand about the Column Calculations & Applications
- To understand about the Beam Calculations & Applications
- To Understand about the fundamentals of Staircase structure

COURSE OUTCOME:

1. Student will be able to apply the concepts/techniques of finding stresses.
2. Student will understand to calculate simple bending theory to find deflection in beams.
3. Student will be able to analyse and solve different types of columns.
4. Student will be able to analyse the different types of indeterminate beams.
5. Student will be able to understand about the Structural systems &Calculations of Slab
6. Student will be able to understand the Fundamental of Staircase.

UNIT- I FOOTING

Types – shallow and Deep foundation- Design- rectangular and combined footing

UNIT- II COLUMN

Types- Circular – square and rectangular column- Designo of columns

UNIT- III BEAM

Simply supported- rectangular beams- continuous beam- Design of Beams

UNIT - IV SLAB

Types-one way – two way – rectangular slab- simple supported-Design of slab etc.

UNIT- V STAIRCASE

Types – doglegged, waist slab type design- Desogn of staircase

SUGGESTED READINGS :

1. R.K. Bansal, 'A Text Book on Strength of Materials', Laxmi Publications, New Delhi,2006
2. B.C. Punmia et al, 'SMTS-I, Strength of Materials', Laxmi Publications, 2015.
3. M.M. Ratwani& V.N. Vazirani, 'Analysis of Structures, Vol. 1', Khanna Publishers, Delhi, 2012.
4. Timoshenko, S.P. and D.H. Young, 'Elements of Strength of Materials', 5th edition, East West Press, 2011.
5. A.R. Jain and B.K.Jain, 'Theory and analysis of structures', Vol. 1, Nemchand and Bros, Roorkee, 1987.
6. R.K. Rajput, 'Strength of Materials', S.Chand, 2006.

19ART303	BUILDING SERVICES - I								SEMESTER-III
Marks	Internal	40	External			60	Total	100	Exam Hours	3
Instruction Hours /week	L	2	T	0	P/S	0			Credits	2

COURSE OBJECTIVE:

- To get a Brief understanding about the list of Services involved in Building
- To understand the sequence and importance of the services in a Building during the planning
- To develop basic technical knowledge in water supply & Applications in Architecture
- To develop the technical knowledge in Electrical Supply & Applications in Architecture
- To develop sanitation, electrical, air conditioning, mechanical and firefighting systems.

COURSE OUTCOME:

1. Student will understand about Building services and its integration in a building
2. Student will learn about water supply, sewage, drainage and waste systems in buildings.
3. Student will learn about the various electrical systems and applications in building
4. Student will understand about Heating, ventilation and air-conditioning systems in a building.
5. Student will learn about the Fire safety & Services in a building
6. Student will understand the importance of application of services in a building.

Building Services – I (Studio)

UNIT- I INTRODUCTION TO BUILDING SERVICES

Services- types- Importance – scale of building

UNIT- II DIFFERENT TYPES OF BUILDING SERVICES

Water supply-Electrical-Data and telecom-Fire safety-Security-Automation- IBMS-HVAC- concepts

UNIT - III WATER SUPPLY AND SEWAGE

Fundamentals- Surface and ground water sources - quality/quantity - nature of impurities
supply and drain-sewage- plumbing-calculations- Environmental sanitation -Sanitation in buildings. Arrangement of sewerage systems in Housing, large factories, towns and cities - sewage pumping station - Rainwater harvesting and disposal

UNIT – IV ELECTRICAL AND ILLUMINATION

Fundamentals- electricity- lighting-Load calculations- Basics of electricity - Single/Three phase supply - Protective devices in electrical installations - Earthling for safety - Types of earthling - ISI specifications.

UNIT- V HVAC

Fundamentals- types- air-conditioning- load calculations

SUGGESTED READINGS ::

1. 'Manual of Water Supply and Treatment', second edition, CPHEEO, Ministry of works and housing, New Delhi, 1977.
2. AFE Wise, JA Swaffied Water, 'Sanitary & Waste Services in buildings', V Edition, Mitchell Publishing, Co. Ltd., 2002.
3. Punmia B.C., 'Waste Water Engineering', Laxmi Publications, 2009.
4. Arceivala S.J., 'Waste Water Treatment for Pollution Control', Tata McGraw Hill,2008.
5. National Building Code - Bureau of Indian Standards. Indian Standard Code of Practice for Water Supply in Buildings, IS :2065 – 1983'
6. S.C.Rangwala, 'Water Supply and Sanitary Engineering', Charotar publishing house

19ARP311	SURVEYING, LEVELLING &SITE PLANNING								SEMESTER-III
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	3			**Credits**	**3**

COURSE OBJECTIVE:

- To understand the principles of surveying, classification, types of surveys
- To understand the applications of surveying
- Know about techniques of surveying.
- Understand the concepts of levelling and its applications.
- Get exposed to total station surveying, GIS and GPS.
- To understand the site, its premises and various factors involved

COURSE OUTCOME:

1. Student will understand the various systems of Surveying
2. Student understand the concept of levelling and its applications on site for various types of buildings.
3. Student will understand about the larger survey context using the total station and GIS mapping
4. Student will understand about the Site Inventory and Site analysis
5. Student will learn about Hill survey and method of Contouring
6. Student will learn about the item planning principles, methods and its applications in architectural design.

UNIT 1 CHAIN SURVEY AND LEVELLING

Chain survey- principles- classification- instruments used, ranging, reciprocal ranging, Leveling , methods of leveling, booking and reduction of levels, longitudinal leveling, cross sectioning, errors in leveling, problems in leveling, contouring- plane table survey – radiation , Intersection, traversing and resection (experiment – 2nos)

UNIT- II THEODILITE SURVEY

To understand Theodolite survey, measurement of horizontal and vertical angles, problems tackled like centre line of building, setting out angles- Rise and fall method- Dumpy level etc.

UNIT- III CONTOURING

Characteristics of contours,direct and indirect methods of contouring

UNIT- IV TOTAL STATION

Total Station Survey- Different types - Introduction of GIS and GPS

UNIT- V SITE INVENTORY,SITE ANALYSIS AND SITE PLANNING

Importance of site analysis - factors involved in accessibility - site characteristics - land, contours, water shed, climate and topography, preparation of site analysis diagram

SUGGESTED READINGS :

1. Kevin Lynch, 'Site Planning', Third Edition, MIT Press, 1984.
2. Edward. T. White, 'Site Analysis', Archi Basic Press, 2014.
3. B.C.Punmia et al, 'Surveying Vol.I', Seventeenth Edition, Laxmi Publications, 2016..
4. Joseph De.Chiarra and Lee Coppleman, 'Urban Planning and Design Criteria', Van Nostrand Reinhold Co., 1982.
5. Strom Steven, 'Site Engineering for Landscape Architects', John Wiley & Sons, 2013.
6. P.B.Shahani, 'Text of Surveying Vol.I', Oxford and IBH Publishing Co, 1980
7. 'Development Control Rules', CMDA 2008.
8. Genevieve S. Baudoin, 'Interpreting Site: Studies in Perception, Representation, and Design', Routledge, 2015

19ARS321	ARCHITECTURAL DESIGN-III								SEMESTER-III	
Marks	**Internal**	**200**	**External**			**300**	**Total**	**500**	**Exam Hours**	**6**
Instruction Hours /week	**L**	0	**T**	0	**P/S**	10			**Credits**	**10**

COURSE OBJECTIVE:

- To create understanding of human built environment as a holistic, living entity from macro to micro scales, and shaped by geographic and socio-cultural forces as well as by historic, political and economic factors, through study of and design within the context of rural settlements.
- Understanding the Design Programme and the Components of the Design Problem&Investigate and Acquire the Knowledge to address the various aspects of the Design Problem and Process
- Develop Ability to Communicate Design Ideas throughout the Design Stages with multiple media&Ability to conceptualize a design idea by Sketching and other techniques
- Ability to do a frame work of Design methodology
- Ability to understand the process of Design and deliver the Architectural Design with Technical Drawings
- To enable a comprehensive **study of rural settlement** and architecture in order to understand them as exemplar of collective design that evolved through various parameters.

COURSE OUTCOME:

1. Student will be able collect data, assimilate and integrate knowledge in a holistic manner.
2. Student will learn about the Sensitivity towards the nature and values of unselfconscious and collective design aswellas the interconnectedness of human society and environment
3. Student will learn about traditional techniques and concepts of Architecture.
4. Student will learn about the evolution and transformation of the rural settlements according to the time and cultural context.
5. Student will understand the essence of rural planning
6. Student will develop the skill of design process for the Rural settlements

CONTENT:

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

Appropriate tools and processes can be used to aid the understanding. These include different methods of historical and socio-cultural study, oral history, discussions, information collection, surveys, maps, perceptual sketches, documentation through drawings, demographic study, assimilation and analysis.
Problems related to Rural Housing - Visits to selected village – based on Rural surveys on socio-economic, physical, housing and visual surveys, etc. to study existing conditions - analysis of survey data - preparation of report and presentation in a seminar - preparation of design brief solutions for housing and community facilities

SUGGESTED READINGS :

1. Amos Rapoport, 'House, Form and Culture', Prentice Hall, 1969.
2. Bernard Rudofsky, 'Architecture without Architects', MoMA, 1964.
3. Rajendra Kumar Sharma, 'Rural Sociology', Atlantic, 2011.
4. Joseph De Chiara, Michael J Crosbie, 'Time Saver Standards for Building Types', McGraw Hill Professional 2001.
5. Ramachandran H, 'Village Clusters and Rural Development', Concept Publications, 1980.
6. Thorbeck D, 'Rural Design', Routledge,2002.
7. Hassan Fathy, 'Architecture for the Poor', University of Chicago press, 1973.
8. R. C. Arora, 'Integrated Rural Development', S. Chand, 1979.

19ARS322	BUILDING MATERIALS AND CONSTRUCTION -II								SEMESTER-III
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	5			**Credits**	**4**

COURSE OBJECTIVE:

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

COURSE OUTCOME:

1. Student will learn about the concrete as a versatile material in different contexts.
2. Student will understand the concepts of concrete as a building construction material.
3. Student will be able to design and detail specific components in concrete in Architectural Design
4. Student will understand about concrete Footing, column by doing detailed drawings
5. Student will understand about concrete Slab, beams by doing detailed drawings
6. Student will understand about concrete Plinth, lintel, Sill by doing detailed drawings
7. Student will understand about concrete Staircase by doing detailed drawings

UNIT- I FOOTING

- Detailed drawings and specs- BOQ
- Footing-isolated, combined, continuous- Rectangular, Square

UNIT- II COLUMN

- Column marking layouts- types-detailed drawings

UNIT- III PLINTH, GRADE AND LINTEL BEAMS

- General arrangement drawings and detailed drawings

UNIT- IV BEAM AND SLAB

- General arrangement drawings
- Detailed beam drawings/ sections

UNIT- V CONCRETE STAIRCASE

- Types-doglegged- bifurcated-quarter turn- Spiral – helical- handrail and baluster detail etc

SUGGESTED READINGS :

1. M.S.Shetty, 'Concrete Technology', S.Chand, 2005.
2. S.K. Duggal, 'Building Materials', New Age International Publishers, 2016.
3. B.C.Punmia et al, 'Building Construction', Laxmi Publications, 2016.
4. T.D Ahuja and G.S. Birdie, 'Fundamentals of Building Construction', Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 1996
5. S.P Arora and S.P Bindra, 'A Text Book of Building Construction', Dhanpat Rai Publishing Company Pvt. Ltd, 2010.
6. Roy Chudley, Roger Greeno, 'Building Construction Handbook', Routledge, 2010.
7. S.N Sinha, 'Reinforced Concrete Design', Tata-McGraw Hill, New Delhi, 2002
8. R. Chudley et al**, '**Construction Technology', Heinemann, 2011

19ARS323	CLIMATE RESPONSIVE ARCHITECTURE								SEMESTER-III
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	3			**Credits**	**3**

COURSE OBJECTIVE:

- To study about climatic factors and its influence
- To understand about the of external and internal factors of Climate for a certain location
- To understand deeply about the Microclimatic influences in a building
- To understand about the Solar geometry and its impacts in a building
- To understand the Air movement & its principles and Applications for humanthermal comfort
- To understand about the Classification of climate and Design strategies recommendations for each climatic Zone

COURSE OUTCOME:

1. Student will understand the whole climatic scenario of the world
2. Student will learn about the Solar geometry, sun path its irradiation effects and control
3. Student will learn about heat transfer in buildings due to materials and design implications.
4. Student will understand about the Various ventilation principles and techniques for good ventilation
5. Student will understand hybrid design strategies and its design applications for different climatic zones
6. Student will develop the skill of doing a climatic design for any building with optimum recommendations.

UNIT 1 CLIMATE & MICROCLIMATE

Introduction of the earth formation,sun-Latitide , longitude, Altitude-Factors that determine climate -Climatic zones of the world,India –Climate classifications -characteristics-Thermal comfort-Mahony's tables,Psychrometricchart,Bioclimatic chart and fanger point scale- Microclimate-Urban heat Island-Built forms – Natural and manmade features – vegetation

UNIT- II SOLAR GEOMETRY- HEAT TRANSFER-BUILDING ENVELOPE CONCEPTS

Movement of sun- Sun path diagram – Solictice-Overheated period–Solar shading–Shadow angles – Types of shading devices and materials,techniques- Transfer of heat through solids -Wall,roof,ground,glass,other materials– Definitions-Conductivity, Resistivity, Emmissivity,Absorbtance– Surface resistance and air cavities– Air to air transmittance (U value) –Time lag and decrement factor – Material Properties-calculations

UNIT- III AIR MOVEMENT STRATEGIES –VENTILATION PRINCIPLES

The wind –wind patterns – Air currents around the building – Air movement through the buildings – Fenestration techniques– Thermally induced air currents – Stack effect, Venturi effect ,bernoullistheory,Finwalls,windtowers etc

UNIT- IV DESIGN STRATEGIES -PASSIVE,ACTIVEAND DAYLIGHITNG

Heating:principles – Passive and Active solar-Direct gain systems - Glazed walls, Bay windows,sun space- Indirect gain systems-Trombe wall,SolarChimney,Roof pond, Roof radiation trap, Solarium etc.Cooling: General principles – Evaporative cooling, Nocturnal radiation cooling,induced ventilation, earth sheltering, Berming, Wind Towers, earth air tunnels, Curved Roofs & Air Vents, Insulation, Vary Thermal wall etc.-Daylighting concepts – Natural – Artificial – WWR – Light shelf etc

UNIT- V DESIGN RECOMMENDATIONS FOR CLIMATE & SUSTAINABILITY IN ARCHITECTURE

Design strategies recommended in warm humid, hot and dry,Moderate , composite and cold climates-Fundamentals of Sustainability- green buildings – rating sstems -Biomimicry -Case studies of buildings

-Excercises involving design strategies receommended

SUGGESTED READINGS :

1. MiliMajunder, Teri – Energy – Efficient Bldgs in India – Thomson Press , New Delhi – 2001
2. Arvind Krishnan & Others – Climate Responsive Architecture, Tata Mcgraw –Hill New Delhi 2001.
3. Heating,Cooling and Lighting – Norbert Lechner, October 2014
4. Charles. J. Kibert, 'Sustainable Construction' John Wiley and sons Inc, USA.2013.
5. N.D. Kaushika, Energy, Ecology and Environment, Capital Publishing Company, New Delhi.2012
6. O.H. Koenigsberger and others (1993), Manual of Tropical Housing and Building –Part I - Climate design, Orient Longman, Madras, India.
7. Sun wind and light- Mark Dekay , G. Z. Brown, Feb 2013

SEMESTER-IV

19ART401	CONTEMPORARY ARCHITECTURE I								SEMESTER-IV
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**3**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	0			**Credits**	**2**

COURSE OBJECTIVE:

- To give exposure to the critiques of modern architecture.
- To understand about influence of new materials in modern architecture
- To study in detail the different postmodern directions in architecture
- To study about the influence of industrial revolution in Architecture
- To understand about the Modern era of Architecture
- To understand the evolution of Western Architecture

COURSE OUTCOME:

1. Student will understand the spread and varied later directions of modern architecture across the world.
2. Student will understand the architectural production from the 1960s as driven by large scale changes across the world.
3. Student will become familiar with contemporary forces and directions in architecture across the world.
4. Student will understand the basis of Architecture revolutions and its changes in every decade
5. Student will understand the Ideologies of various Architects& their Works
6. Student will impart this Knowledge in his Architectural Design

UNIT- I EVOLUTION OF MODERN ARCHITECTURE & INFLUENCE OF NEW MATERIALS

Reasons for the evolution of Modern Architecture, origins-Neo Classicism Industrial revolution and its impact – Emergence of new building typologies, New Materials and Technologies- steel, glass and concrete

UNIT- II REVIEWING INDUSTRIALISATION

Arts & Crafts movement in Europe and America; Art nouveau, and the works of Horta, Guimard, Gaudi and Macintosh; Organic Architecture -Early works of F.L.Wright. Chicago school; Art deco Architecture in Europe and America.

UNIT- III EVOLUTION OF MODERNISM, POST MODERNISM AND CRITIQUE

Viennese secession, Adolph Loos and debates on ornamentation ; Futurism, Expressionism works of Mendelssohn &Taut, Cubism, Constructivism, De stijl and their influence on Architecture. Bauhaus school &Walter gropius, Modernism and the International style, Brutalism, Writings of Venturi - Jane Jacobus - Aldo Rossi - Christopher Alexander.

UNIT – IV WESTERN ARCHITECTURE

Ideas and works of Richard Meier (Smith House, Connecticut and Getty Centre, Brent Wood, LosAngeles), Charles Moore (Architect's Own House at Orinda and Piazza d'Italia, New Orleans), Bernard Tschumi (Kyoto Railway Station Project and Parc de la Villete, Paris), Frank Gehry (AeroSpace Museum, Santa Monica and Guggenheim Museum, Bilbao), Norman Foster (Hong Kong Shanghai Bank and Renault Distribution Centre, Swindon, England),

UNIT- V MODERN ARCHITECTURE

Zaha Hadid (The Peak Club, HongKong and IBA Housing Block 2, West Berlin), Daniel Leibskind(Jewish Museum, Berlin and World Trade Centre, New York), Rem Koolhas(Dance Theatre, The Hague and Netherlands Sports Museum), Santiago Calatrava(Lyon- Satolas Railway Station and Olympic Stadium at Athens), Renzo Piano(Pompidou Centre, Paris and Menil Museum, Houston) - Deconstructivist Theory – Parametric.

SUGGESTED READINGS :

1. Kenneth Frampton, 'Modern Architecture: A Critical History', Thames & Hudson, London, 2007.
2. William J. Curtis, 'Modern Architecture since 1900', Phaidon Press, 1996.
3. Diane Ghirardo , 'Architecture after Modernism', Thames & Hudson, London, 1990.
4. Elie G. Haddad, David Rifkind, 'A Critical History of Contemporary Architecture: 1960-2010', Routledge, 2016.
5. Bhatt and Scriver, 'Contemporary Indian Architecture- After the Masters', University of Washington Press, 1991
6. Bahga et al, 'Modern Architecture in India - Post Independence Perspective', Galgotia, 1993

19ART402	DESIGN OF STRUCTURES II								SEMESTER-IV
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**3**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	0			**Credits**	**2**

COURSE OBJECTIVE:

- To get introduced to basic structural members in timber and steel.
- To give knowledge to design different timber components in a building.
- To enable an understanding of the types, efficiency and strength, advantages and disadvantages of rivet joints
- To enable an understanding of the types, efficiency and strength, advantages and disadvantages of welded joints
- To enable the design of tension (beams) and compression (columns) steel members in a building under different conditions.
- To Understand the concept of Structural system of Steel & Timber

COURSE OUTCOME:

1. Student will understand about Various Timber sections
2. Student will understand about the design timber beams and columns by applying the code provisions.
3. Student will understand about the Steel Sections and its usage.
4. Student will be able to design steel joints for maximum efficiency and strength.
5. Student will be able to design tension and compression members for different conditions by applying the
6. code provisions.
7. Student will be able to design different types of laterally unsupported & supported beams for different conditions.

UNIT- I STEEL SECTIONS AND WELDED JOINTS

Types-various steel section -design of fillet wield

UNIT- II TENSION MEMBERS

Introduction- Plate- and angle sections – design of axially loaded tension member-

UNIT- III COMPRESSION MEMBERS

Introduction – slenderness ratio – various section s- built up section – design of columns

UNIT- IV STEEL BEAMS

General specs- design of lateral supported beam

UNIT- V TIMBER BEAMS

Grading – design of timber beams etc

SUGGESTED READINGS :

1. M.R. Shiyekar, 'Limit State Design in Structural Steel', PHI Learning Private Limited, 2010.
2. N. Subramanian, 'Design of Steel Structures', Oxford Higher Education, 2008.
3. S.K. Duggal, 'Limit State Design of Steel Structures', McGraw Hill Education, Private Limited,2010.
4. Dr. V. L. Shah & Prof. Veena Gore, 'Limit State Design of Steel Structures', Structures Publications, Pune, 2012.
5. S.S. Bhavikatti, 'Design of Steel Structures by Limit State Method as per IS800-2007', I.K.International Publishing House Pvt, Ltd, 2012.

19ART403	ACOUSTICS AND LIGHTING							SEMESTER-IV
Marks	**Internal**	**40**	**External**		**60**	**Total**	**100**	**Exam Hours**	**3**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	**0**		**Credits**	**2**

COURSE OBJECTIVE:

- To understand the science behind acoustical design and Lighting design
- To expose students to understand sound transmission & Noise Control
- To understand about the Daylighting and artificial lighting.
- To familiarize the students with various building and interior elements for Acoustics and lighting
- To familiarize the students with the basic principles of acoustic design and Lighting design
- To familiarize the student with the applications of Acoustical materials

COURSE OUTCOME:

1. Student will understand the theoretical concepts of acoustics
2. Student will understand the theoretical ideas and concepts of lighting
3. Student will be able to understand the basis of noise reduction and design applications of noise control
4. Student will be able to understand the basis of Lighting and method at provide daylighting and Artificial lighting as per the functionality of the space.
5. Student will understand about Daylighting concepts & its Applications
6. Student will understand about efficient lighting techniques & its Applications

UNIT- I FUNDAMENTALS OF ACOUSTICS- SOUND TRANSMISSION AND ABSORPTION

Sound waves, frequency, intensity, wave length, measure of sound, decibel scale, speech and music frequencies, human ear characteristics - Tone structure-Outdoor noise levels, acceptable indoor noise levels, sonometer, determinate of density of a given building material, absorption co-efficient and measurements, choice of absorption material, resonance, reverberation, echo, exercises involving reverberation time and absorption co-efficient.

UNIT- II NOISE CONTROL AND SOUND ABSORPTION

Types of noises, transmission of noise, transmission loss, noise control and sound insulation, remedial measures and legislation.

UNIT- III CONSTRUCTIONAL MEASURES FOR ACOUSTICS AND BUILDING DESIGN

Walls/partitions, floors/ceilings, widow/doors, insulating fittings and gadjets, machine mounting and insulation of machinery.Site selection, shape, volume, treatment for interior surfaces, basic principles in designing open air theatres, cinemas, broadcasting studios, concert halls, class rooms, lecture halls, schools, residences. Call Centers, Office building and sound reinforcement systems for building types.

UNIT- IV LIGHTING – NATURAL LIGHITNG

Daylighting, units-reflection, refraction, sky component- IRC, ERC etc- Daylighting levels, Daylight factor,method of calculations, daylignting techniques- etc

UNIT- V LIGHTING – ARTIFICIAL LIGHITNG

Artificial lighting- various types of interior and exterior lighting- lighting standards for various work areas and uses- energy – units calculations – methods- design innovations - etc

SUGGESTED READINGS :

1. Dr.V.Narasimhan - An Introduction to Building Physics - Kabeer Printing Works, Chennai-5 - 1974.
2. D.J.Groomet - Noise, Building and People - Pergumon Press - 1977.
3. Thomas D.Northwood - Architectural Acoustics - Dowden, Hutchinson and Ross Inc. – 1977.
4. David Egan, 'Architectural Acoustics', J.Ross Publishing, 2007.
5. Steven. V. Szokolay – Introdcution to Architectural Science– the basis of sustainable design
6. Norbert lechner – Heating, Cooling, lighting- susutainable design methods for architects

19ARP411	COMPUTER APPLICATION -II								SEMESTER-IV	
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	3			**Credits**	**3**

COURSE OBJECTIVE:

- To develop the advanced Digital knowledge and skills
- To develop the skills of two-dimensional rendering
- To develop the skill and knowledge of the Building information Modelling
- To develop the Skill related to building visualization,
- To develop the skill of multimedia presentations, brochures,
- To develop the skill of video presentations as required in architectural practice.

COURSE OUTCOME:

1. Student will be able to understand the use of digital tools in the realm of visual composition,
2. Student will understand the drafting & Details through Software
3. Student will develop the skill of 3D visualization and rendering
4. Student will understand the concept of BIM- building information modelling through the specific software
5. Student will gain the Skill of Multimedia & video making presentations required for Architectural practice
6. Student will gain knowledge about the latest developments of digital applications in Architecture

CONTENT

1. Advanced techniques in rendering with differential lighting for realistic rendering

2. Animations and Walkthroughs

3. Simulating gravity, wind and other effects in the scene, distributed rendering

4. Application of videography in architecture

5.Basics of developing and hosting websites

REVIT,BIM,ECOTECT and reentsoftwares

SUGGESTED READINGS :

1. Rendering Techniques for mixed reality, Thomas Girlinger, Daniel Dauch, Andre Stork, Springer, Berlin, October 2009
2. 3D Computer Animated Walk Throughs, Clark Cory, Scott Meador, William Rosi, McGraw Hill 2009.
3. The Animation Book: A complete guide to animation and film making, Kit Laybourne, Three Rivers Press, December 1998
4. Creating a website, Matthew McDonald, Pogue Press, January 2009
5. Deke McClelland, 'Photoshop 7 Bible Professional Edition', Wiley John & Son INC, New York, 2000.
6. Aouad, 'Computer Aided Design guide for Architecture, Engineering and construction', Spon process, 2012.
7. Mohammed Saleh Uddin, 'Digital Architecture – 3D Computer Graphics from 50 top designers', 1999.

19ARS421	ARCHITECTURAL DESIGN -IV								SEMESTER-IV
Marks	**Internal**	**200**	**External**			**300**	**Total**	**500**	**Exam Hours**	**6**
Instruction Hours /week	**L**	0	**T**	0	**P/S**	10			**Credits**	**10**

COURSE OBJECTIVE:

- Understanding Complex Design Programme and the Components of the Design Problem.
- Investigate and Acquire the Knowledge to address the various aspects of the Design Problem and Process
- Develop Ability to Communicate Design Ideas throughout the Design Stages with multiple media.
- Ability to conceptualize a design idea by Sketching and other techniques
- Ability to do a frame work of Design methodology
- Ability to understand the process of Design and deliver the Architectural Design with Technical Drawings

COURSE OUTCOME:

1. Student shall understand the basic functional aspect of designing simple building type and its relevant spatial organization.
2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project
3. Student will be able to transform the theoretical ideas to the tangible output of design.
4. Student will be able to understand the space organization, space- volume design approach
5. Student will be able to research, Analyse and Deliver a Architectural Design.
6. Student will be able to Communicate effectively through the design ideas

CONTENT

Multi space- Multi level planning in small scale, small span, horizontal movement and simple vertical movement, data collection, case studies, analysis and presentation of studies – Data collection with respect to design and detailing for physically handicapped persons - Concepts and presentation of design with scaled models -Examples:Gatedcommunity,Institutional buildings: banks, Nursery or Primary /Secondary schools, primary health center, school for children with learning disabilities, neighborhood market,Municipaloffice,Cafeteria,Multicuisine Restaurant etc.

Design Process to be approached stage wise through Architectural Programming

SUGGESTED READINGS :

1. Joseph De Chiara, Michael J Crosbie, 'Time Saver Standards for Building Types', McGraw Hill Professional, 2001.
2. Kevin Lynch, 'Site Planning', MIT Press, Cambridge, 1967.
3. Steen Eiler Rasmussen, Experiencing Architecture; MIT Press; 1959.
4. Kent C. Bloomer and Charles W. Moore, 'Body, Memory, and Architecture', Yale University Press, 1977.
5. Juhani Pallasmaa, 'The Eyes of the Skin - Architecture and the Senses', John Wiley: New York, 2005.
   Julius Panero, Martin Zelnik, 'Human Dimension and Interior Space', Whitney Library of Design, 1975.
6. Richard P. Dober, 'Campus Planning', Reinhold Book Corporation, 1963.
7. Sam F.Miller, 'Design Process: A Primer for Architectural and Interior Design', Van Nostrand Reinhold, 1995. Dudek M, 'Schools and Kindergartens', Birkhauser 2007

19ARS422	BUILDING MATERIALS AND CONSTRUCTION -III							SEMESTER-IV
Marks	**Internal**	**80**	**External**		**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	5		**Credits**	**4**

COURSE OBJECTIVE:

- To give an introduction to metals as material for building construction.
- To give knowledge about the principles, methods of construction and applications of metals for structural components
- To understand about non-structural building components.
- To gain Knowledge about Steelfloor &SteelStaircase
- To understand about Door, windows & partitions
- To provide familiarity with market forms of metals and finishes for them.

COURSE OUTCOME:

1. Student will gain Knowledge of properties of ferrous and non-ferrous metals as materials for buildings.
2. Student will understand about the possibilities of steel as an important building construction material.
3. Student will be able to design and detail structural and non-structural components of simple buildings using metals.
4. Student will gain Knowledge about Steel Floors & Staircase
5. Student will understand about the details of Door, windows &Partitions by detailed Drawings.
6. Student will be able to use metal innovatively in building projects.

UNIT- I STEEL - BUILDING FOOTING

Steel foundation – Structural steel sections - types of connections in steel -steel in foundations, columns and beams - different types of steel roof trusses including northlight truss - space frames - materials for roof covering. Steel staircases and handrails, balustersgeneral arrangement and detailed drawings

UNIT- II STEEL COLUMN, JOINTS- TYPES

Column marking layouts- types-detailed drawings

UNIT- III STEEL BEAMS AND TRUSS AND ROOF

General arrangement drawings and detailed drawings- north light – Space frames – roof covering etc.

UNIT4 STEEL FLOORS AND STAIRCASE

Staircase- detailed drawings

Floor- Detailed drawings

UNIT 5 DOOR, WINDOWS AND PARTITIONS

Safety door- dock door- cold storage door-etc

Partitions, Furniture etc- Steel doors and windows – safety doors, dock doors, cold storage doors, revolving doors - collapsible gates - rolling shutters. Steel in furniture and other interior uses

SUGGESTED READINGS :

1. P.C Vargheese, 'Building Materials', Prentice Hall of India, 2015.
2. S.K. Duggal, 'Building Materials', New Age International Publishers, 2016.
3. B.C.Punmia et al, 'Building Construction', Laxmi Publications, 2016.
4. Roy Chudley, Roger Greeno, 'Building Construction Handbook', Routledge, 2010
5. Mark Lawson, Peter Trebilcock, 'Architectural Design in Steel', Taylor and Francis, 2004.
6. Terri Meyer Boake, 'Understanding Steel Design', Birkhauser, 2011.

19ARSS423	BUILDING SERVICES -II							SEMESTER-IV
Marks	Internal	60	External		90	Total	150	Exam Hours	6
Instruction Hours /week	L	1	T	0	P/S	3		Credits	3

COURSE OBJECTIVE:

- To inform about the principles and laws of Water supply and sewage systems in buildings.
- To inform about the principles and laws of Electrical lighting systems in buildings.
- To inform about the principles and laws of HVAC systems
- To inform about the principles of Mechanical and Integrated systems
- To understand about the Integrated building management in Services
- To Inform about the integration of service with the Architectural Design

COURSE OUTCOME:

1. Student will gain Knowledge of design of water supply and sewage services
2. Student will learn and understand about the design of electrical and lighting systems in buildings.
3. Student will be able to design buildings satisfying the HVAC systems
4. Student will understand the applications of mechanical systems and it design applications as per standards.
5. Student will gain basic knowledge about the Integrated Building management Systems.
6. Student will understand the Applications of building Services in advanced level by detailed Drawings

UNIT- I WATER SUPPLY & SEWAGE

Water supply systems – Domestic – Commercial – usages - Distribution systems in buildings - Types of pipes used - Laying, jointing, testing - prevention of water wastage and reuse of water - Internal water supply in buildings various scale and types-water supply layout- sewage layout- detail of Sump –
OHT- Solid waste management etc- Arrangement of sewerage systems in buildings - sewage treatment plant- Solid waste Disposal: Collection, conveyance and disposal of town Solid waste- Design of services for residence design-

UNIT- II ELECTRICAL SYSTEM AND LIGHTING DESIGN

Design of services for residence- lighting Layout- detail layout – interiors- load calculations- Study of electrical layout for residential Building - Types of wires, wiring systems and their choice - Main and distribution boards - Electrical load calculation – Details - Classification of lighting - Artificial light sources - spectral energy distribution - luminous efficiency - colour temperature - colour rendering – lighting fixtures.

UNIT -III – HVAC SYSTEMS

Design of services for residence-
Airconditioning Layout-interiors- load calculations-Types-various uses

UNIT- IV MECHANICAL SYSTEMS

Lift- design-types-no of lifts-escalator- introductions

UNIT V- INTEGRATED BUILDING MANAGEMENT SYSTEMS

Security camera- fire alarm systems-automations-Public address system etc

SUGGESTED READINGS :

1. Phillips, 'Lighting in Architectural Design', McGraw Hill. New York, 1964.
2. David Egan, Victor Olgyay 'Architectural Lighting', McGraw-Hill, 2001.
3. Gary Gordon, 'Interior Lighting for Designers', 5th Edition, John Wiley & Sons Inc., New York, 2015.
4. David Egan, 'Architectural Acoustics', J.Ross Publishing, 2007.
5. David Lee Smith, 'Environmental Issues for Architecture', Wiley, 2011.
6. National Building Code - Bureau of Indian Standards.
7. 'The Lighting Handbook', IES, 2011.

SEMESTER-V

19ART501	CONTEMPORARY ARCHITECTURE-II								SEMESTER-V
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**3**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	0			**Credits**	**2**

COURSE OBJECTIVE:

- To provide the student an in-depth knowledge of modern design philosophies in the evolution of innovative architectural forms and designs in the Indian context.
- To give an outline of architectural approaches across the world from late 20th century.
- To study in detail the different post-modern directions in architecture. +
- To provide information about the Alternate Practice
- To understand about the evolution of Architectural design of pre – independence
- To understand the Recent trends in Architecture

COURSE OUTCOME:

1. Student will learn about the spread and varied later directions of modern architecture across the world.
2. Student will become familiar with contemporary forces and directions in architecture across the world and in India
3. Student will understand about the post-independence architecture in India contemporaneous with the rest of the world, along with its own particular influences.
4. Student will understand about the Post- independence revolution of design in India
5. Student will know about the Alternate practices
6. Student will gain knowledge in recent trends of Architecture & Design

UNIT- I ALTERNATIVE PRACTICE

Ideas and Works of Fathy - Baker - Ando -Soleri – Bawa – Buckminister fuller-Architects of Auroville .

UNIT - II PRE – INDEPENDENT ARCHITECTURE IN INDIA

Monumental buildings of Early colonial period – Examples – St.Pauls Cathedral, Calcatta& Bombay Townhall – Architectural character of Indo-Saracenic and Classical revival –University of Madras Senate House & Victoria Memorial hall, Calcatta – Later Colonial period – Contribution of Edwin Lutyens & Herbert Baker to the lay-out and Architecture of New Delhi – Rashtrapathi Bhavan & Parliament House.

UNIT - III POST-INDEPENDENT ARCHITECTURE IN INDIA

Post-Independence Architecture in India – Works of Corbusier in Chandigarh and Ahmedabad (Legislative Assembly Complex including High Court, Legislative assembly and Secretariat, Chandigarh and Mill Owners' Building, Ahmadabad) Louis Kahn's contributions – the IIM, Ahmedabad, Koenigsberger and the Bhubaneswar experiment.

UNIT - IV CONTEMPORARY INDIAN ARCHITECTS AND THEIR WORKS

Ideas and works of BV Doshi (Institute of Indology Ahmedabad, IIM-Bangalore and Gufa, Ahmedabad), Charles Correa (RamaKrishna House, Ahmedabad, KanchenJunga Apartments, Mumbai and MRF Headquarters, Chennai), Raj Rewal (Pragati Maidan, New Delhi and Asian Games Village, New Delhi), Achyut Kanvinde(IIT, Kanpur and Nehru Science Centre, Mumbai), Uttam Jain(Lecture Theatres, Jodhpur and Engineering College, Kota), Lauire Baker(Centre for Development Studies, Thiruvananthapuram and St. John Cathedral at Tiruvalla) and Anant Raje(IIFM, Bhopal and Management Development Centre, IIM-Ahmedabad)

UNIT- V RECENT TRENDS IN INDIAN ARCHITECTURE

Recent developments in architecture of India – works of Selected architects – Current architecture practice.
Sanjay Mohe, Christopher benninger, Hafeez contractor, Chitra viswanath,Sanjaypuri etc

SUGGESTED READINGS :

1. Kenneth Frampton, 'Modern Architecture: A Critical History', Thames & Hudson, London, 2007.
2. William J. Curtis, 'Modern Architecture since 1900', Phaidon Press, 1996.
3. Diane Ghirardo , 'Architecture after Modernism', Thames & Hudson, London, 1990.
4. Elie G. Haddad, David Rifkind, 'A Critical History of Contemporary Architecture: 1960-2010', Routledge, 2016.
5. Bhatt and Scriver, 'Contemporary Indian Architecture- After the Masters', University of Washington Press, 1991
6. Bahga et al, 'Modern Architecture in India - Post Independence Perspective', Galgotia, 1993

19ART502	LANDSCAPE ARCHITECTURE								SEMESTER-V
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**3**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	0			**Credits**	**2**

COURSE OBJECTIVE:

- To introduce the various aspects of outdoor design and site planning
- To teach them to enhance & improve the quality of built environment, functionally and aesthetically.
- To stress on the role of landscape design in sustainability, to provide an overview of ecological balance and impacts of human activities and the need for environmental protection and landscape conservation.
- To study the historical method of garden Design
- To understand the significance of urban landscape.
- To provide familiarity with the various elements of landscape architecture and the principle of landscape design.

COURSE OUTCOME:

1. Student will understand the role of landscape design with respect to macro scale of sustainability and ecology
2. Student will understand the micro scale of shaping of outdoor environments.
3. Student will gain Knowledge about the elements of landscape design and their scope.
4. Student will know about the Sensitivity towards evolution of different garden and landscape design across time and context.
5. Student will understand the historical method of landscape design
6. Student will understand the urban scale landscape design.
7. Student will be able to do landscape design with respect to site planning and different functional typologies of spaces

UNIT- I INTRODUCTION TO LANDSCAPE ARCHITECTURE AND DESIGN

Introduction to landscape architecture; role of landscape design in architecture; Introduction to site planning, site analysis & landscape design. Site selection criteria for landscape projects.

UNIT- II ELEMENTS IN LANDSCAPE DESIGN

Hard and soft landscape elements, Plant materials, classification, characteristics, use and application in landscape design; Water and Landform.

UNIT - III GARDEN DESIGN IN HISTORY

Landscape and garden design in history - French, English, Japanese, Renaissance and Moghul . Study of notable examples.

UNIT - IV URBAN LANDSCAPE

Significance of landscape in urban areas; road landscaping; waterfront development, landscaping of residential areas , Industrial landscaping .

UNIT- V LANDSCAPE DESIGN

Basic principles of planting design; Spatial development in landscape design; Detailed landscape design of any small project including paving and street furniture design

SUGGESTED READINGS :

1. Motloch, J.L., 'An Introduction to Landscape Design', US: John Wiley and Sons, 2001.
2. Michael Laurie, 'Introduction to Landscape Architecture', Elsevier, 1986.
3. Sauter D; 'Landscape Construction', Delmar Publishers; 2000.
4. Geoffrey And Susan Jellico, 'The Landscape of Man', Thames And Hudson, 1987
5. 'Time Saver Standards for Landscape Architecture', McGraw Hill, Inc, 1995.
6. Grant W Reid, 'From Concept to Form in Landscape Design', Van Nostrand Reinhold Company, 1993.
7. Albert J. Rutledge, 'Anatomy of a Park', McGraw-Hill Book Company, 1971.
8. Richard P. Dober, 'Campus Landscape', John Wiley and Sons; 2000.
9. Strom Steven, 'Site Engineering for Landscape Architects', John Wiley and Sons Inc., 2004.
10. Brian Hacket, 'Planting Design', Mc Graw Hill Inc, 1976.
11. T.K. Bose and Chowdhury, 'Tropical Garden Plants in Colour', Horticulture And Allied Publishers, Calcutta, 1991.
12. Rahoul B Singh, 'Gardens of Delight- Indian Gardens through the Ages', Lustre Press, Roli Books, 2008.

19ARP511	COMPUTER APPLICATION-III								SEMESTER-V
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	2			**Credits**	**3**

COURSE OBJECTIVE:

- To develop the advanced Digital knowledge and skills
- To develop the skills of two-dimensional rendering
- To develop the skill and knowledge of the Building information Modelling
- To develop the Skill related to building visualization,
- To develop the skill of multimedia presentations, brochures,
- To develop the skill of video presentations as required in architectural practice.

COURSE OUTCOME:

1. Student will be able to understand the use of digital tools in the realm of visual composition,
2. Student will understand the drafting & Details through Software
3. Student will develop the skill of 3D visualization and rendering
4. Student will understand the concept of BIM- building information modelling through the specific software
5. Student will gain the Skill of Multimedia & video making presentations required for Architectural practice
6. Student will gain knowledge about the latest developments of digital applications in Architecture

CONTENT

1. Advanced techniques in rendering with differential lighting for realistic rendering

2. Animations and Walkthroughs

3. Simulation features of radiation, wind – Computational fluid dynamics,shadows,daylighting

Recommended softwares :
RHINO,GRASSHOPPER,VECTORWORKS,
PLUGINS-LADYBUG,OPENSTUDIO,DAYSIM,RADIANCE,SEFAIRA
ECOTECT,REVIT SIMULATIONS

SUGGESTED READINGS:

1.Rendering Techniques for mixed reality, Thomas Girlinger, Daniel Dauch, Andre Stork, Springer, Berlin, October 2009

2.3D Computer Animated Walk Throughs, Clark Cory, Scott Meador, William Rosi, McGraw Hill 2009.

3.The Animation Book: A complete guide to animation and film making, Kit Laybourne, Three Rivers Press, December 1998

4.Creating a website, Matthew McDonald, Pogue Press, January 2009

19ARS521	ARCHITECTURAL DESIGN -V								SEMESTER-V
Marks	**Internal**	**200**	**External**			**300**	**Total**	**500**	**Exam Hours**	**6**
Instruction Hours /week	**L**	0	**T**	0	**P/S**	10			**Credits**	**10**

COURSE OBJECTIVE:

- Understanding Complex Design Programme and the Components of the Design Problem.
- Investigate and Acquire the Knowledge to address the various aspects of the Design Problem and Process
- Develop Ability to Communicate Design Ideas throughout the Design Stages with multiple media.
- Ability to conceptualize a design idea by Sketching and other techniques
- Ability to do a frame work of Design methodology
- Ability to understand the process of Design and deliver the Architectural Design with Technical Drawings

COURSE OUTCOME:

1. Student shall understand the basic functional aspect of designing simple building type and its relevant spatial organization.
2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project
3. Student will be able to transform the theoretical ideas to the tangible output of design.
4. Student will be able to understand the space organization, space- volume design approach in large scale projects
5. Student will be able to research, Analyse and Deliver a Mixed-use Architectural Design.
6. Student will be able to Communicate effectively through the design ideas

CONTENT

Small complexes - multi planning circulation analysis - massing problems involving building technology - Design and detailing for movement of physically handicapped and elderly persons within and around buildings. examples, shopping centre (Commercial) , Apartments (residential)Nursing home (institutional) home for aged. Construction and manipulation of three dimensional building data bases, Rendering 3D images. Presentation techniques, preparing scaled models using different materials.

Design Process to be approached stage wise through Architectural Programming. Site Planning fundamentals as relevant to small projects to be introduced in the design.

SUGGESTED READINGS :

1. Joseph De Chiara, Michael J Crosbie, 'Time Saver Standards for Building Types', McGraw Hill Professional, 2001.
2. Ernst Neuferts Architects Data', Blackwell ,2002.
3. Stephen A. Kliment, Editor 'Building Type Basics' Series, Wiley.
4. Wolfgang Preiser, Korydon H. Smith, 'Universal Design Handbook', 2nd Edition, McGraw-Hill, 2010.
5. Rem Koolhaas et al, 'Project on the City II: The Harvard Guide to Shopping', Taschen, 2001.
6. Peter Coleman, 'Shopping Environments: Evolution, Planning and Design', Routledge, 2006.
7. LMVRDV, 'FARMAX- Excursions on Density', 010 Publishers, 2006.
8. Jos Boys, 'Disability, Space, Architecture: A Reader', Routledge, 2017.
9. Emily Talen, 'Design for Diversity', Routledge, 2012.
10. luis Alexandre Casanovas Blanco (Ed), 'After Belonging: Objects, Spaces, and Territories of the Ways We Stay in Transit', Lars Muller Publishers, 2016.
11. Manuel Gausa, 'Housing: New Alternatives, New Systems', Birkhäuser Basel 1999
12. Mark Hutter, 'Experiencing Cities (The Metropolis and Modern Life)', Routledge, 2015.

19ARS522	BUILDING MATERIALS AND CONSTRUCTION -IV								SEMESTER-V	
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	3			**Credits**	**4**

COURSE OBJECTIVE:

- To give an introduction to liquid storage structure and retaining wall
- To give an introduction about retaining wall
- To understand about the design of R.C.C slabs & footing
- To give an introduction to glass, plastic and related materials in building construction.
- To understand about the Applications of Glass in Building Industry
- To provide familiarity with advanced building construction techniques (shell structures) and materials as well as design with them.

COURSE OUTCOME:

1. Student will learn about the Liquid storage structure design calculations and applications
2. Student will learn about Retaining wall
3. Student will learn about the Structural design of R.C.C slab & Footing
4. Student will gain Knowledge of glass, plastics, paints and finishes in building construction.
5. Student will become familiar with advanced materials and construction techniques of shell structures
6. Student will gain knowledge in design the R.C.C slab and footing

UNIT- I LIQUID STORAGE STRUCTURE

Rectangular and circular water tank-design and detailing

UNIT - II RETAINING WALL

Cantilever and counterfort retaining wall.

UNIT - III R.C.C SLABS and FOOTING

Design of r.c.c. slabs-circular slab- detailing, Design of raft footing- Detailing

UNIT - IV SHELL STRUCTURES

Design of Domes - detailing

UNIT- V GLASS, PLASTICS-CLADDING- FLOORING-PAINTING

Glass- types , properties , uses – technical specs etc
Plastics – properties, uses – technical specs- current development in building industry
Stone, ACP, wood, Glass, curtain wall, Structural glazing,(reflected ceiling plan)
Flooring – techniques – specs -etc
Painting – types-specs - applications

SUGGESTED READINGS :

1. S.K. Duggal, 'Building Materials', New Age International Publishers, 2016.
2. B.C.Punmia et al, 'Building Construction', Laxmi Publications, 2016.
3. S.P Arora and S.P Bindra, 'A Text Book of Building Construction', Dhanpat Rai Publishing Company Pvt. Ltd, 2010.
4. M.S.Shetty, 'Concrete Technology', S.Chand, 2005.
5. Arthur Lyons, 'Materials for Architects and Builders- An Introduction' Arnold, London, 1997.
6. Pamphlet and Manuals supplied or published by SERC, BMPTC, HUDCO and other research organisations.

7. Roy Chudley, Roger Greeno, 'Building Construction Handbook', Routledge, 2010
8. R.M. Davis, 'Plastics in Building Construction', Battersea College of Technology, Blackie, London, 1966
9. Ralph Monletta, 'Plastics in Architecture– A Guide to acrylic and Polycarbonate', Marcel Dekker Inc, New York, 1989
10. 'IS 7883. Code of Practice for the Use of Glass in Buildings ', Bureau of Indian Standards,2013.
11. Gorenc, Tinyou, Syam, 'Steel Designer's Handbook', CBS Publishers and Distributors, New Delhi, Bangalore, 2005.

ELECTIVES

19ARET531	PROGRESSIVE ARCHITECTURE								SEMESTER-V
Marks	Internal	40	External			60	Total	100	Exam Hours	3
Instruction Hours /week	L	2	T	0	P/S	0	Credits			2

COURSE OBJECTIVE:

- To understand and acquire knowledge in advanced architectural concepts and ideologies.
- To gain Knowledge about the future concepts of eminent architects
- To understand about the material usage in the current trend of architecture
- To gain knowledge about the Concept of biomimicry
- To understand about the adaptive reuse
- To gain understanding about energy integration and zero energy developments

COURSE OUTCOME:

1. Student will be able to understand and evolve futuristic design ideas and concepts
2. Student will be able to integrate various aspects of design thinking of future
3. Student will understand about the parametric design concepts and applications
4. Student will understand about the concept of Biomimicry
5. Student will gain knowledge about the Adaptive reuse
6. Student will gain knowledge about energy integration and zero energy development.

UNIT- I FUTURISTIC VISION

Future concepts as envisioned by Antonio Saint Elia, Frank Lloyd Wright, Corbusier.

UNIT – II FUTURISTIC TRENDS

Future trends being evolved by Marcos Novak, Neil Denari, Greg Lynn, Toyo Ito and others.

UNIT – III ARCHITECTURAL CONCEPTS AND IDEAS

Evolution of contemporary architectural concepts such as biomimcry, adaptive reuse, low cost development and urban regeneration.

UNIT – IV MATERIALS, TECHNOLOGY AND SYSTEMS

Futuristic building materials, building tectonics and systems of the future.

UNIT- V ENERGY INTEGRATION

“Zero energy” and “Energy +” buildings with emphasis on an integrated approach.

SUGGESTED READINGS :

1. Bell, J., “21st Century House”, Laurence King Publishing, 2006
2. Jodidio, P., “Building a New Milleneum”, Vol.1 Taschen, 2003
3. Jodidio, P., “Architecture Now”, Vol. 2, Taschen, 2004
4. TerrimeyerBuake, 'Architectural Design in Steel', SPON, 2004.
5. Peter Silver et al, 'Structural Engineering for Architects', Laurence King, 2013.
6. Gillian Hunt, 'Architecture in the Cyberspace II', John Wiley & Sons, 2001.
7. L. Convey et al, 'Virtual Architecture', Batsford, 1995.
8. Rob Shields (ed.), 'Cultures of the internet: Virtual Spaces, Real Histories, Living bodies', Sage, London, 1996.
9. John Beckman, 'The Virtual Dimension, Architecture, Representation and Crash Culture', Princeton Architecture Press, 1998.
10. William J Mitchell, City of Bits: Space, Place and the Infobahn',MIT Press, Cambridge, 1995.
11. Marcos Novak, 'Invisible Architecture: An Installation for the Greek Pavilion', Venice Biennale, 2000
12. Ali Rahim, 'Contemporary Process in Architecture', John Wiley & Sons, 2000.
13. Ali Rahim (Ed), 'Contemporary Techniques in Architecture', Halsted Press, 2002. .

19ARET532	ENVIRONMENTAL PLANNING								SEMESTER-V	
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**3**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	**0**			**Credits**	**2**

COURSE OBJECTIVE:

- To understand the impact of man's activities on the environment
- To gain knowledge about the ecology of the whole world
- To gain knowledge about the Environmental impacts
- To understand about the Assessment methods of Environment
- To understand about the Renewable & Non – renewable sources
- To gain knowledge about the Environmental laws

COURSE OUTCOME:

1. Student will understand about the ecosystem and approach towards sustainability
2. Student will gain knowledge about the environmental impacts
3. Student will gain knowledge in
4. Student will be able to understand the current environmental conditions and to work towards a sustainable approach
5. Student will know to integrate the global environmental situation with the policy level decisions
6. Student will become capable of envisioning for the future environmental benefits.

UNIT- I to V

Man – biosphere – ecosystems – resource identification and its implications for development – soil water , land , plants , animals , renewable energy and non renewable energy . preparation and analysis or resource inventories

Environmental Impact Assessment – methodologies and techniques

Environment legislation – significance of law – relationship to development – evolution of planning legislation – National environmental policy

SUGGESTED READINGS :

1.Richard p. Dober – Environmental design – VNR company – Newyork 1969
2.Albert J. Rutledge – Anatomy of a Park – Mc Graw hill book co., USA 1971
3.Harvey m. Rubenstein – A Guide to site and environmental planning , vol 3 – John wiley and sons , Newyork, 1987

19ARES533	ADVANCED STRCUTURAL DESIGN								SEMESTER-V
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	3			**Credits**	**3**

COURSE OBJECTIVE:

- To introduce the material concrete and its various usage
- To learn about the liquid Storage Structure
- To learn about retaining wall
- To learn about RCC and enable students to carry out limit state method of design of flat slabs
- To learn about the Limit state for beams, columns and foundation using BIS codes and hand books.
- To enable the learning of design of structural elements like footings, retaining walls and masonry walls.

COURSE OUTCOME:

1. Student will understand about the liquid Storage Structure
2. Student will understand the Retaining wall concepts
3. Student will understand different concepts in designing footings and columns and masonry walls using LSD methods.
4. Student will gain understanding about circular slab and Detailing
5. Student will be able to design advanced level – complex structures
6. Student will be able to design shell structures

UNIT- I LIQUID STORAGE STRUCTURE

Rectangular and circular water tank-design and detailing

UNIT - II RETAINING WALL

Cantilever and counterfort retaining wall.

UNIT - III R.C.C SLABS

Design of r.c.c. slabs-circular slab- detailing

UNIT - IV FOOTING

Design of raft footing- Detailing

UNIT- V SHELL STRUCTURES

Design of Domes - detailing

SUGGESTED READINGS :

1. S.N. Sinha, “Reinforced Concrete Design”, Tata McGraw Hill , 2002.
2. Shah H.J, , 'Reinforced Concrete', Charotar, Vol. 1 2016, Vol.2 2014.
3. P.Dayaratnam, 'Design of Reinforced Concrete Structures', Oxford and IBH Publishing Co.,1983.
4. C. Sinha and S.K. Roy, 'Fundamentals of Reinforced Concrete', S.Chand& Co., New Delhi,1983.
5. Dr. B.C. Punmia, 'Reinforced Concrete Structures' Vol, 1 & 2', Laxmi publication, Delhi, 2004.
6. IS 456 'Indian Standard, Plain and Reinforced Concrete, Code of Practice', Bureau of Indian Standards, 2000.
7. S.Unnikrishnan Pillai and Devados Menon, 'Reinforced Concrete Design', Tata Publishing Co. Ltd., New Delhi, 1999.

19ARES534	BUILDING SERVICES FOR SPECIAL BUILDINGS								SEMESTER-V	
Marks	Internal	60	External			90	Total	150	Exam Hours	6
Instruction Hours /week	L	1	T	0	P/S	3			Credits	3

COURSE OBJECTIVE:

- To impart advanced technical and practical knowledge in building services
- To gain knowledge of special services through preparation of service drawing and details.
- To understand about the water distribution for high rise structures
- To gain understanding about the Sewage & Drainage for high rise buildings
- To gain knowledge about the Sewage treatment plant
- To gain knowledge about Electrical installation for high rise buildings

COURSE OUTCOME:

1. Student will be able to understand and design high rise buildings with essential services
2. Student will gain knowledge in advanced services
3. Student will understand about Safety standards for special buildings
4. Student will gain knowledge about Fire safety service standards for all types of buildings
5. Student will gain knowledge in Building management systems
6. Student will gain Knowledge about the integration of services for Multi storied structures

UNIT- I WATER DISTRIBUTION FOR HIGH RISE / CAMPUS DEVELOPMENT

External water distribution layout- header pipe- U G sump – Puddle flange – water riser pipes – water calculation for campus – water meter – water irrigation – vision for landscaping- water management –
Iternal water distribution layout – toilet details- plumbing – kitchen –and utilities – types of pipies and joints – fixtures and fittings – shaft details

UNIT - II SEWAGE AND DRAINAGE FOR HIGH RISE AND CAMPUS DEVELOPMENT

External sewage and drainage layout – Gully trap -Collection chamber – manholes – invert level – sewagw treatment plant – grey water supply and calculation –saucer drian – rain water harvesting and terrace rain water piping system
Internal sewage systems – toilet details – Trap details – pipes and joints –vent pipes – plumbing system types- fixtures

UNIT -3 ELECTRCIAL INSTALLATION FOR HISH RISE AND CAMPUS DESIGN

Electrical panel details- basic SLD(single line diagram)-external cable layout – external lighitng layout –false ceiling layout - internal lighting layout – internal raw and UPS power layout – cable tray and cable trunk layout - Vertical shaft details

UNIT -4 HEATING VENTILATION AND AIR CONDITIONING SYSTEMS IN HIGH RISE AND CAMPUS DESIGN

Different types of chillers and layout –external chiller piping system – AHU details – false ceiling layout – supply and return air diffuser details – ducting layout – Verticial shaft – VRV – VAV systems- Sound attenuator.

UNIT -5 FIRE FIGHTING AND BMS SYSTEMS IN HIGH RISE AND CAMPUS DESIGN

UG sump for Fire fighting- fire hydrant systems – external routing – internal hydrant systems – hose reel hydrant – foam hydrant -overhead tank – False ceiling layout -Fire detection – smoke detectors -Sprinklers -Glass break system - fire alarm system –Internal fire piping layout IBMS(Integrated Building Management Systems)- types of IBMS-Control room details – Internal Routing details – sensors – CCTV – access control – burglar control etC.Drawings : Integrated Sevice layout – Internal and External – cross section details

SUGGESTED READINGS :

1. William H.Severns and Julian R.Fellows, Airconditioning and Refrigeration, John Wiley and Sons, London, 1988.
2. Robert D.Finch, Introduction to Acoustics, Prentice Hall of India Private Limited, New Dehli, 2008.
3. MARK J. HAMMER MARK J. HAMMER, JR, Water and Wastewater Technology, PHI Learning Private Limited, New Delhi. 2009.
4. M.N.Rao, A.K.Datta, Waste Water Treatment, Oxford & IBH PUBLISHING CO. PVT. LTD,New Delhi,2007.
5. Section 11. Sanitary Appliances and Water Fittings. IS Code- SP: 21-1983.
6. Hand book on Water Supply and Drainage with Special emphasis on plumbing IS Code – SP: 35 – 1987.
7. Part of Section 1: Water Supply. IS CODE – SP: 7 – 1992

SEMESTER-VI

19ART601	BUILDING CODES AND REGULATIONS								SEMESTER-VI
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**3**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	0			**Credits**	**2**

COURSE OBJECTIVE:

- To develop understanding of the duties and liabilities of an architect
- To gain knowledge of bye-laws that relate to the building
- To understand about the environment in the Indian context.
- To Understand about legislation of corporation areas
- To understand about the Legislation of panchayat
- To understand about legislation of Industries

COURSE OUTCOME:

1. Student will be able to read and understand government related documents and incorporate it in practice
2. Student will be able to understand the building regulations and follow accordingly
3. Student will understand about the legislation of corporation areas
4. Student will understand about the legislation of panchayat
5. Student will understand about the legislation of Industries
6. Student will be able to design buildings as per the recent norms and standards

UNIT- I LEGISLATION - CORPORATION AREAS

Chennai Corporation Building Rules 1972, Development control Rules for Chennai Metropolitan Area 1990

UNIT- II LEGISLATION - PANCHAYATS

The Panchayat Building Rules 1942

UNIT - III LEGISLATION - INDUSTRIES AND FACTORIES

The Tamil Nadu Factory Rules 1950

UNIT - IV EMERGING AREAS OF IMPORTANCE

Role of urban Arts Commissions - need for special rules on architectural control and development

UNIT- V SPECIAL LEGISLATION

Environmental Acts and Laws - Special Rules governing Hill Area Development - coastal area development and management - Heritage Act of India - Consumer protection act and their relevant provisions- OTHER norms- HAKA,CRSnorms,MOEF ,FMB DRAWINGS- Approval drawings .

SUGGESTED READINGS :

1. Publications of COA, IIA Hand book on Professional Practice, The Architects publishing Corporation of India, Bombay nov 2016
2. D.C. Rules for Chennai Metropolitan Area- 2014
3. T.N.D.M. Building Rules, 2012
4. T.N.P. Building Rules 1942 and updated norms and regulations
5. Environmental Laws of India - by Kishore Vanguri, C.P.R. Environmental Education Centre, Chennai
6. The Tamil Nadu Hill Areas Special Building Rules – recent version
7. Heritage Act
8. Consumer Protection Act
9. Indian Easements Act

19ART602	ESTIMATION AND SPECIFICATION								SEMESTER-VI
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**3**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	0			**Credits**	**2**

COURSE OBJECTIVE:

- To provide the student adequate knowledge to write the specifications for a given item of work
- To gain knowledge in specification
- To gain Knowledge in Estimation of Civil Work
- To gain knowledge in estimation of Carpentry work
- To gain Knowledge in the estimation of Plumbing work
- To understand to work out the unit cost of individual items based on their specifications and arrive at the overall cost of the project.

COURSE OUTCOME:

1. Student will be able to understand and write specification for the given item of work
2. Student will gain knowledge & Understanding of Estimation of civil work
3. Student will gain knowledge about estimation of Carpentry work
4. Student will gain knowledge about estimation of plumbing work
5. Student will be able to do calculate the quantities on site with Field measurement book
6. Student will learn about various calculation of bill of quantities for Interiors

UNIT- I SPECIFICATION

Necessity of specification, importance of specification, - How to write specification, - Types of Specification, - Principles of Specification writing, - Important aspects of the design of specification – sources of information – Classification of Specification.

UNIT - II SPECIFICATION WRITING

Brief Specification for 1st class, 2nd class , 3rd class building. Detailed specification for earthwork excavation, plain cement concrete, Reinforced concrete, first class and second class brickwork, Damp proof course, ceramic tiles/marble flooring and dado work, woodwork for doors, windows frames and shutters, cement plastering, painting & weathering course in terrace.

UNIT - III ESTIMATION

Types & purpose, Approximate estimate of buildings – Bill of quality, - Requirement for preparing estimation, factors to be considered, - principles of measurement and billing, contingencies, Elementary billing and measurement of basic materials like brick, wood, concrete and unit of measurement for various items of work – abstract of an estimate.

UNIT - IV DETAILED ESTIMATE – PART-1

Deriving detailed quantity estimates for various items of work of a building. Like earthwork excavation, brick work, plain cement concrete, Reinforced cement concrete works, wood work, iron works,

UNIT- V DETAILED ESTIMATE – PART-2

.Deriving detailed estimate for items of work such as -plastering, painting, flooring, weathering course for a single storied building using centre line method and long and short wall method.

SUGGESTED READINGS :

1. Rangwala. S.C, 'Estimating, Costing and Valuation (Professional practice)', Charotar Publishing House,1984
2. M.Chakraborthi, 'Estimating, Costing, Specification and Valuation in Civil Engineering, Chakraborthi, 2010.
3. B.N. Dutta, 'Estimating and Costing' UBS Publishers and Distributors,2000.
4. S.SangaReddi and P.L.Meiyappan, 'Construction Management', Kumaran Publication, Coimbatore.
5. Gurcharan Singh and Jagdish Singh, 'Estimating Costing and Valuation', Standard Publishers Distributors, 2012.
6. 'I.S.1200-1968 Methods of Measurements of Buildings and Civil Engineering works'.
7. Latest schedule of rates of P.W.D.
8. Latest Data book of P.W.D.
9. PWD Standard Specifications. Govt Publicatio

19ARS621	ARCHITECTURAL DESIGN VI								SEMESTER-VI
Marks	**Internal**	**200**	**External**			**300**	**Total**	**500**	**Exam Hours**	**6**
Instruction Hours /week	**L**	0	**T**	0	**P/S**	10			**Credits**	**10**

COURSE OBJECTIVE:

- Understanding Complex Design Programme and the Components of the Design Problem.
- Investigate and Acquire the Knowledge to address the various aspects of the Design Problem and Process
- Develop Ability to Communicate Design Ideas throughout the Design Stages with multiple media.
- Ability to conceptualize a design idea by Sketching and other techniques
- Ability to do a frame work of Design methodology
- Ability to understand the process of Design and deliver the Architectural Design with Technical Drawings

COURSE OUTCOME:

1. Student shall understand the basic functional aspect of designing complex building type and its relevant spatial organization.
2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project
3. Student will be able to transform the theoretical ideas to the tangible output of design.
4. Student will be able to understand the space organization, space- volume design approach in large scale projects
5. Student will be able to research, Analyse and Deliver a Campus Design.
6. Student will be able to Communicate effectively through the design ideas

CONTENT

Design of large structures - Multiuse multi span - non masonry building types involving buildings – Design and detailing for movement and use by physically handicapped people within and around building technology and services. Examples: college (Institutional) office buildings Resorts - etc. Preparation of working drawings using CAD for the design exercises.

Design Process to be approached stage wise through Architectural Programming. Advanced concepts of Site Planning as relevant to small and medium sized campuses to be introduced in the design.

SUGGESTED READINGS :

1. Kate Nesbitt, 'Theorizing a New Agenda for Architecture', Princeton Architectural Press, 1996.
2. Neil Leach, 'Rethinking Architecture', Routledge, 2000.
3. Harry Francis Mallgrave and David Goodman, 'An Introduction to Architectural Theory- 1968 to the Present', Wiley Blackwell, 2011.
4. Stephen A. Kliment, Editor 'Building Type Basics' Series, Wiley.
5. Mitchell WJ, 'Imagining MIT: Designing a campus for the 21st century', MIT Press, 2007.
6. Himanshu Burte, 'Space For Engagement', Seagull Books, 2008.
7. Mark Garcia, 'The Diagrams of Architecture', Wiley 2010.
8. Bjarke Ingels, 'Yes is More', Taschen, 2009.
9. Steven Holl, Juhani Pallasmaa, Alberto Pérez Gómez, 'Questions of perception: Phenomenology of Architecture', William Stout, 2

19ARS622	ARCHITECTURAL DETAILING AND WORKING DRAWING								SEMESTER-VI	
Marks	**Internal**	**80**	**External**			**120**	**Total**	**200**	**Exam Hours**	**6**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	4			**Credits**	**4**

COURSE OBJECTIVE:

- To enable students to appreciate the challenges in detailing for both the newly designed buildings as well as while carrying out additions and alterations to existing buildings.
- To enable students to understand the various Fittings, Furniture & Equipment (FFE) that are needed in buildings and their installation methods.
- To create architectural drawings for construction
- To understand the structural &services drawings
- To refer & integrate all the architectural and supporting working drawings
- To design, incorporate and detail architectural and interior components of the architectural design project

COURSE OUTCOME:

1. Student will gain understanding of all the aspects that go into the making of a building through study of drawings related to construction.
2. Student will gain the ability to resolve spatial concerns with technical aspects and services of a building.
3. Student will understand to design and detail components within a building.
4. Student will gain knowledge in interior detailing and planning
5. Student will gain knowledge in Interior furniture, fixtures as per the functionality
6. Student will gain understanding in the installation methods of cladding, integrated services by means of detailed drawings etc

CONTENT

DETAILING OF RESIDENTIAL BUILDING

Detailing of a residence – Building marking drawing,Working Drawings- Plan, Section- Longitudinal ,Transverse sections,chordsections,Door Window schedule,centre line column marking drawing, door and window joinery details – Flooing layout – toilet layout – Electrcial layout and Plumbing layout – Terrace RWP details -Staircase details – Interior details - Detailing of built-in elements like kitchen counters, cupboards, cabinets, toilets, toilet fitting, Exercises of the above through case studies and drawings.

DETAILING OF COMMERCIAL BUILDINGS

A)Detailing of a commercial building – Building marking drawing,Working Drawings- Plan, Section- Longitudinal ,Transverse sections,chordsections,Door Window schedule,centre line column marking drawing, door and window joinery details – Flooing layout – toilet layout – Electrcial layout and Plumbing layout – Terrace RWP details - Staircase details – Interior details - Detailing of built-in elements like cabinets, toilets, toilet fitting, Structural Glazing, Staircase, Flooring. Exercises of the above through case studies and drawings.

B)Detailing of shop-fronts, office spaces for commercial buildings including detailing of crucial elements such as entrance porches, main doors, show-windows, enclosed and air-conditioned atrium spaces.

C) Detailing of façade and selected spaces for apartment buildings, hotels and hostels.

Exercises of the above through case studies and drawings.

SUGGESTED READINGS :

1. Joseph De Chiara, Michael Crosby, 'Time Saver Standards for Building Types', McGraw Hill Co, 2001.
2. Richardson Dietruck, 'Big Idea and Small Building', Thames and Hudson, 2002.
3. Edward D Mills, 'Planning–The Architect's Handbook, Butterworths, 1985.
4. Roy Chudley, Roger Greeno, 'Building Construction Handbook', Routledge, 2010.
5. Susan Dawson, 'Architect's Working Details -Volume 1-10', E- Map Construct, 2004.
6. Nelson L Burbank, 'House Carpentry Simplified', McGraw Hill, 1985.
7. David Sauter, 'Landscape Construction', Delmar Publishers, 2010.
8. Grant W. Reid ,'Landscape Graphics', Whitney Library of Design, 1987.
9. Francis. D. K. Ching, 'Building Construction Illustrated', John Wiley & Sons, 2011.

19ARS623	VERNACULAR ARCHITECTURE								SEMESTER-VI	
Marks	Internal	60	External			90	Total	150	Exam Hours	6
Instruction Hours /week	L	1	T	0	P/S	3	Credits			3

COURSE OBJECTIVE:

- To introduce the study of vernacular architecture as a process and not a product.
- To provide an overview of the various approaches and concepts to the study of vernacular architecture.
- To study the various vernacular architecture forms in the different regions of the country.
- To gain Knowledge about the methods & techniques of Vernacular Architecture
- To gain understanding about the climatic considerations & Design aspects of vernacular Architecture
- To gain understanding about socio- economic aspects of the vernacular & Traditional Architecture

COURSE OUTCOME:

1. Student will understand the Indian vernacular architecture as a process and to also provide an overview of various approaches and concepts towards its study.
2. Student will gain Knowledge of vernacular architectural forms in different regions.
3. Student will gain understanding of the impact of colonial rule on vernacular architecture in India
4. Student will understand about the climatic consideration & Design aspects
5. Student will understand the socio economic aspects existed in the various regions through the study of vernacular Architecture
6. Student will gain knowledge in the vernacular methods of construction and ways to incorporate in this modern architecture.

UNIT 1 INTRODUCTION TO VERNACULAR ARCHITECTURE

Definition and classification of Vernacular architecture – Vernacular architecture as a process – Survey and study of vernacular architecture: methodology- Cultural and contextual responsiveness of vernacular architecture: an overview

UNIT- II VERNACULAR APPROACHES AND CONCEPTS

Different approaches and concepts to the study of vernacular architecture: an over view – Aesthetic, Architectural and anthropological studies in detail

UNIT- III VERNACULAR ARCHITECTURE OF THE WESTERN NORTHERN REGION OF INDIA

Forms spatial planning, cultural aspects, symbolism, colour, art, materials of construction and construction technique of the vernacular architecture of the following: - Deserts of Kutch and Rajasthan; Havelis of Rajasthan - Rural and urban Gujarat; wooden mansions (havelis); Havelis of the Bohra Muslims - Geographical regions of Kashmir;

UNIT- IV VERNACULAR ARCHITECTURE OF SOUTH INDIA

Forms, spatial planning, cultural aspects, symbolism, art, colour, materials of construction and construction technique, proportioning systems, religious beliefs and practices in the vernacular architecture of the following - Kerala: Houses of the Nair &Namboothri community; Koothambalam, Padmanabhapuram palace.

- Tamil Nadu: Houses and palaces of the Chettinad region; Agraharams

. **UNIT- V WESTERN INFLUENCES ON VENRACULAR ARCHITECTURE OF INDIA**

Colonial influences on the Tradition Goan house Evolution of the Bungalow from the traditional bangla, Victoria Villas – Planning principles and materials and methods of construction. Settlement pattern and house typologies in Pondicherry and Cochin.

SUGGESTED READINGS :

1. Paul Oliver, Encyclopedia of Vernacular Architecture of the World, Cambridge University Press, 1997.
2. Amos Rapoport, House, Form & Culture, Prentice Hall Inc. 1969.
3. R W Brunskill: Handbook on Vernacular Architecture
4. V.S. Pramar, Haveli – Wooden Houses and Mansions of Gujarat, Mapin Publishing Pvt. Ltd., Ahmedabad,1989.
5.. Kulbushanshan Jain and Minakshi Jain – Mud Architecture of the Indian Desert, Aadi Centre, Ahmedabad1992.
6. G.H.R. Tillotsum – The tradition of Indian Architecture Continuity, Controversy – Change since 1850,Oxford University Press, Delhi, 1989.
7. Carmen Kagal, VISTARA – The Architecture of India, Pub: The Festival of India, 1986.
8. S. Muthiah and others: The Chettiar Heritage; Chettiar Heritage 2000
10.Weber.W&Yannas.S, 'Lessons from Vernacular Architecture', Routledge, 2014.

ELECTIVES

19ARET631	ARCHITECTURAL CONSERVATION								SEMESTER-VI	
Marks	Internal	40	External			60	Total	100	Exam Hours	3
Instruction Hours /week	L	2	T	0	P/S	0			Credits	2

COURSE OBJECTIVE:

- To introduce the various issues and practices of Conservation
- To familiarize the students with the status of conservation in India
- To teach them about the various agencies involved in the field of conservation worldwide and their policies.
- To outline the status of conservation practice in the country
- To Know about the various guidelines for the preservation, conservation and restoration of buildings.
- To inform the students about the character and issues in our heritage towns through case studies.

COURSE OUTCOME:

1. Student will understand the importance of heritage, issues and practices of conservation through case studies.
2. Student will become familiar with historic materials and their properties, different technologies for investigating masonry, foundation and also traditional and modern repair methods
3. Student will gain knowledge about the government agencies involved in Conservation
4. Student will understand the methods of urban Conservation.
5. Student will gain knowledge about various methods of Conservation techniques and Design
6. Student will gain knowledge about various policies involved in Conservation and practice in India

UNIT 1 INTRODUCTION TO CONSERVATION

Conservation- Need, Debate and purpose.

Defining Conservation, Preservation and Adaptive reuse. Distinction between Architectural and Urban Conservation. International agencies like ICCROM , UNESCO and their role in Conservation

UNIT- II CONSERVATION IN INDIA

Museum conservation – monument conservation and the role of Archeological Survey of India – role of INTACH – Central and state government policies and legislations – inventories and

projects- select case studies of sites such as Hampi, Golconda, Mahabalipuram -craft Issues of conservation

UNIT- III CONSERVATION PRACTICE

Listing of monuments- documentation of historic structures- assessing architectural character – historic structure report- guidelines for preservation, rehabilitation and adaptive re-use of historic structures- Case studies of Palaces in Rajasthan, Chettinad and Swamimalai dwellings, seismic retrofit and disabled access/ services additions tohistoric buildings-heritage site management

UNIT- IV URBAN CONSERVATION

Over view of urban history of India and Tamil Nadu- understanding the character and issues of historic cities – select case studies of towns like Srirangaram, Kumbakonam and Kanchipuram - historic districts and heritage precincts.

UNIT- V CONSERVATION PLANNING

Conservation as a planning tool.- financial incentives and planning tools such as Transferable

Development Right(TDR)-urban conservation and heritage tourism-case studies of sites like for Cochin, Pondichery French town.- conservation project management

SUGGESTED READINGS :

1. Bernard Fielden, 'Conservation of Historic Buildings', Architectural Press, 2003.
2. Bernard Fielden, 'Guidelines for Conservation - A Technical Manual', INTACH, 1989.
3. MS Mathews, 'Conservation Engineering', Universitat Karlsruhe, 1998.
4. J. Kirk Irwin, 'Historic Preservation Handbook', McGraw Hill, 2003.
5. Donald Appleyard, 'The Conservation of European Cities', M.I.T. Press, Massachusetts, 1979.
6. Publications of INTACH
7. James M. Fitch, Historic Preservation: Curatorial Management of the Built World by University Press1990

19ARET632	VAASTU AND PRINCIPLES OF TRADITIONAL INDIAN ARCHITECTURE								SEMESTER-VI	
Marks	Internal	40	External			60	Total	100	Exam Hours	3
Instruction Hours /week	L	2	T	0	P/S	0			Credits	2

COURSE OBJECTIVE:

- To introduce the principles of Vastu and Vaastu and relationship between building and site.
- To familiarize the students with the units of measurement in traditional architecture.
- To introduce concepts of orientation and Cosmo gram according to the Vaastu Purusha Mandala.
- To learn about the planning aspects of all residential, commercial & other buildings
- To study the detailing and design of various building components and their material and method of construction.
- To learn about the vasstu detailing

COURSE OUTCOME:

1. Student will be able to understand the principles of vastu and Vaastu
2. Student will understand the traditional site planning principles and its application in the present context.
3. Student will understand the relevance of vasstu and Architecture
4. Student will gain Knowledge in various material usage as per the principles of vasstu
5. Student will gain knowledge in Architectural design in accordance with vasstu
6. Student will learn about the landscape design as per Vaastu

UNIT -1 INTRODUCTION TO VASTU AND VAASTHU

Vastu and Vaastu -its definition and classification -Relationship to earth.

Features of good building site -good building shapes -macro, micro, enclosed and material spaces -relationship between built space, living organism and universe -impact of built space on human psyche.

UNIT - II MEASUREMENT AND RESONANCE TO VIBRATION

Units of measurement -Tala system and Hasta system of measures -Theory of vibration -vibration as time, equation of time and space -Time space relationship and measurement of the same.

UNIT - III SITE PLANNING AND COSMOGRAM

Orientation of building, site, layout and settlement -positive and negative energies -importance of cardinal and ordinal directions -The celestial grid or mandala and its types. The Vaastu Pursha Mandala and its significance in creation of patterns, and lay-outs, Types of lay-outs. Simple design of residential buildings.

UNIT- IV COMPONENTS AND DETAILING

Building heights -Base and basement -wall and roof specifications -column and beam designs -Pitched roof and domical roofs -significance of pyramid.

UNIT- V MATERIALS AND CONSTRUCTION

Use of wood, stone, metal, brick and time -marking technology, corbelling technology, jointing technology -foundations for heavy and light structures -Landscaping in and around buildings Aesthetics in Indian Architecture.

SUGGESTED READINGS :

1. Dr.V.GanapatiSthapati -:Sthapatya Veda" Dakshina Publishing House, Chennai-41, India, 2001.
2. Stella Kramrisch -The Hindu Temple Vol.IMotitalBanarsidass Publishers Pvt. Ltd., Delhi -1991.
3. K.S.SubramanyaSastri -Maya Matam -Thanjavur Maharaja Sarjoji Saraswathi Mahal Library -Thanjavur -1966.
4. Dr.V.GanapatiSthapati -:Sthapatya Veda" Dakshina Publishing House, Chennai-41, India, 2001 .
5. Bruno Dagens -Mayamatam, Vol.I& II IGNCA and Motilal Bamarsidars Publishers Pvt. Ltd., Delhi -1994.
6. Dr.V.GanapatiSthapati -Vastu Purusha Mandalam, Dakshina Publishing House, Chennai, 1998.
7. Ananda Kentish Coomaraswamy,Symbolism of Indian Architecture" – Historical Research Documentation Programme, Jaipur, 1983

19ARES633	PRODUCT DESIGN								SEMESTER-VI
Marks	Internal	60	External			90	Total	150	Exam Hours	6
Instruction Hours /week	L	1	T	0	P/S	3			Credits	3

COURSE OBJECTIVE:

- To gain Knowledge about the various styles of furniture
- To gain knowledge about the manufacturing of various materials/ product
- To learn about visual codes & Symbols
- To understand the importance of Artefacts, murals and Artwork
- To learn about various products for the Physically challenged
- Understanding the methods and techniques involved in furniture and product design.

COURSE OUTCOME:

1. Student will gain knowledge about the various furniture and products
2. Student will understand the needs of the industry demand and product value
3. Student will gain knowledge in Composite materials and Products
4. Student will gain knowledge about Packaging design
5. Student will gain knowledge about the House hold items / products
6. Student will be able to do a Product design for the client

UNIT- I INTRODUCTION TO PRODUCT DESIGN

An brief introduction to Product Designing – Various elements – History of Product Design – Definition of Product Design, understanding of Product Design - Purpose of Product Design – Role of Product Designers.

UNIT - II HUMAN FACTORS

Definition of human factors, Application of human factors data. Human activities, their nature and effects. Man-machine system and physical environment. Human performance and system reliability.Information input and processing. Human control systems. Applied anthropometry – Human response toclimate.

UNIT - III ASPECTS OF PRODUCT DESIGN

Visual, Auditory, Tactual, Olfactory human mechanisms, Physical space and arrangement. Visual display, process of seeing, visual discrimination, quantitative and qualitative visual display, Alphanumeric and related displays , Visual codes and symbols.

UNIT - IV PRODUCT DESIGN

Form, Colour, Symbols, User specific criteria, Material, Technology and recyclability, Packaging. Multiple Utility oriented approach to Product Design.

UNIT- V DESIGN EXERCISES

Design of Household elements, tools and devices – Spoon/Cutlery.Design of furniture – Chairs/Computer table, Kitchen racks, Cabinets etc.Design of Industrial Product – Watch Dial, Gear Wheels, Automobile Headlights etc. Element design for the physically and mentally different people.

SUGGESTED READINGS :

1. Time Saver Standards for Interior Design
2. Andrew Alpern, Handbook of Speciality Elements in Architecture, McGrawhill Co., USA, 1982.
3. Francis D.K.Ching, Interior Design Illustrated, VNR Publications, New York, 1987.
4. An invitation to Design, Helen Marie Evans.
4. Mark Garcia, 'The Diagrams of Architecture', Wiley 2010.
5. C. Thomas Mitchell, 'Redefining Designing: From Form to Experience', Van Nostrand Reinhold, 1992.
6. Jeremy Till et al, 'Spatial Agency: Other Ways of Doing Architecture', Routledge, 2011

19ARES634	ARCHITECTURAL JOURNALISM								SEMESTER-VI
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	3			**Credits**	**3**

COURSE OBJECTIVE:

- To introduce general skills necessary for the practice of professional journalism.
- To introduce the fundamentals of writing, explain different strategies and their criticism.
- To give good exposure to architectural journalism.
- To make them understand the importance of writing articles
- To introduce photojournalism, bring out importance/ contributions of photography
- To gain knowledge in modern photography techniques.

COURSE OUTCOME:

1. Student will gain the ability to critically think and analyse about the effects of architecture on society as well as the tools to enable recording of the same
2. Student will be able to express by means of effective communication, writing and video documentation
3. Student will learn about the composition of content in Architecture Journals
4. Student will learn about Photography and Photo Journalism
5. Student will be able to document, analyse and critic the work by means of interview and data collection
6. Student will develop the proficiency in Field program, interviews and Architectural Document witting

UNIT- I PHOTOGRAPHY & TECHNIQUES

Concept of color; concepts of lighting, distance, visual angle, frames; media; Types of camera, properties and priorities; Exposure, Aperture, Speed; Photographic films. Techniques of photography relevant to architecture.

UNIT – II JOURNALISM

Analysis of recent historical and contemporary examples of written and journalistic criticism of architecture, including selected writings by Indian and overseas critics; discursive techniques, analysis of major critical themes, thematic categories in architectural writing over the past three centuries.

UNIT – III ANALYSIS OF WORKS

Works of Indian and international writers and critics will be presented and discussed. Seminars on Indian architectural writers, journalists and critics

UNIT – IV FIELD PROGRAM

Exercise on integrating photography in architectural journalism.

UNIT- V DOCUMENTING AND REPORTING

Preparation of documentaries and reports in any media such as Video, Still images, Reports, presentations etc., and present as a Seminar.

SUGGESTED READINGS :

1. Edward Jay Friedlander and John Lee, 'Feature Writing for Newspapers and Magazines', 4th edition, Longman, 2000.
2. David Fuller & Patricia Waugh, eds., 'The Arts and Sciences of Criticism', Oxford: Oxford University Press, 1999.
3. James Foust, 'Online Journalism Principles and Practices of News for the Web', Holcomb Hathaway Publishers, Scottsdale, AZ, 2005.
4. M. Harris, 'Professional Architectural Photography', Focal Press, 2001.
5. M. Harris, 'Professional Interior Photography', Focal Press, 2002
6. Martin Huckerby, 'The Net for Journalists: A Practical Guide to the Internet for Journalists in Developing Countries'. UNESCO/Thomson Foundation/ Common wealth Broadcasting Association, 2005.
7. S. J. A.Ward, 'Philosophical Foundations of Global Journalism Ethics', Journal of Mass Media Ethics, Vol. 20, No. 1, 3-21, 2005.
8. M. Heinrich, 'Basics Architectural Photography', Bikhauser Verlag AG, 2008.
9. Gerry Kopelow, 'Architectural Photography: The Professional Way', Princeton Architectural Press, 2007

SEMESTER-VII

19ARP711	PRACTICAL TRAINING								SEMESTER-VII
Marks	**Internal**	**400**	**External**			**600**	**Total**	**1000**	**Exam Hours**	**6**
Instruction Hours /week	**L**	0	**T**	0	**P/S**	0			**Credits**	**18**

COURSE OBJECTIVE:

- To introduce the challenges of architectural practice.
- To enable overall understanding of different stages in real life architectural projects in practice.
- To create involvement in these stages as much as possible within the scope of a specific architectural practice
- To work from initiation of project, development of concepts into schematic drawings, approval process, presentations and release of working drawings
- To get involvement in office discussions and client meetings, integrating structural and service concerns, estimation and tendering processes, site supervision and coordination in the construction process
- To coordinate with the various levels of workman/contractors etc for execution of the Project

COURSE OUTCOME:

1. Student will get and overall idea of the nuances of architectural practice.
2. Student will understand about the total process that takes place in an Architectural firm
3. Student will understand the Specifications of a project, time involved and the execution process
4. Student will gain knowledge in architectural working drawings
5. Student will gain experience of client meetings & site Execution
6. Student will gain the maturity of Architectural design, and the experience gained from internship will be helpful in the thesis project

CONTENT

The choice of the place of training shall be Architectural Firms, Organizations, Development Authorities, etc. which are headed by eminent architects. The choice of the office shall be approved by the Training Committee of the Faculty of Architecture. The practical training, primarily involves learning in the office and on the site. The progress of training shall be assessed periodically by reports from the employers of trainees and by the Training Committee of the Faculty of Architecture.

The evaluation of the practical training will be based on the following features.

- Client meeting and interaction
- Site visits, verification and measurements
- Concept and scheme development
- Construction documents / drawings
- Training portfolio

SEMESTER-VIII

19ART801	PHYSICAL PLANNING								SEMESTER-VIII
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**3**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	0			**Credits**	**2**

COURSE OBJECTIVE:

- To introduce the vocabulary, elements and classification of human settlements.
- To learn about the planning theories
- To give exposure to planning concepts at different scales of settlements.
- To understand about the planning aspects by means of Survey
- To gain understanding about the land use planning
- To give an understanding of planning addressing current issues.

COURSE OUTCOME:

1. Student will understand morphology of settlements and their generating forces and characteristics.
2. Student will understand the role of planning processes in making positive changes to settlements.
3. Student will gain knowledge and awareness of planning interventions with respect to the current world.
4. Student will gain understanding about the city evolution process due to planning
5. Student will gain Knowledge about existing settlements by Survey studies
6. Student will gain vast knowledge about Landsue patterns and planning theories

UNIT- I HUMAN SETTLEMENTS AND PLANNING THEORIES

Origins, evolution and growth of settlements. Relation between urban and rural settlements
Urbanisation, Industrialisation and urban growth, definitions and inter relationship. Trends in urbanization in India since Independence. Growth of metropolitan cities and their management.

UNIT - II PLANNING THEORIES

Enunciated by Ebenezer Howard, Patrick Geddes, Soria Y Mata, Doxiadis, Le-Corbusier, Clarence Stein, Clarence Arthur perry, Hilberseimer.

UNIT - III EVOLUTION OF CITY

Evolution of city and Components of a city - Central business district of a city, Special economic zone, coastal regulatory zone, fringe area.

UNIT - IV LANDUSE PLANNING

Land use classification for cities, analysis of land uses in Indian cities. Demography pattern, social & physical infrastructure, environmental and pollution, traffic and road network.

UNIT- V PLANNING TECHNIQUES

Study and analysis of existing settlements, methodology of conducting diagnostic surveys and studies, land use survey, socio economic survey, traffic surveys and presentation of data

SUGGESTED READINGS :

1. C.L.Doxiadis, Ekistics, 'An Introduction to the Science of Human Settlements', Hutchinson, London, 1968.
2. Thooyavan K R, 'Human Settlements- A Planning guide to Beginners', M.A.Publications, 2005.
3. Ministry of Urban affairs and Employment, Government of India, New Delhi, 'Urban Development Plans: Formulation and Implementation-Guidelines', 1996.
4. Andrew D Thomas, 'Housing and Urban Renewal', Harper Collins, 1986.
5. S. B. Golahit, 'Rural Development Programmes In India', Neha Publishers & Distributors, 2010.
6. 'CMDA Second Master Plan for Chennai Metropolitan Area 2026: Vision, Strategies and Action Plans (Vol.I, II &III)', Chennai, India, 2008.
7. V. Nath, 'Regional Development And Planning In India', Neha Publishers & Distributors, 2009.
8. Government of India, 'Report of the National Commission on Urbanisation', 1988.
9. Hansen N., 'Regional Policy and Regional Integration', Edward Elgar, UK, 1996.

19ART802	URBAN DESIGN								SEMESTER-VIII
Marks	Internal	40	External			60	Total	100	Exam Hours	3
Instruction Hours /week	L	2	T	0	P/S	0			Credits	2

COURSE OBJECTIVE:

- To provide knowledge of design of urban spaces including renewal and development.
- To understand the Evolution and transformation of urban areas
- To understand the urban design & town Planning principles
- To understand the role of Urban Settlements
- To understand the transformation of urban Settlement pattern
- To understand the methods & Proposals of Urban Redevelopment

COURSE OUTCOME:

1. Student will gain knowledge in urban spaces, formation and transformation
2. Student will understand the organization of urban spaces and
3. Student will understand about the morphological development of the space in time
4. Student will understand the importance of urban renewal
5. Student will understand the urban Regeneration
6. Student will be able to design large scale urban renewal projects

UNIT- IINTRODUCTION TO URBAN DESIGN

Relationship between Architecture, Urban Design and Town Planning - Perception of city form and pattern – Townscape elements

UNIT- IIROLE OF PUBLIC SPACE IN URBAN AREAS

Introduction to public spaces. Evolution of public spaces. Comparative analysis of public spaces, their organization and articulation.

UNIT – III ORGANIZATION OF SPACE

Understanding, organizing and articulation of spaces for residential, commercial, industrial and recreational areas.

UNIT - IVURBAN RENEWAL

Causes and consequences of urban blight and obsolescence – slums and shanties – methods of conducting surveys, analysis and presentation of data, prevention of formation of slums and squatter settlements. Environmental and management issues.

UNIT- V URBAN REDEVELOPMENT

Objectives, surveys programs of urban redevelopment and public involvement and participation.

SUGGESTED READINGS :

1. A.E.J. Morris, 'History of Urban Form before the Industrial Revolution', Prentice Hall, 1996.
2. Edmund Bacon, 'Design of Cities', Penguin, 1976.
3. Gordon Cullen, 'The Concise Townscape', The Architectural Press, 1978.
4. Michelle Provoost et al., 'Dutchtown', NAI Publishers, Rotterdam, 1999.
5. 'Time Saver Standards for Urban Design', Donald Natson, McGraw Hill, 2003.
6. Kevin Lynch, 'The Image of the City' MIT Press, 1960.
7. Rithchie. A, 'Sustainable Urban Design: An Environmental Approach', Taylor & Francis, 2000.
8. Tridib Banerjee, Anastasia Loukaitou-Sideris, Editors, 'Companion to Urban Design', Routledge, 2014.
9. Malcolm Moor, 'Urban Design Futures', Routledge, 2006.
10. Geoffrey Broadbent, 'Emerging Concepts in Urban Space Design', Taylor & Francis, 2003.
11. Anuradha Mathu, 'Deccan Traverses', Rupa, 2006.

19ARS821	ARCHITECTURAL DESIGN - VII								SEMESTER-VIII
Marks	**Internal**	**200**	**External**			**300**	**Total**	**500**	**Exam Hours**	**6**
Instruction Hours /week	**L**	0	**T**	0	**P/S**	10			**Credits**	**10**

COURSE OBJECTIVE:

- Understanding Complex Design Programme and the Components of the Design Problem.
- Investigate and Acquire the Knowledge to address the various aspects of the Design Problem and Process
- Develop Ability to Communicate Design Ideas throughout the Design Stages with multiple media.
- Ability to conceptualize a design idea by Sketching and other techniques
- Ability to do a frame work of Design methodology
- Ability to understand the process of Design and deliver the Architectural Design with Technical Drawings

COURSE OUTCOME:

1. Student shall understand the basic functional aspect of designing complex building type and its relevant spatial organization.
2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project
3. Student will be able to transform the theoretical ideas to the tangible output of design.
4. Student will be able to understand the space organization, space- volume design approach in large scale projects
5. Student will be able to research, Analyse and Deliver a Urban Design proposal
6. Student will be able to Communicate effectively through the design ideas

CONTENT

Design of advanced and complex problems – URBAN LEVEL - comprising group multi storeyed structures and infrastructure - with regard to climatic conditions, orientation, services, circulation problems relating to large developments Design and detailing for movement and use by handicapped persons within and around building and campuses to be addressed – examples: campus design, urban centers, Housing for Senior citizens- Urban and regional planning etc

SUGGESTED READINGS :

1. Kate Nesbitt, 'Theorizing a New Agenda for Architecture', Princeton Architectural Press, 1996.
2. Neil Leach, 'Rethinking Architecture', Routledge, 2000.
3. Harry Francis Mallgrave and David Goodman, 'An Introduction to Architectural Theory- 1968 to the Present', Wiley Blackwell, 2011.
4. Stephen A. Kliment, Editor 'Building Type Basics' Series, Wiley.
5. Mitchell WJ, 'Imagining MIT: Designing a campus for the 21st century', MIT Press, 2007.
6. Himanshu Burte, 'Space For Engagement', Seagull Books, 2008.
7. Mark Garcia, 'The Diagrams of Architecture', Wiley 2010.
8. Bjarke Ingels, 'Yes is More', Taschen, 2009.
9. Steven Holl, Juhani Pallasmaa, Alberto Pérez Gómez, 'Questions of perception: Phenomenology of Architecture', William Stout, 2

19ARS822	INTERIOR DESIGN								SEMESTER-VIII
Marks	Internal	80	External			120	Total	200	Exam Hours	6
Instruction Hours /week	L	2	T	0	P/S	3			Credits	4

COURSE OBJECTIVE:

- To provide familiarity with the characteristics of interior spaces
- To gain knowledge in all types furniture across history.
- To introduce the profession of interior design and bring out its role.
- To inform about the various components of interior space and give an understanding of the design aspects involved in each
- To provide knowledge in Interior services
- To provide knowledge in interior specification & costing

COURSE OUTCOME:

1. Student will gain knowledge and understanding in Interior design
2. Student will understand the various elements in Interior Design
3. Student will gain knowledge in terms of Interior design lighting and accessories
4. Student will gain an overall exposure to the ways in which interior spaces can be enriched through the design of specific interior components.
5. Student will be able to do specification for an Interior Design layout
6. Student will be able to design a Interior project with all working drawings

UNIT- IINTRODUCTION TO INTERIOR DESIGN

Definition of interior design -design of interior spaces as related to typologies and functions, themes and concepts - Study of the history of interior design through the ages relating to historical context, design movements and ideas etc.

UNIT – II ELEMENTS OF INTERIOR DESIGN

Introduction to various elements in interiors like floors, ceilings, walls, staircases, openings, interior service elements, incidental elements etc. and various methods of their treatment involving use of materials and methods of construction in order to obtain certain specific functional, aesthetic and psychological effects - design projects.

UNIT- IIIINTERIOR DESIGN SERVICES - LIGHTING, ACCESSORIES, LANDSCAPE

Study of interior lighting - different types of lighting, their effects, types of lighting fixtures. Other elements of interiors like accessories used for enhancement of interiors - paintings, objects de art,Interior landscaping - elements like rocks, plants, water, flowers, fountains, paving, artefacts, etc. their physical properties, effects on spaces and design values.

UNIT – IV FURNITURE DESIGN

Study of relationship of furniture to spaces and human movements furniture design as related to human comfort, function, materials and methods of construction, changing trends and lifestyles, innovations and design ideas - study on furniture for specific types of interiors like office furniture, children's furniture, residential furnitures, display systems, etc. - projects on furniture design.

UNIT- VCASE STUDIES AND PROJECT

Study of Contemporary design in India and abroad with reference to interior design and decoration.Study of projects related to Residential Interiors, Commercial Interiors, Hospital Interiors etc. as regards to design scheme, functionalism, aesthetics, services integration, interior materials and details. Small scale interior projects such as Interior of an Office, Restaurant, Kids bedroom etc.

SUGGESTED READINGS ::

1. Francis D.K.Ching, 'Interior Design Illustrated', John Wiley & Sons, 2012.
2. Joseph DeChiara, Julius Panero, Martin Zelnik, 'Time Saver's Standards for Interior Design', McGraw-Hill Professional, 2001.
3. John F. Pile, 'Interior Design', Pearson Prentice Hall, 2007.
4 Aronson J, 'The Encyclopaedia of Furniture', Potter Style, 1965.
5. Pat Kirkham, Susan Weber, Editors, 'History of Design: Decorative Arts and Material Culture, 1400-2000', Yale University Press, 2013.
6. John F.Pile, Judith Gura, 'A History of Interior Design', Wiley, 2013.

19ARS823	SUSTAINABLE ARCHITECTURE							SEMESTER-VIII	
Marks	Internal	80	External			120	Total	200	Exam Hours	6
Instruction Hours /week	L	2	T	0	P/S	3			Credits	4

COURSE OBJECTIVE:

- To understand the concept of sustainability
- To understand the impacts of environment today and to follow the steps to sustainability
- To work towards sustainable development and to understand low impact construction practices,
- To understand the life cycle costs and alternative energy resources.
- To familiarize the students with the various rating systems for building practices with case studies.
- Through case studies to understand the concept of sustainable communities and the economic and social dimensions.

COURSE OUTCOME:

1. Student will understand about climate change and the need for the sustainable buildings
2. Student will understand the energy-based concepts and resource optimisation
3. Student will understand about the environmental impacts of today and Follow the Sustainable approach
4. Student will gain ability to design energy efficient buildings
5. Student will understand the green concepts and apply them in every aspect and approach towards sustainable architecture
6. Student will understand about the building simulation for energy analysis and for various design solutions

UNIT-I INTRODCUTION TO SUSTAINBALITY

Concept of Sustainability – Carrying capacity, sustainable development– Ethics and Visions of sustainability. Eco system and food chain, natural cycles – Ecological foot print – Climate change and Sustainability-World population – Gdp – Carbon emmissions–steps by the organisations etc

UNIT- II ENERGY ANALYSIS ,ASSESMENT AND AUDIT

Energy – resources availability – Renewable and non – renewable energy resources – Embodied energy – energy efficiency – cost savings – technologies – net zero energy – Zero waste – Integrated energy design –Low energy building design- Life cycle assesments and Energy Audits -related Case studies

UNIT- III GREEN MATERIALS AND SUSTAINABLE PRACTICES

Materials -Selection of materials Eco building materials and construction- Green materials – Biomimicry, Low impact construction, and recyclable products-Adaptive reuse and regeneration -related case studies

UNIT- IV GREEN BUILDING RATING SYSTEMS

Green building systems – Rating system –LEED-INDIA,GRIHA,etc., with related case studies

UNIT- V BUILDING PERFORMANCE ANALYSIS AND SIMULATION

Design Analysis and Simulation studies –Building performance anlaysis–Modelling tools and techniques – daylighting,shading , ventilation , insolation effects – Design Strategies – Passive ,Active ,Hybrid systems –Thermal comfort analysis – Percentage People dissatisfied(PPD)- PMV etc-Usage of simulation softwares are recommended

SUGGESTED READINGS :

1. Sustainable Architecture and Urbanism: Concepts, Technologies and examples by Gauzin- Muller(D) – Birkhauser 2002.
2. Sustainable Architecture : Low tech houses by Mostaedi (A) – CarlesBroto 2002.
3. HOK guide book to sustainable design by Mendler (S) & Odell (W) – John willey and sons 2000.
4. Environmental brief : Path ways for green design by Hyder(R) – Taylor and Francis 2007.
5. Green Architecture: Design for a sustainable future by Brenda and Vale (R) – Thames and Hudson 1996. .
6. Arvind Krishnan & Others – Climate Responsive Architecture, Tata Mcgraw –Hill New Delhi 2001.
7. N.D. Kaushika, Energy, Ecology and Environment, Capital Publishing Company, New Delhi.
8. O.H. Koenigsberger and others (1993), Manual of Tropical Housing and Building –Part I - Climate design, Orient Longman, Madras, India.
9. Heating,Cooling and Lighting – Norbert Lechner, October 2014

19ARET831	EARTH QUAKE RESISTANCE ARCHITECTURE								SEMESTER-VIII	
Marks	Internal	40	External			60	Total	100	Exam Hours	3
Instruction Hours /week	L	2	T	0	P/S	0			Credits	2

COURSE OBJECTIVE:

- To understand the fundamentals of Earthquake and the basic terminology
- To familiarize the students with design codes and building configuration
- To understand the site planning and performance of ground & Buildings
- To understand the seismic design codes & configurations
- To understand the impacts in urban level due to earth quake and solution for mitigation
- To understand the various types of construction details to be adopted in a seismic prone area.

COURSE OUTCOME:

1. Student will be able to understand the formation and causes of earthquakes
2. Student will gain understanding of the factors to be considered in the design of buildings
3. Student will understand the services to resist earthquakes.
4. Student will become familiar with the Seismic Design Codes & configurations
5. Student will understand about designing earth quake resistant structures
6. Student will learn about urban level planning strategies for earth quake resistance

UNIT -I FUNDAMENTALS OF EARTHQUAKES

a) Earths structure, seismic waves, plate tectonics theory, origin of continents, seismic zones in India.
b) Predictability, intensity and measurement of earthquake
c) Basic terms- fault line, focus, epicentre, focal depth etc.

UNIT- II SITE PLANNING, PERFORMANCE OF GROUND AND BUILDINGS

a) Historical experience, site selection and development b) Earthquake effects on ground, soil rupture, liquefaction, landslides. c) Behaviour of various types of building structures, equipments, lifelines, collapse patterns d) Behaviour of non-structural elements like services, fixtures in earthquake-prone zones

UNIT- III SEISMIC DESIGN CODES AND BUILDING CONFIGURATION

a) Seismic design code provisions – Introduction to Indian codes b) Building configuration- scale of building, size and horizontal and vertical plane, building proportions, symmetry of building- torsion, re-entrant corners, irregularities in buildingslikeshort stories, short columns etc.

UNIT- IV VARIOUS TYPES OF CONSTRUCTION DETAILS

a) Seismic design and detailing of non-engineered construction- masonry structures, wood structures, earthen structures.
b) Seismic design and detailing of RC and steel buildings c) Design of non-structural elements- Architectural elements, water supply, drainage, electrical and mechanical components

UNIT- V URBAN PLANNING AND DESIGN

a) Vulnerability of existing buildings, facilities planning, fires after earthquake, socioeconomic impact after earthquakes.
b) Architectural design assignment- Institutional masonry building with horizontal spread and height restriction, multi-storeyed RC framed apartment or commercial building .

SUGGESTED READINGS :

1. Guidelines for earthquake resistant non-engineered construction, National Information centre of earthquake engineering (NICEE, IIT Kanpur, India)
2. C.V.R Murthy, Andrew Charlson. "Earthquake design concepts", NICEE, IIT Kanpur India.
3. Ian Davis (1987) Safe shelter within unsafe cities" Disaster vulnerability and rapid urbanisation, Open House International, UK
4. Socio-economic developmental record- Vol.12, No.1, Jan-Feb 2005
5. Learning from Practice- A review of Architectural design and construction experience after recent earthquakes- Joint USA-Italy workshop, Oct.18-23, 1992, Orvieto, Italy.

19ARET832	INTEGRATED BUILDING MANAGEMENT SYSTEM								SEMESTER-VIII	
Marks	Internal	40	External			60	Total	100	Exam Hours	3
Instruction Hours /week	L	2	T	0	P/S	0			Credits	2

COURSE OBJECTIVE:

- To familiarize the student with minimum safety requirements for a high-rise building
- To understand the codes of NBC.
- To gain knowledge about the safety codes & practice
- To Gain Knowledge about the security systems
- T deeply understand the Building Address System & Automation Systems
- To study fire alarm systems and fire suppression systems and their installation.

COURSE OUTCOME:

1. Student will be able to understand the practice of safety standards
2. Student will gain knowledge in Fire safety standards & practice considerations
3. Student will understand about the integrated building management systems
4. Student will gain understanding in building automation systems
5. Student will become familiar with integrated services for multistoried buildings
6. Student will learn about the new concepts of Security and building Management systems

UNIT -I SAFETY REQUIREMENTS

Minimum safety requirements for a building, particularly for a high rise building as per the National Building Code.

UNIT -II FIRE ALARM SYSTEMS

Objectives of a Fire Alarm System, Essential components of a Fire Alarm System, Technology of detection, Type of Statutory Standards followed in direction, Explaination on the essential clauses, various types of technologies employed in the Fire Alarm System, basic knowledge on how a Fire Alarm System is designed and installed

UNIT -III FIRE SUPPRESSION SYSTEMS

Objectives of a Fire Suppression System, Explanation on fire triangle,Essential components of a Fire Suppression System, different types of Fire Suppression Systems, Type of Statutory Standards followed in Suppression, Explanation on the essential clauses and basic knowledge on how a Fire Suppression System is designed and installed.

UNIT-IV SECURITY SYSTEMS

Introduction to different types of Security Systems and why they are required. Introduction to Access Control, CCTV, Intruder Alarm and Perimeter protection Systems, Essential components of each system, various types of technologies employed in these Systems, basic knowledge on how they are designed and installed.

UNIT- V AUTOMATION SYSTEMS

The objectives of the Building Automation system (BAS), the list of utility, safety and security systems that are generally monitored and controlled through IBMS, the various components of IBMS, types of integration with the utility, safety and security systems and the basic knowledge on how they are designed and installed.

SUGGESTED READINGS :

1. Building Automation Systems – A Practical Guide to selection and implementation – Author : Maurice Eyke
2. National Building Code of India 1983 (SP 7:1983 Part IV) – Published by Bureau of Indian Standards
3. IS 2189 – Selection, Installation and Maintenance of Automatic fire Detection and Alarm System – Code of Practice (3rd Revision) – Published by Bureau of Indian Standards.
4. The Principles and Practice of Closed Circuit Television – Author: Mike Constant and Peter Turnbull
5. Rules of Automatic Sprinkler Installation – 2nd Edition – Published by Tariff Advisory Committee.
6. Fire Suppression Detection System – Author : John L. Bryan
7. Design and Application of Security/Fire Alarm system – Author: John E. Traister.
8. CCTV Surveillance – Author: Herman Kruegle
9. Security Systems and Intruder Alarm Systems – Author: Vivian Capel

19ARES833	INDUSTRIAL ARCHITECTURE								SEMESTER-VIII
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	3			**Credits**	**3**

COURSE OBJECTIVE:

- To introduce about Industrial design building and architecture
- To understand about the types of industrial space
- To understand about precast building types & practice
- To gain knowledge in on site & off-site prefabrication systems
- To gain deep understanding about the Modular - technologies
- To understand about the overall structural system of Industrial buildings

COURSE OUTCOME:

1. Student will understand the application of Industrial buildings
2. Student will gain understanding about the pre fabrication systems
3. Student will gain Knowledge in Industrial construction
4. Student will understand about the modular components & coordination of Industrial Buildings
5. Student will understand about the overall structural system of Industrial buildings
6. Student will be able to design large scale Industrial buildings

UNIT -I INTRODUCTION

Five year plans and thrust in housing – Issues in Urban Housing – use of modern building materials – application of modern technology – meaning of industrial building system.

UNIT -II APPLICATION OF INDUSTRIAL BUILDING SYSTEM

Feasibility of using industrial building system in Residential and Non-Residential buildings – manufacturing of building components – Technology requirements for industrial building system – use of Industrial building system as an option for disaster mitigation.

UNIT- III MODULAR CO-ORDINATION AND INDUSTRIALISED SYSTEM

Concept and definition of Modular dimensional discipline – Advantages and Limitations of modular principle – Components of residential buildings – precast elements.

UNIT- IV PRE-FABRICATION SYSTEM

Objective and necessity – Off site on site prefabrication elements and construction joints – architectural and technical limitations.

UNIT- V PROCEDURES AND ORGANISATION

Equipments used – manufacturing processes – transportation of components – assembly and finishing – Structural, social and economic issues related to industrial building system.

SUGGESTED READINGS :

1. Industrial Building and Modular Design Henrik Missen – C & CK, UK 1972.
2. Albert G.H.Dietz, Laurence Secotter – "Industrialized Building Systems for Housing" – MIT, special summer session, 1970 USA.
3. "Industrialized Building Construction" – Proceedings of National Seminar, Nov-17-18, 2000, Indian Concrete Institute, Mumbai.
4. "Innovative Construction Materials" – Proceedings of Seminar, Jan 20-21,2001, Veermata Jeejabai Technical Institute, Mumbai.

19ARES834	DIGITAL ARCHITECTURE								SEMESTER-VIII
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	3			**Credits**	**3**

COURSE OBJECTIVE:

- To develop the advanced knowledge and skills in Digital application
- To develop knowledge in building visualization
- To develop knowledge in digital rendering
- To develop knowledge in walk through Animations
- To get familiarized & create simple multimedia presentations & brochures
- To learn about the videos & Presentations as required in architectural practice.

COURSE OUTCOME:

1. Student will learn about the Latest digital applications used in the architectural practice
2. Student will gain knowledge about parametric applications in design
3. Student will learn about the building visualization & Simulation
4. Student will learn about Advanced rendering techniques
5. Student will learn about animation and visualization techniques used in the architecture industry
6. Student will learn about the video presentations and realistic animations of buildings

CONTENT

1. Advanced techniques in rendering with differential lighting for realistic rendering

2. Advanced techniques in building information modeling

3. Advanced Animations and Walkthroughs

4. Advanced Simulating gravity, wind and other effects in the scene, distributed rendering

5. Advanced Building Performance Analysis on Building Model using softwares.

Example :Advanced level of animations -Auto desk Revit, 3ds Max, rhino, lumion, vector works, BIM, Ecotect, v-ray rendering techniques ,Grasshopper, Sketch up – Sefaira, Open studio and recent softwares

SUGGESTED READINGS :

1. Rendering Techniques for mixed reality, Thomas Girlinger, Daniel Dauch, Andre Stork, Springer, Berlin, October 2009
2. 3D Computer Animated Walk Throughs, Clark Cory, Scott Meador, William Rosi, McGraw Hill 2009.
3. The Animation Book: A complete guide to animation and film making, Kit Laybourne, Three Rivers Press, December 1998
4. Creating a website, Matthew McDonald, Pogue Press, January 2009s

19ARES835	VISUAL COMMUNICATION DESIGN								SEMESTER-VIII	
Marks	Internal	60	External			90	Total	150	Exam Hours	6
Instruction Hours /week	L	1	T	0	P/S	3	Credits			3

COURSE OBJECTIVE:

- To outline the visual communication design
- To introduce concepts of various visual designs
- To learn about signage design
- To get familiarized with the user experience design
- To create understanding about the differences and relationship between all the user and design
- To learn about logo design and branding

COURSE OUTCOME:

1. Student will become familiar with concepts of visual communication design
2. Student will learn about the psychological aspects of the visual communication design
3. Student will learn about the graphic methodology and the interface of design
4. Student will learn about the User experience design
5. Student will upgrade the knowledge in current trends of emerging visual communication design
6. Student will create interest to pursue higher studies in Visual communication in master level

UNIT- I FUNDAMENTALS OF DESIGN

Design- introduction – theoretical understanding- concepts- color theory- geometry- material knowledge- sturcture – form – space and structure- elementa of design, priciples of design- gestalt theory- representation techniques- Manual and digital

UNIT- II HISTORY OF DESIGN

Chronological summary of major movements, styles, periods and artists that have contributed to the evolution and development of visual art.- from stone age to contemporary art- evolution of design and art medium

UNIT- III USER EXPERIENCE DESIGN

TypographyBasics (crop type- type design)-lettering- calligraphy-logo type-Layout -Applications of typography in branding-signs and symbols
Information Architecture- infographics- data visualization
User Persona -Task Design -Card sort excercise - Experience Maps -User Journey -Wireframe-Interactive Prototyping Usability Testing – digital application – design with appropriate software

UNIT- IV DESIGN THINKING, METHODOLOGY AND ANALYSIS

Design thinking-Methodology- anlaysis- design ergonomics-Tangible user interface (TUI)- Graphic user Interface (GUI)-story telling – affinity mapping
rapid prototyping-

UNIT- V DESIGN PROJECT

Website design- logo design- product branding-story board- prototyping – drawing , design and model making excercises

SUGGESTED READINGS :

1. Don Norman " Design of everyday Things "
2. Steve Krug "Don't Make Me Think"
3. Tim brown "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation"
4. William Lidwell "Universal Principles of Design"
5. Robert Bringurst "The Elements of Typographic Style"

SEMESTER-IX

19ART901	HOUSING							SEMESTER-IX	
Marks	**Internal**	**40**	**External**		**60**	**Total**	**100**	**Exam Hours**	**3**
Instruction Hours /week	**L**	2	**T**	0	**P**	0		**Credits**	**2**

COURSE OBJECTIVE:

- Understanding of the various issues involved in urban housing
- Understand the various issues of Rural housing
- Understand about the planning and design solutions for low income groups.
- Understanding about the housing Policies & Agencies involved
- Understanding about the housing design aspects in a Larger scale
- Understanding about the Socio-economic Aspects

COURSE OUTCOME:

1. Student will learn the various schemes and policies in Housing in India
2. Student will understand the importance of socio-economic aspects of the People and need for Housing
3. Student will learn about housing standards
4. Student will learn about the Housing design Process
5. Student will learn about government housing, private& cooperative housing
6. Student will be able to arrive at design ideas for large scale Housing Projects

UNIT- I INTRODUCTION TO HOUSING

Review of housing typology, Housing demand and supply – Calculation of future need.
Housing resources and options available in housing

UNIT - II HOUSING AGENCIES AND POLICIES

Housing Agencies and their contributions to housing development – HUDCO, State Housing Boards, Housing Co-operatives and Banks. Housing Policies in India and other countries.

UNIT - III SOCIO ECONOMIC ASPECTS

Social factors influencing Housing Design, affordability, economic factors and housing concepts – Slum – rehabilitation and resettlement schemes

UNIT - IV HOUSING STANDARDS

Different types of Housing standards – Methodology of formulating standards – Relevance of standards in Housing Development.

UNIT- V HOUSING DESIGN PROCESS

Different stages in project development – Layout design including utilities and common facilities – Housing design as a result of environmental aspects, development of technology and community interests.Case studies of Public Sector housing, Government housing, Private and Co-operative housing – their Advantages and disadvantages.

SUGGESTED READINGS :

1. Babur Mumtaz and Patweikly, Urban Housing Strategies, Pitman Publishing, London, 1976.
2. GeofreyK.Payne, Low Income Housing in the Development World, John Wiley and Sons, Chichester, 1984.
3. John F.C.Turner, Housing by people, Marison Boyars, London, 1976.
4. Martin Evans, Housing, Climate and Ocmfort, Architectural Press, London, 1980.
5. Forbes Davidson and Geoff Payne, Urban Projects Manual, Liverpool University Press, Liverpool, 1983.
6. Christopher Alexander, 'A Pattern Language', Oxford University press, New York 1977.
7. Leuris S, 'Front to back: A Design Agenda for Urban Housing', Architectural Press, 2006.
8. S.K.Sharma, 'Mane A New Initiative in Public Housing', Housing & Urban Development Corporation, 1991.
9. 'Sustainable Building Design Manual: Vol 1 and 2',The Energy Research Institute, 2004.

19ART902	RESEARCH METHODS AND FIELD STUDIES								SEMESTER-IX
Marks	**Internal**	**40**	**External**			**60**	**Total**	**100**	**Exam Hours**	**3**
Instruction Hours /week	**L**	2	**T**	0	**P/S**	0			**Credits**	**2**

COURSE OBJECTIVE:

- To learn the importance of and undertake research and field studies
- To understand the research applications in architectural design.
- To understand the different methods and the techniques as relevant to the design profession
- To understand the experimental research methods
- To apply research in evaluation and appraisal of architectural design projects.
- To understand about different survey methods

COURSE OUTCOME:

1. Student will understand the research methodology and research methods
2. Student will understand the various analytical methods
3. Student will understand the experimental methods of Research
4. Student will learn about the survey methods and documentation
5. Student will know to collect relevant data, compile and document
6. Student will be able to critically analyse the data and present it as a document

UNIT- I INTRODUCTION TO RESEARCH METHODOLOGY

Importance. Purpose and scope of research and field studies. Application in architecture in terms of design , technology, environment, economic and behavioral areas.

UNIT- II RESEARCH METHODS

Sequence and methods of research, Identification of problem, Hypothesis formulation objectives and methodology.

UNIT- III ANALYTICAL METHODS

Understanding and applying qualitative analytical interpretative correlation, quasi experimental, experimental, simulation and modeling techniques in Architectural design.

UNIT- IV SURVEY ANS STUDY METHODS

Pilot studies field surveys and collection of samples – physical, Architectural, Environmental organizational, preparation and Analysis of Data sheets and Questionnaires.

UNIT- V DOCUMENTATION AND PRESENTATION

Preparation and analysis of data sheets and questionnaires. Arriving at conclusions from the research at fiels studies. Report writing and publications.

SUGGESTED READINGS ::

1.Knight. A and Ruddock L., “Advanced Research Methods in build Environment”, John Wiley & Sons 2008.

2.Groat L, and Wang D, “Architectural Research Methods”. John Wiley & Sons, 2002.

3.Gibbs J P “ Urban Research Methods”, (rev.ed) Von Nostrand 1988.

4.Kothari C R, Research Methodology – Methods and Techniques”, New Age Interntional 2004.

5.Khanzode V V, “ Research Methodology – Techniques and Trends”, APH Publishing, 1995.

19ARS921	ARCHITECTURAL DESIGN – VIII-(Urban Design)								SEMESTER-IX
Marks	**Internal**	**280**	**External**			**420**	**Total**	**700**	**Exam Hours**	**6**
Instruction Hours /week	**L**	0	**T**	0	**P/S**	14			**Credits**	**14**

COURSE OBJECTIVE:

- Understanding Complex Design Programme and the Components of the Design Problem.
- Investigate and Acquire the Knowledge to address the various aspects of the Design Problem and Process
- Develop Ability to Communicate Design Ideas throughout the Design Stages with multiple media.
- Ability to conceptualize a design idea by Sketching and other techniques
- Ability to do a frame work of Design methodology
- Ability to understand the process of Design and deliver the Architectural Design with Technical Drawings

COURSE OUTCOME:

1. Student shall understand the basic functional aspect of designing complex building type and its relevant spatial organization.
2. Student will be learning to reciprocate and sensitize the design/concept to the environment and the design skill of the project
3. Student will be able to transform the theoretical ideas to the tangible output of design.
4. Student will be able to understand the space organization, space- volume design approach in large scale projects
5. Student will be able to research, Analyse and Deliver a Urban Design proposal
6. Student will be able to Communicate effectively through the design ideas.

CONTENT

Study of Urban Elements and Analysis – Urban Design excercises - large scale township -Neighbourhood Planning - large structures - Multiuse multi span- Pavilions –transport hub– Design and detailing for movement and use by physically handicapped people within and around building technology and services. Examples: Large scale projects – neighbourhood, Integrated Township , IT park, Satellite town ,Sports complex,Apparelpark,SEZetc

Design Process to be approached stage wise through Architectural Programming. Advanced concepts of Site Planning as relevant to small and medium sized campuses to be introduced in the design.

SUGGESTED READINGS :

1. Jonathan Barnett, 'An Introduction to Urban Design', Harper and Row; 1982
2. Cavallo, R. et al, 'New Urban Configurations', IOS Press, 2014.
3. Henriette Steiner & Maximilian Sternberg, 'Phenomenologies of the City: Studies in the History and Philosophy of Architecture', Routledge 2015.
4. Jan Gehl, 'Life between Buildings- Using Public Space', ArkitektensForleg 1987.
5. Time Savers Standard for Urban Design', Donald Watson, McGraw Hill, 2005.
6. Malcolm Moore & Jon Rowland Eds, 'Urban Design Futures', Routledge, 2006.
7. Michelle Provoost et al., 'Dutchtown', NAI Publishers, Rotterdam, 1999.
8. Lawrence Halprin, 'Cities', Reinhold Publishing Corporation, New York, 1964.
9. Gosling and Maitland, 'Urban Design', St. Martin's Press, 1984.
10. Kevin Lynch, 'Site Planning', MIT Press, Cambridge 1967.
11. Jeremy Till et al, 'Spatial Agency: Other Ways of Doing Architecture', Routledge, 2011.

19ARS922	DISSERTATION								SEMESTER-IX	
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	0	**T**	0	**P/S**	6			**Credits**	**3**

COURSE OBJECTIVE:

- To inculcate the spirit of research in architecture.
- To enable the acquisition of in-depth knowledge in a specific aspect/ issue in the discipline of architecture
- To develop perspectives on the same through reading, study, analysis and thought.
- To develop the skill of experimentation by their own course of study
- To facilitate the development of a coherent line of thinking and express it through clear writing.
- To serve as prelude to Thesis.

COURSE OUTCOME:

1. Student will learn to research on a specific interested topic and collect appropriate data
2. Student will develop the skill of analytical approach towards the related topic
3. Student will be able to develop a coherent line of thought based on point of view,
4. Student will be able to do observation, analysis and study
5. Student will be able to prepare a dissertation report which is based on accepted norms of technical writing.
6. Student will become prepared for the larger thesis project.

CONTENT

Identification of Dissertation Topic and Area, Hypothesis Formulation, Objectives and Methodology. Importance, Purpose and Scope of the Dissertation in architecture in terms of design, technology, environment, economic and behavioral areas.

Related Research, Literature and Field Studies. Submission of the above in report form.

SUGGESTED READINGS :

1. . Knight, A. and Ruddock,L., "Advanced Research Methods in Built Environment", John Wiley & Sons. 2008.
2. Groat, L. and Wang D., "Architectural Research Methods", John Wiley & Sons. 2002.
3. Kothari, C.R., "Research Methodology- Methods and Techniques", New Age International. 2004.
4. Wayne C Booth, Joseph M Williams, Gregory G. Colomb, 'The Craft of Research', 2nd Edition, University of Chicago Press, 2008.
5. Ranjith Kumar, 'Research Methodology- A Step by Step Guide for Beginners', Sage Publications, 2005.
6. John W Creswell, 'Research Design: Qualitative, Quantitative and Mixed Methods Approaches', Sage Publications, 2002.

ELECTIVES

19ARET931	DISASTER MANAGEMENT								SEMESTER-IX
Marks	Internal	40	External			60	Total	100	Exam Hours	3
Instruction Hours /week	L	2	T	0	P/S	0			Credits	2

COURSE OBJECTIVE:

- To create awareness about natural disasters-factors
- To be aware of the disaster cause them-and to foster knowledge about strategies
- To learn about the methods of disaster prevention and management-
- To understand the fragile Eco-systems and factors that cause global climatic changes.
- Overview of major natural disasters-design & planning solutions for disaster mitigation-organizational
- To understand about the Disaster management aspects.

COURSE OUTCOME:

1. Student will be able to understand the cause and effects of natural disasters
2. Student will understand about climate change & disaster influences due to natural calamities
3. Student will learn to understand the prevention and design resistant structures
4. Student will understand the strategies to be implemented for disaster Mitigation.
5. Student will learn about Disaster management & recovery
6. Student will gain knowledge in design and Planning solutions of disaster proof structures

UNIT- I INTRODUCTION TO NATURAL HAZARDS

Understanding the effects of natural calamities such as floods, tropical cyclones, earthquakes, landslides, heat waves , droughts & Tsunami. Climate changes, global sea rise, coastal erosion, environmental degradation, large dams & earth tremors, roads buildings & landslides, urbanization & desertification, cyclone effects on coastal towns.

UNIT- II CASE STUDIES OF NATURAL DISASTERS IN INDIA

Earthquakes at Bhuj, Lattur, etc., Cyclones in coastal Andhra pradesh& Orissa, Landslides in Nilgiris, Himachal etc, Floods in Bangladesh, and Droughts in Rajasthan & Tsunami in Tamil Nadu.

UNIT- III STRATEGIES FOR DISASTER PREVENTION & MITIGATION

Pre disaster, emergency, transition, and recovery. Disaster management plan, Natural crisis management committee [NCMC], State crisis management group [SCMG].

UNIT – IV DESIGN & PLANNING SOLUTIONS

Design guidelines for disaster proof construction at appropriate situations.-Engineering, architectural, landscape & planning solutions for different types of calamities.- Norms, standards and practice procedures for shelter & settlement. Seismic repairs & retrofitting of damaged and undamaged buildings

UNIT – V SEMINAR

Seminar on case studies – disaster management – natural crisis management

SUGGESTED READINGS :

1. Earthquake Resistant Design for Built Environment. Compiled notes by Department of Architecture and Planning, IIT-Roorkee.December 2003.

2. Das P.K, A.R.Ramanathan, An Introduction to Seismic Safety in Architecture, 2007

3. Paul D.K. Singh, Yogendra, Short Term Training Course on Earthquake Resistant Design of Buildings, ADPC, IIT Roorkhe& DMMC, Dehradun, 2002

4. S.Rajagopal - *Problems of housing in cyclone prone areas* - SERC, Vol.2, Chennai, 1980 5.Office of the UN Disaster Relief Co-ordinator - *Disaster prevention and mitigation*, Vol 12, Social and Sociological aspects - UNO, NY, 1986

5. F.C.Cony et.al - *Issue and problems in the prevention of disaster and housing* - A review of experiences from recent disasters - Appropriate reconstruction and training information centre, 1978

6. S.Ramani, *Disaster management - Advanced course on modern trends in housing* - SERC, Vol 2, Chennai, 1980

19ARET932	REAL ESTATE MANAGEMENT								SEMESTER-IX	
Marks	Internal	40	External			60	Total	100	Exam Hours	3
Instruction Hours /week	L	2	T	0	P/S	0	Credits			2

COURSE OBJECTIVE:

- To give an overview of real estate development
- To understand about the market potential in the current scenario
- Stimulating an awareness of the issues involved in international real estate
- To learn about urban level policy & Decisions
- To learn about various differences in Real Estate market conditions all over the world
- To gain knowledge about the leverage that the real estate could provide in the overall development

COURSE OUTCOME:

1. Student will gain knowledge in the concepts of Real estate development
2. Student will understand about Property development
3. Student will learn about urban level policies in Real estate management
4. Student will learn about the corporate Real estate management
5. Student will gain knowledge in Project financing and development
6. Student will understand the Current scenario through case studies

UNIT-I REAL ESTATE DEVELOPMENT

Fundamentals of real estate development – concepts – techniques – recognizing institutional elements – issues encountered in various phases of development like the site evaluation and land procurement – lease hold and free hold property – development team assembly – market potential – demand estimation study – development scheme – construction and project management – Project marketing

UNIT- II DEVLOPMENT AND PROJECT FINANCING

Project feasibility – options – development financing – asset disposal and redevelopment options – analysis of development sites and case studies – integrated case study on specific development project – reviewing and analysis – problems and strategic issues

UNIT- III URBAN POLICY AND REAL ESTATE MARKET

Impact of government regulations and public policies on real estate markets – urban land rate and location theories – Land us e structures – community and neighborhood dynamics – degeneration and renewal in urban dynamics – private public participation- government policies – public and private housing and fiscal policy – Property taxation – local government finance

UNIT- IV CORPORATE REAL ESTATE MANAGEMENT

Strategic plans to align real estate needs with corporate business plans – performance measurement techniques – identify assets acquisition or disposal – methods for enhancing values through alternative – efficient source utilization or improving user satisfaction

UNIT – V FIELD SURVEY

Real estate value- market survey – case studies through field survey.

SUGGESTED READINGS :

1. Fillmore W Galaty, "Modern Real estate practice" (2002); Dearborn Trade Publishing, NewYork,U.S.A.
2. Gerald R Cortesi, "Mastering Real estate principles" (2001); Dearborn Trade Publishing, NewYork, U.S.A.
3. Mike .E. Miles, "Real estate development – Principles & Process 3rd edition, (2000); UrbanLand Institute, ULI – Washington DC
4. Richard B Peiser& Anne B. Frej, "Professional real estate development" – The ULI guide tothe business – (2003), Urban Land Institute U.S.A.
5. Tanya Davis, "Real estate developer's handbook", (2007), Atlantic pub company, Ocala, USA.
6. John Ratcliffe; "Urban Planning & Real estate development, (2004); Taylor & Francis pub. U.K.
7. David Falk; "The fundamentals of Real estate finance", (2005).USA
8. Valuation of Immovable properties" (Under Direct Taxes) edn(2002), Grish Chand Gupta,

19ARES933	HIGH RISE BUILDINGS								SEMESTER-IX	
Marks	Internal	60	External			90	Total	150	Exam Hours	6
Instruction Hours /week	L	1	T	0	P/S	3			Credits	3

COURSE OBJECTIVE:

- To understand the various types of multistoried buildings
- To understand the structural systems of High -rise buildings
- To understand deeply about the building service systems of high- rise buildings
- To deeply understand about the Structural Systems in High Rise Buildings
- To understand about the Safety Systems in high Rise buildings
- To understand about the Bye – laws & codes of design of high -rise buildings

COURSE OUTCOME:

1. Student will learn about the Design and planning aspects of High-rise structures
2. Student will gain knowledge about the National building Codes of high rise structures
3. Student will understand about the various development control regulations all over India
4. Student will gain knowledge about the Structural aspects of High-Rise buildings
5. Student will gain knowledge about various technical services involved in High rise buildings
6. Student will gain knowledge about functionality of the high-rise structures

UNIT 1 INTRODUCTION TO HIGH RISE STRUCTURES

Urban environment and physical planning considerations – architectural design considerations – space planning- building services – advanced service systems – antomation – Bye laws and codes applicable – for every structure and service section

UNIT- II TALL BUILDING TYPES AND FLOOR SYSTEMS

Classification of tall buildings – types – shear frames ,interacting systems – Tubular systems.
Composite steel floor systems , pre stressed and post tensioned concrete floor systems – examples

UNIT- III LATERAL LOAD RESISTING SYSTEMS

Braced frames – moment resisting frame systems – core and out trigger systems – benefits and drawbacks – tubular system – Hybrid systems – examples

UNIT- IV SERVICES FOR TALL BUILDINGS

Express evators- Sky lobbies – service floor etc – Water supply system- skip stage plumbing – energy conservation methods – location and sizing of water tanks – wet risers, sumps , smoke detectors , alarms ,sprinkler systwms – fire escpae stairs – fire resistant doors – Fire resistant materials – fire fightingequipments.

SUGGESTED READINGS :

1. B.C. Punmia, 'Reinforced Concrete Structures, Vol. 1 & 2', Laxmi Publications, New Delhi, 1994.
2. N. Subramanian, 'Principles of Space Structures', Wheeler, 1998.
3. Thandavamoorthy T.S, 'Advanced Structures of Architecture', Eswar Press, 2008.
4. Council on Tall Buildings and Urban Habitat, 'Structural System for Tall Buildings', McGraw Hill, 1995.
5. Milo.S.Ketchum and Mark.A. Ketchum, 'Types and Forms of Shell Structures, 1997.
6. P. Dayaratnam, P.Sarah, 'Prestressed Concrete Structures', Medtech, 2017.
7. Wolfgang Schueller, 'High Rise Building Structures', John Wiley & Sons,1976.
8. Frei Otto, 'Tensile Structures Volume 1 & 2' The MIT Press, 1973.
9. Bryan Stafford Smith, Alex Coull, 'Tall Building Structures - Analysis & Design', John Wiley, 1991.

19ARES934	GREEN BUILDINGS								SEMESTER-IX	
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	3			**Credits**	**3**

COURSE OBJECTIVE:

- To develop and acquire knowledge about environment and ecosystems
- To understand about Energy usage &energy efficient technologies
- To learn about the use of natural materials and water conservation technique.
- To Understand about Water Efficiency & regeneration
- To understand about the Rating of current buildings
- To understand the Bio degradability materials & recycling

COURSE OUTCOME:

1. Student will understand the basic concept of sustainability in Architecture
2. Student will gain knowledge in passive and Hybrid design strategies for designing a green building
3. Student will understand the energy usage of various types of buildings
4. Student will learn about energy efficiency and ways to minimize the energy.
5. Student will learn about the environmental impacts and assessment
6. Student will gain knowledge about the green rating systems and codes in India

UNIT- I SUSTAINABILTY AND GREEN BUILDING

Understanding of food and energy cycle – Principals of sustainability – Natural ecosystem – Elements of green development – Introduction to green architecture – green building design – benefits – rating systems – LEED, GRIHA,codes -ECBC

UNIT- II SUSTAINABLE STRATEGIES AND DEVELOPMENT

Sustainable design concepts – strategies – Design principles – Active and passive techniques – land use patterns – site development – site selection – adaptive reuse – existing buildings up gradation

UNIT- III ENERGY – USAGE AND REGENERATION

Water – consumption – domestic usage – efficiency in usage – low flow plumbing fixtures – water appliances – rain water harvesting – reuse of gray water – energy efficiency – optimizing building envelopes configuration – renewable power- Towards net zero energy building - use of photovoltaic- automation for efficient usage – smart buildings

UNIT- IV BIO DEGRADABLE MATERIALS AND RECYCLING

Concept of embodied energy – performance and life cycles – building materials – selection of sustainable materials – recycling waste – collection and disposal – appropriate technologies – use in landscape.

UNIT- V ENVIRONMENTAL IMPACT ASSESMENT.

Envirnmental Impact Assesment – Internal frame works & Assessment Tools.

SUGGESTED READINGS :

1.Anna ray – Jone – Sustainable architecture in japan – The green buildings of Nikken seiki, Wiley – acdemy 2000

2.Architecture and th e environment – bio climatic building design – David Lloyd (Laurence king publishers, London 1998)

3.Sustainable Architecture low tech houses – Charles Broto& Arian MostediPub : joseph Ma Minguet 2002.

4.Energy effiecient buildings in India – Millimajundar. TER publication and ministry of non conventional energy sources,2001

5.Ecology of the sky – Ivor Richards , The Image publishing groups ,2009

SEMESTER-X

19ARS1021	PROFESSIONAL PRACTICE								SEMESTER-X
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	3			**Credits**	**3**

COURSE OBJECTIVE:

- To give an introduction to the architectural profession
- To know about the role of professional bodies and statutory bodies as well as ethics of the profession.
- To give familiarity with basic aspects of running an architectural practice.
- To know about the tenders & market Evaluations in Architectural practice
- To give exposure to the processes involved in taking up and completing an architectural project.
- To inform about legal aspects and legislations associated with the profession.

COURSE OUTCOME:

1. Student will gain knowledge of the role of professional and statutory bodies.
2. Student will become familiar with the process involved in an Architecture Project
3. Student will gain knowledge about the Scale of Services and Fees for an Architect
4. Student will understand the code of conduct and ethical values of the Profession
5. Student will understand about the Tender & Contract
6. Student will understand about the participation, award in an Architectural competition

UNIT -I ARCHITECT -PROFESSION- SERVICES AND SCALE OF FEES

Role of architect in society - relationship with client and contractor - code of conduct – management of an architect's office - elementary accountancy -Conditions of engagement of an architect - normal additional, special and partial services – scale of fees for various services - claiming of fees

UNIT -II LEGISLATION

Salient features of various acts such as Architects Act 1972-Chennai corporation building rules 1972-The panchayat building rules-Tamilnadu factory rules,Development control rules for Chennai metropolitan Environmental acts and laws- special rules governing Hill area development – coastal area development and management – Heritage act of India – consumer protection act and their relevant provision- Role of urban arts commission – need for special rules on architectural control and development

UNIT - III TENDER AND CONTRACT

Definition – types of easements- acquisition , extinction and protection of easements

Calling for tenders - tender documents - open and closed tenders - item rate, lumpsum, labor and demolition tender - conditions of tender - submission of tender - scrutiny and recommendations

Conditions of contract - Form of contract articles of agreement - Contractor's bill certification

UNIT - IV EASEMENTS AND ARBITRATION

Definition – types of easements- acquisition , extinction and protection of easements

Arbitration in disputes - arbitration agreement - sole arbitration - umpire - excepted matters - award

UNIT - V ARCHITECTURAL COMPETITIONS

Open and closed competitions - appointment of assessors - duties of assessors - instructions to participants - rejection of entries - award of premium – guidelines prescribed by COA AND IIA for promotion and conduct of competition.

SUGGESTED READINGS :

1. Architects Act 1972,-Arbitration Act,196 – Factories Act,1948- person with disabilities act 1995
2. Publications of Council of Architecture
3. Roshan Namavati, 'Professional Practice', Lakhani Book Depot, Mumbai, 2016.
4. Ar. V.S. Apte, 'Architectural Practice and Procedure', Mrs. Padmaja Bhide, 2008.
5. Madhav Deobhakta, 'Architectural Practice in India', COA, 2007.
6. J.J.Scott, 'Architect's Practice', Butterworth, London 1985.
7. Development Regulations of Second Master Plan for Chennai Metropolitan Area-2026. (Second Master plan of CMA).
8. Chennai City Corporation Building Rules 1972 AND cmda- 2014
9. T.N.D.M. Buildings rules, 1972.

19ARS1022	PROJECT MANAGEMENT								SEMESTER-X	
Marks	**Internal**	**60**	**External**			**90**	**Total**	**150**	**Exam Hours**	**6**
Instruction Hours /week	**L**	1	**T**	0	**P/S**	3			**Credits**	**3**

COURSE OBJECTIVE:

- To introduce different Project management techniques
- To learn about project control, updating & Monitoring
- To Know about network concepts, network elements and inter - relationships
- To know about PERT network
- To understand about the project Costing
- To enable understanding of management systems for accomplishing the task efficiently in terms of quality, time and cost.

COURSE OUTCOME:

1. Student will understand a project from concept to commissioning,
2. Student will understand the feasibility study & facility programme, design, construction to commissioning.
3. Student will be able to apply project management techniques in achieving objectives of a project like client needs, quality, time & cost.
4. Student will understand about the Project Costing
5. Student will understand about the various software of project management.
6. Student will gain understanding of principles of management, construction scheduling, scope definition and team roles

UNIT- I INTRODUCTION TO PROJECT MANAGEMENT

Introduction to project Management concepts - background of management, purpose, goal and objectives, characteristics of projects and different aspects of management. Traditional management system, Gantt's approach load chart, progress chart, bar chart merits and limitation. Schedule time, estimates units

UNIT- IIPROJECT PROGRAMMING

Project programming, resources balancing, phasing of activities, programs, scheduling, project control, reviewing, updating and monitoring. Exposure to relevant software such as MS Project, Primavera, Introduction to modern management, concepts, uni-dimensional management techniques - Introduction to PERT and CPM introduction to network concepts, network elements and inter-relationships.

UNIT - III NETWORK TECHNIQUES

Network techniques, network logic - interrelationships, activity information, data sheets, development of network. CPM for management, CPM network analysis, identification of critical path float computation result sheets.

UNIT - IV PERT NETWORK

PERT Network, introduction to the theory of probability and statistics, probabilistic time estimation for the activities of PERT network

UNIT- V PROJECT COST

Introduction to two dimensional network analysis, activity cost information. Cost time relationship, crashed estimates for the activities, compression potential, cost slope, utility, data sheet, project direct cost and indirect cost. Crashed programmes, network compression least cost solution least time solution, optimum time solution. Network techniques, PERT/CPM, generating alternative strategies using computers

SUGGESTED READINGS :

1. Dr. B.C. Punmia and K.K. Khandelwal, 'Project Planning and Control with PERT and CPM', Laxmi Publications, 2018.
2. Elaine Marmel, 'Microsoft Project 2010 Bible', Wiley, 2010.
3. Sam Kubba, 'Green Construction Project Management and Cost Oversight', Elsevier, 2010.
4. Jerome D. Wiest and Ferdinand K. Levy, 'A Management Guide to PERT/CPM', Prentice Hall of India, 1982.
5. Bert Bielefeld, 'Basics Project Management Architecture', Birkhauser, 2013.

19ARS1023	ARCHITECTURAL THESIS								SEMESTER-X
Marks	**Internal**	**360**	**External**			**540**	**Total**	**900**	**Exam Hours**	**6**
Instruction Hours /week	**L**	0	**T**	0	**P/S**	18			**Credits**	**18**

COURSE OBJECTIVE:

- To ensure consolidation and application of the knowledge gained in preceding years of the programme
- To develop the skill of Design in the context of a project of the student's choice.
- To enable addressing of specific projects through key, identified issues inherent in the project
- To enable development of thought processes in specific areas/aspects into a project.
- To facilitate development of ability to complete and handle projects independently
- To develop the career of Architecture by exhibiting the skill in thesis

COURSE OUTCOME:

1. Student will gain an overall understanding of an Architectural project
2. Student will be able to research, Analyse, synthesize and present his ideas
3. Student will apply his skills developed in the previous years in this Project
4. Student will gain the ability to handle major architectural project of a larger scale
5. Student will be able to design with all Socio, economic and Environmental aspects.
6. Student will become an expertise in his domain of architectural design

CONTENT

The main areas of study and analysis shall be Architecture, Urban design, Urban renewal and Human settlements, Environmental Design, Conservation, Landscape Design, Housing etc.. However, the specific thrust should be architectural design of built environment.

Research Methods as applicable to architectural studies is to be taught as part of Thesis.

METHOD OF SUBMISSION

The Thesis Project shall be submitted in the form of drawings, project report, physical/ digital models, presentations and walkthroughs.

SUGGESTED READINGS :

1. Linda Grant and David Wang, 'Architectural Research Methods', John Wiley & Sons, 2002.
7. Joseph De Chiara, Michael J Crosbie, 'Time Saver Standards for Building Types', McGraw Hill Professional, 2001.

8. Stephen A. Kliment, Editor 'Building Type Basics' Series, Wiley.
9. Igor Marjanović, Katerina RüediRay,LesleyNaaNorleLokko, 'The Portfolio - An Architecture Student's Handbook', Routledge, 2003.