

**UNIVERSITY OF KERALA**

**B. ARCH. DEGREE COURSE  
(2013 SCHEME)**

**SYLLABUS FOR  
VI SEMESTER**

## SCHEME -2013

### VI SEMESTER

Course No	Course Title	Credits	Hours/ week			Duration of Exam	Marks			Total
			L	T	P		W	J	S	
13AR1601	Architectural Design V	5	-	-	10			250	250	500
13AR1602	Building Materials and Construction - V	4	1	-	3	4	100		100	200
13AR1603	History of Architecture -V	2	2	-	-	3	100		50	150
13AR1604	Town Planning	2	2	-	-	3	100		50	150
13AR1605	Housing	2	2	-	-	3	100		50	150
13AR1606	Elective I	2	2	-	-	3	100		50	150
13AR1607	Elective II	2	2	-	-	3	100		50	150
13AR1608	Structural Design V – Advanced Structural Systems	3	2	1	-	3	100		50	150
13AR1609	Building Science Lab	2	-	-	2				50	50
	<b>Total</b>	<b>24</b>	<b>13</b>	<b>1</b>	<b>15</b>					<b>1650</b>

#### Elective I

13AR1606.1	Ecology and Environmental Studies
13AR1606.2	Traditional Architecture
13AR1606.3	Cost Effective Technology
13AR1606.4	Digital Architecture

#### Elective II

13AR1607.1	Research Methodology
13AR1607.2	Architectural Criticism
13AR1607.3	Architectural Journalism and Photography
13AR1607.4	Product Design

## 13AR1601 ARCHITECTURAL DESIGN – V

Teaching Scheme: 0(L) - 0(T) - 10(P)

Credits: 5

### Course Objective:

- *To introduce the design of multifunctional multi-storeyed buildings. Projects shall have enough emphasis on technology and the application of various building services and circulation systems.*
- *To understand the structure of dwelling community and neighbourhood.*

The students are required to do one major project and one minor project.

**Major Project** – Projects may be on commercial, public, semi public use like large hospitals, shopping malls, large convention centres, campus etc.

**Short Project** – Projects – Housing, urban neighbourhood, traditional settlement, hill area settlement etc., Working drawing of a selected area of the building.

### References:

1. Mills E. D., *Planning: Architect's Handbook*, 10/e, Butterworths, 1985.
2. De Chiara J. and J. H. Callender, *Time Saver Standards for Building Types*, McGraw Hill, 2001.
3. Neufert E., P. Neufert, and J. Kister, *Neufert Architects' Data*, Wiley- Blackwell, 2012.
4. Ramsey C. G., H. R. Sleeper, *Architectural Graphic Standards*, 11/e, Wiley, 2008.
5. BIS, Various Codes of Practice and National Building Code of India

### Internal Continuous Assessment (Maximum Marks - 250) (Group 1 Subject)

20% - Tests (minimum 2)

70% - Class work

10% - Regularity in the class

### University Examination Pattern:

*Course work will be assessed by a panel of Jury. (Maximum Marks - 250)*

### Course Outcome:

*The students shall have acquired knowledge of designing multifunctional, multi-storeyed buildings based on project brief, site and cultural context of the design problem. They shall be able to analyse the function, building services and circulation systems in high rise public buildings and develop suitable designs.*

## 13AR1602 BUILDING MATERIALS AND CONSTRUCTION –V

Teaching Scheme: 1(L) - 0(T) - 3(P)

Credits: 4

### Course Objectives:

- *To introduce the study of building materials, their applications and construction methods.*
- *To familiarize the students with market study of building components and details.*
- *To understand conventional as well as vernacular and traditional building materials and practices.*
- *To understand prevailing BIS specifications.*

### Module – I

**Study of advanced concrete:** Lightweight, high density, fiber reinforced, polymer concrete - outline of manufacture, properties and uses of the above.

**Admixtures:** Water repellent, waterproofing compounds, accelerators, air entraining agents, hardeners, plasticizer - Their properties and uses.

### Module – II

#### Advanced Structural Concepts in Architecture:

Pre stressed concrete structures: Precast pre stressed construction. Use and examples of various pre stressed structures.

**Tensile structures:** Concept of tensile structures, formation, classification, use and examples of various cable structures. Application of cable structures in architecture. Materials and construction methods of membrane structures.

**Plate structures:** Definition, classification and application, concept and application of folded plates, flat slab and coffered slab.

**Special Structures:** Concept, Classification and Application of Pneumatic Structures, Kinetic Structures and Mobile Structures: Definition, and Application.

*Discussion: Role of structural grids in planning.*

*Exercise: Case studies of tensile structures, folded plates and coffered slab.*

*Drawings: Tensile structures, folded plates and coffered slab.*

### Module – III

**Pre-fabrication & Modular Co-ordination:** Introduction to the concepts of standardization – need and importance. Introduction to concepts of Modular Coordination Objectives of Modular coordination & definition of Basic Module. Modular controlling dimensions, Planning Modules and preferred Multi-modules. Introduction to concepts of prefabrication. Advantages & disadvantages of onsite & off-site prefabrication. Methods of prefabrication &

Examples of prefabricated components. Process of prefabrication. Various issues related to prefabrication industry & Examples of prefabrication concepts.

*Discussion: Future architecture and pre fabrication*

*Exercise: Documentation of pre fabricated components.*

*Drawings: Design and draw prefabricated structural solution for buildings like public toilet facility, bus waiting shelter, kiosk etc.*

#### **Module – IV**

**Applied finishes:-** Floor finishes- Types of flooring, methods of laying, furnishing of floors with different floor finishes like cement, colored cement, mosaic, terrazzo, tiles, wood, parquet flooring, stone, etc. Classification & properties of tiles used in flooring. Selection criteria & Methods of fixing various types of tiles. Different type of resilient and vibration resistive floor like rubber, Linoleum and PVC flooring.

General character and construction process of traditional flooring.

*Discussion: Selection of appropriate floor finish based on Cost, cleanliness & Hygiene.*

*Exercise: Case study of floor finishing techniques.*

#### **References**

1. Parker H., *Materials and Methods of Architectural Construction*, John Wiley & Sons, Canada, 1958.
2. Ching F. D. K., *Building Construction Illustrated*, 4/e, Wiley, New Delhi, 2012.
3. Relevant BIS codes.
4. Kelly, *the Prefabrication of Houses*.
5. Nagarajan R.; *Standards in Building*.
6. *Standards & Specifications for Cost-Effective, Innovative Building Materials and Techniques*; BMTPC; New Delhi.
7. Nissen H., *Industrialized Building and Modular Design*, Cement & Concrete Association; London; 1972.
8. Dayaratnam P., *Pre stressed Concrete Structures*, Oxford and IBM Publishing Co., New Delhi, 1982.
9. Frei Otto, *Tensile Structures, Vol-II, Pneumatic Structures, Cable Structures*: The MIT Press London.
10. N.Subramaniam, *Principles of Space Structures*: Wheeler& Co., Allahabad 1983.

**Internal Continuous Assessment** (Maximum Marks - 100) (Group 1 Subject)

20% - Tests (minimum 2)

70% - Class work

10% - Regularity in the class

**University Examination Pattern:**

*Examination duration: 4 hours*

*Maximum Total Marks: 100*

*The question paper shall consist of 2 parts.*

**Part A:**

*Question 1. (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Question 2. (10 marks) – Questions for 10 marks from module I and II. Candidates have to answer any one out of the two.*

*Question 3. (10 marks) – Questions for 10 marks from module III and IV. Candidates have to answer any one out of the two.*

**Part B:**

*Question 4. (20 Marks) – Drawing: Candidates have to answer any one full question out of the two from module II.*

*Question 5. (20 Marks) – Drawing: Candidates have to answer any one full question out of the two from module III.*

**Course outcome:**

*The course will enable the students of architecture to gain knowledge in advanced construction materials and structural applications which is required to enhance the performance and durability of buildings.*

## 13AR1603 HISTORY OF ARCHITECTURE V

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objective:

- *To introduce to the students the world architectural scenario from around 1947 AD to present period.*
- *To induce an appreciation to the importance of history of architecture and its relationship to the development of any place.*
- *To develop awareness about the precious architectural past we had and how to build our future based on that tradition, wisdom and technical knowledge.*

### Module – I

**Isms in Architecture: Phenomenology** (Christian Noberg Schultz ('genius loci'), Alvar Aalto, Steven Holl, eg. Therme Vals, Switzerland by Peter Zumthor)

**Post Modernism** (Charles Jencks and theories in Architecture, Michael Graves, Robert Venturi, Phillip Johnson, eg. New Staatsgalerie by James Stirling)

**Structural Expressionism** (eg; Hearst tower by Sir Norman Foster)

**Critical Regionalism** (Geoffrey Bawa, Hassan Fathy, Christopher Alexander, eg. Water Temple by Tadao Ando)

**Deconstruction** (Mark Wigley, Bernard Tschumi, Peter Eisenmann, Zaha Hadid, eg. Guggenheim by Frank Gehry)

**Architecture Manifestos for 20<sup>th</sup> Century:** Adolf Loos (Ornament & Crime), Antonio Sant Elia (Futuristic Architecture), Walter Gropius (BAUHAUS programme), Mies Van der Rohe (On Form), Louis Khan (Order Is).

### Module – II

**Contemporary Master Architects;** Richard Mier (Eg; Museum of Contemporary Art), Renzo Piano (eg. Center Georges Pompidou), I M Pei (Miho Museum, Japan), Santiago Calatrava (Auditorio de Tenerife, Spain), Rem Koolhaas (eg. Casa de Musica, Portugal).

### Module – III

**Architecture in post Independent India;** Works of Foreign Architects in India and their influence – Le Corbusier (Palace of Assembly, Chandigadh), Louis Khan (Eg; IIM, Ahmedabad), Joseph Stein (Eg; India Habitat Centre, New Delhi). **Reinterpreting the Indian Vernacular;** Works of Indian Architects – Charles Correa (Eg; Gandhi Ashram, Ahmedabad), B.V. Doshi (IIM, Bangalore), A.P. Kanvinde (IIT, Kanpur), Raj Rewal (CIDCO housing, Mumbai)

### Module – IV

**Search for appropriate architecture in Kerala;** Impact of Land reforms Act and Migration abroad on house forms

**Influence of work of these architects:** Laurie Baker (Cost effectiveness, eg. CDS, Trivandrum), Charles Correa (eg. Kovalam beach resort, Kovalam), Functionalist rationale of Prof. J C Alexander (eg. CET, Trivandrum) and Benneth Pithavadian (eg. AIR INDIA office, Trivandrum), Empiricist Philosophy of S L Chitale (eg. Senate House of Kerala University, Trivandrum).

**References:**

1. Lang, Jon, A Concise History of Modern Architecture, (2002)
2. Vidler, Antony, Histories of the Immediate Present (Inventing Architectural Modernism), (2008)
3. Frampton, Kenneth, Modern Architecture; A Critical History, (1980)
4. Jencks, Charles, Theories and Manifestoes of Contemporary Architecture, (2006)
5. Ghirardo, Diane, Architecture after Modernism, (1996)
6. Mehrotra, Rahul, Architecture in India since 1990, (2011)
7. Tillotson, Giles, The Tradition of Indian Architecture; Continuity, Controversy and Change Since 1850, (1989)

**Internal Continuous Assessment** (*Maximum Marks - 50*) (*Group 2 Subject*)

*50% - Tests (minimum 2)*

*30% - Assignments (minimum 2) such as home work, quiz, seminar, term-project, etc.*

*20% - Regularity in the class*

**University Examination Pattern:**

*Examination duration: 3 hours*

*Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Part B (60 Marks) – Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.*

**Course Outcome:**

*Knowledge about the history of a culture, its building art and construction techniques helps an architecture student to develop designs that are rooted in the country. Upon completion of the course, the student will be able to develop a keen appreciation of our heritage buildings leading to the understanding that architecture is the product of a particular culture, time and place.*



## 13AR1604 TOWN PLANNING

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objective:

- *To expose the students to the origin and evolution of settlements primitive to present times and the various influences affecting these*
- *To make them understand the process of urbanisation and the problems and potentials of urban areas*
- *To equip them to understand the process of planning, plan formulation and implementation mechanisms and laws and legislations.*

### Module – I

Origin and evolution of human settlements from pre history – Human settlements as an expression of civilization – Town planning in ancient- Mesopotamia , Greece, Rome , India – Planning in Medieval, Renaissance, Industrial and Post industrial age.

### Module – II

Contribution of Ebenezer Howard, Le Corbusier, Clarence Stein, Patrick Geddes and C.A. Doxiadis to town planning – Impact of urbanisation on cities, urban environmental problems – Models of urban structure, CBD, nodes, fringe area, peri-urban areas, ribbon development, extended metropolitan areas – New towns – New urbanism - Transit oriented development, Neighbourhood design.

### Module – III

Master plans, Perspective Plans, Development plans – Town planning schemes – Regional planning – Integrated rural and urban planning –Process of Plan preparation– Surveys for plan preparation– Development Control tools - land use, density, height, building line, FAR, etc.

### Module – IV

Institutional framework for planning and implementation –Acts related to Land Acquisition, 73<sup>rd</sup> and 74<sup>th</sup> Amendment of the Constitution –Coastal Regulation Zone Act –SEZ Act – Environmental Acts –Slum related Acts –Schemes and Programmes for control and development of urban areas–Planning for the urban poor – JNNURM, IHSDP.

### References:

1. Arthur B. Gallion and Simon Eisner - 'The Urban Pattern'

2. Morris AEJ - 'History of Urban Form from Pre-history to Renaissance'
3. Peter Hall - 'Urban & Regional Planning'
4. Doxiadis C.A. - 'An Introduction to Science of Human Settlements'
5. Paul D. Spreiregen – 'Architecture of Town & Cities'
6. Ramachandran R.– Urbanization and urban systems in India
7. UDPFI guidelines
8. Kulsreshtha- Urban and Regional Planning in India: A handbook for professionals
9. Amiya Kumar Das- Urban Planning in India

**Internal Continuous Assessment** (*Maximum Marks - 50*) (*Group 2 Subject*)

*50% - Tests (minimum 2)*

*30% - Assignments (minimum 2) such as home work, quiz, seminar, term-project, etc.*

*20% - Regularity in the class*

**University Examination Pattern:**

*Examination duration: 3 hours*

*Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Part B (60 Marks) – Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.*

**Course Outcome:**

*The students will be able to understand the forces that shape and drive a city, the impact of urbanisation and the institutional mechanisms that enable proper planning and implementation processes.*

## 13AR1605 HOUSING

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objectives:

- *To create awareness about the Housing Situation in India.*
- *To create awareness about the living conditions of Low Income Communities*
- *To increase the social responsibility of future architects by making them aware of the social realities around them.*

### Module – I

Nature and Magnitude of Housing Problem in India, Housing Shortage, Estimation of Housing Shortage.

Role of Housing in the National level with a study on the changing priorities in the housing policies and the major housing programmes carried out in the various five year plans.

Initiatives at global Level, Habitat Agenda, Changing role of governments (From Providers to facilitators).

### Module – II

Study of Urban and Rural Housing.

Housing typology- apartments, detached housing, row housing.

Housing Density- net density and gross density, Rental Housing.

Characteristics of Housing for various Income groups.

Housing Design and Standards conforming to local climatic and socioeconomic conditions.

Study of Slums, causes, Magnitude of the problem in India.

### Module – III

Changing priorities in Housing Programmes in India: Major Housing Programmes carried out in the various Five Year Plans. Major Housing Schemes in Kerala- One Lakh Housing Scheme, SASH Scheme etc.

Housing the poor: Incremental Housing, Core Housing, Site and Services.

National Urban Housing and Habitat Policy, National Rural Housing and Habitat policy.

Recent Programs in Housing- IAY, IHSDP, RAY.

### Module – IV

Agencies involved in Housing: Government Departments, HUDCO, BMTPC, NBO, Housing Boards.

Role of NGOs, Cooperative sector and Private Sector in Housing.

Housing Finance: Essential characteristics, Sources of Housing Finance. Major Finance Agencies in housing at National and State Level; NHB, RBI, HDFC, Scheduled Commercial Banks, Housing Subsidiaries, Cooperatives etc.

**References:**

1. Arthur Gallion, *Urban Pattern*.
2. Isher Judge Ahluwalia, Ravi Kambar, P. K. Mohanti. *Urbanization in India: Challenges, Opportunities and the Way Forward*.
3. K Thomas Poulouse, *Innovative Approaches to Housing for the Poor-Lectures* Compiled by ITPI *Reading Material on Housing*.
4. Nick Gallent and Mark Tewdwr-Jones *Decent Homes for All: Planning's Evolving Role in Housing provision*, Routledge, 2006.
5. Paul Jenkins, Harry Smith & Ya Ping Wang *Planning and Housing in the Rapidly Urbanizing World* Routledge 2007.
6. Paul Spriegreg, *Architecture of Town and cities* -
7. Ravinder Singh Sandhu, Jasmeet Sandhu, Balwinder Arora, *Urban Poverty in Developing Countries: Issues and strategies for Sustainable Cities*.
8. Rishi Muni Dwivedi, Rimpi Kaur and Rakesh Shahani, *Urban Development and Housing in India 1947-2007*, New Central Book Agency.

**Internal Continuous Assessment (Maximum Marks - 50) (Group 2 Subject)**

50% - Tests (minimum 2)

30% - Assignments (minimum 2) such as home work, quiz, seminar, term-project, etc.

20% - Regularity in the class

**University Examination Pattern:**

Examination duration: 3 hours

Maximum Total Marks: 100

The question paper shall consist of Two Parts

Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.

Part B (60 Marks) – Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.

**Course Outcome:**

At the end of the course, the students shall be able to think contextually while acting locally. They shall be able to take appropriate decision while designing housing projects for various income groups.

## 13AR1606.1 ECOLOGY AND ENVIRONMENTAL STUDIES (Elective I)

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objectives:

*Students more interested in environment and ecological issues get to know in detail the effects of various anthropogenic activities on the natural environment. They are made aware of the existing policies and laws related to environment*

### Module – I

#### Fundamentals of Ecology and Environment

Environment Definition, Concept of Ecosystem

Fundamental of Ecology, Components of Ecosystem, Food Chain, Food Web, Tropic Level, Energy Flow.

### Module – II

Structure and Functions of the following Ecosystems: Forest, Grassland, Desert and aquatic ecosystem.

Effects of Human Activities on Environment: Agriculture, Housing, Industry, Mining and Transportation activities.

### Module – III

#### Urban Environmental Management

Urban ecosystems, Cities and energy management, Impacts on Hydrological cycle, urban floods , Effects of climate change, Management of urban solid waste, Air quality management, Impact of landfills, Reducing the ecological footprint.

### Module – IV

Environmental Policies and laws in India, Laws related to air and water pollution, conservation of forests, Coastal Regulation Zone, Ecologically Fragile Areas, Wetlands Conservation Act. Western Ghats Environment Management.

Environmental impact assessment.

### References:

1. Baker, Nick and Steemers, Koen, *Energy and Environment in Architecture* E& FN, Spon. London 1999.
2. Goulding, John R., Lewis, Owen J and Steemers, Theo C. *Energy in Architecture*, Bastford Ltd., London, 1986.
3. Michael Redcliff, *Sustainability: Critical Concepts in the Social Sciences*, Routledge 2005.
4. Nicholas Stern *The Economics of Climate Change* 2007.

5. Rees, W.E., *Our Ecological footprint: Reducing Human Impact on Earth*, Routledge 2007
6. Rogers, Jalal and Boyd, *An Introduction to Sustainable Development*, Earthscan, 2008.
7. Schumacher E F *Small is Beautiful: Economics as if people mattered*.
8. TERI *Sustainable Building Design Manual Vol 1 & 2*, TERI, New Delhi.
9. The United Nations *Earth summit: Agenda 21* UN 1993.
10. Watson Donald *Climatic Design : Energy Efficient Building Principles &Practices* McGraw Hill Book company, New York, 1983.
11. World commission on Environment and Development *Our Common Future* Oxford University Press, 1987.

**Internal Continuous Assessment** (*Maximum Marks - 50*) (*Group 2 Subject*)

*50% - Tests (minimum 2)*

*30% - Assignments (minimum 2) such as home work, quiz, seminar, term-project, etc.*

*20% - Regularity in the class*

**University Examination Pattern:**

*Examination duration: 3 hours*

*Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Part B (60 Marks) – Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.*

**Course Outcome:**

*At the end of the course, students shall become more environmentally sensitive in their approach towards their profession. They shall be encouraged to seek innovative methods of practice to reduce the impacts of construction and urbanization.*

## 13AR1606.2 TRADITIONAL ARCHITECTURE (Elective I)

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objectives:

- *Develop a broader sense of understanding of the relationship between architecture, and culture.*
- *To induce the understanding of relevance of traditional building practices.*
- *To understand, acknowledge and preserve the traditional architecture.*

### Module – I

Traditional architecture, traditional architecture of India, meaning and definition of the terms *vastu*, *vastuvidya* and *vastusastra*.

Origin and development of *vastuvidya* over centuries, education, resource material and *acaryas*.

Underlying philosophy of *vastusastra*, concept of *brahmanda* and *pindanda*, concept of *prakrti* and *purusa*, concept of *mandala* – *mandala* as a representation of universe, its practical application, elemental shapes of *mandala*.

Definition and classification of *vastu*, four tier classification of *silpi*, their qualities, role and responsibilities in building construction, duties of the owner.

Relevance of *vastuvidya* in the present context.

### Module – II

Selection of land based on observations like geometry, topography, availability of water, soil condition, vegetation and position of trees and proximity of temples. Various tests to be carried out to assess the quality of site.

Analysis of site, leveling the ground, fixing up cardinal directions, fixing *rajju* and *pariyanta*, dividing the site into *khanda* and *upakhanda*, classification of sites according to size, squaring the site, concept of *sutra* and *sutravedha*, *vithivinyasam*, fixing the boundaries of plots, concept of *marma* and *marmavedha*, concept of *pada*, *padavinyasa* and *padadevata*, concept of *vastupurusa*.

Basic dimensional systems, units for measurements, types of scales, concept of *yonis* and *ayadisadvarga*, *yonis* and orientation, concept of *padayonis*.

Proportions of rectangles nomenclature of ratios and *gunamsavidhi*.

### Module – III

Layout and planning of *sala*, *ekasala* as the basic unit, fixing the dimension of *ekasala* – *istadirkhavidhi*, *gunavistaravidhi*, *padavistaravidhi* and *gunamsavidhi*.

Classification of residences on the basis of number of *sala*, classification of *catussala*, functions of various parts of the house, expansion of plan.

Demarcation of plot and locating the building, concept of *gamana*, position of gates, position of well and pond, location of ancillary structure.

Vertical composition and elements of residential buildings. Recommended materials for construction.

#### **Module – IV**

Planning of settlements, types of settlements, formation, growth and size of settlements, models of settlements.

Planning of temples, temple form, types of temples, plan composition and vertical composition.

#### **References:**

1. Acharya, Prasanna Kumar, *An Encyclopaedia of Hindu Architecture*, Manasara Series, Oriental Book reprint corporation, New Delhi, 1979.
2. Bruno Dagens (Tr.), *Mayamata*, Indira Gandhi national Center for the Arts, Motilal Banarassidas, Delhi, 2007.
3. Balagopal T S Prabu, A. Achyuthan, A text book of *Vastuvidya*, Vastuvidya-pratisthanam, Kozhikode, 1996.
4. A. Achyuthan, Balagopal T S Prabu, An Engineering Commentary on *Manusyalaya-chandrika*, Vastuvidyapratisthanam, Kozhikode, 1998.

#### **Internal Continuous Assessment (Maximum Marks - 50) (Group 2 Subject)**

*50% - Tests (minimum 2)*

*30% - Assignments (minimum 2) such as home work, quiz, seminar, term-project, etc.*

*20% - Regularity in the class*

#### **University Examination Pattern:**

*Examination duration: 3 hours*

*Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Part B (60 Marks) – Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.*

#### **Course Outcome:**

*Upon completion of the course, the student of architecture shall have acquired knowledge in traditional building practices.*



## 13AR1606.3 COST EFFECTIVE TECHNOLOGY (Elective I)

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objectives:

- *To introduce the study of cost effectiveness in building construction.*
- *To familiarize the students with study of cost effective building components and materials.*
- *To understand conventional as well as traditional building construction practices.*
- *To understand the role of various agencies.*

### Module – I

Cost effective techniques: Need, Planning aspects, construction aspects, maintenance and longevity aspects.

### Module – II

Choice of materials in Indian/Kerala conditions, indigenous building materials, organic and inorganic building materials, alternative building materials.

Use of industrial and agricultural wastes - Survey of such materials development by research organizations like CBRI, SERC etc.

### Module – III

Significance of construction technology: Relevance of improving of traditional technology, relevance of innovative technology/alternate technology, survey of such technologies by various research institutes.

### Module – IV

Critical analysis (in terms of initial investment, maintenance cost and longevity of buildings) of the local adaptation of the innovative technologies by various agencies.

### References:

1. Hand book of Low Cost Housing.
2. G.C. Mathew, 'Low Cost Housing in Development Countries'.
3. Publications of CBRI, SERC, RRL, NBO, COSTFORD.

### Internal Continuous Assessment (Maximum Marks - 50) (Group 2 Subject)

*50% - Tests (minimum 2)*

*30% - Assignments (minimum 2) such as home work, quiz, seminar, term-project, etc.*

*20% - Regularity in the class*

**University Examination Pattern:**

*Examination duration: 3 hours*

*Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Part B (60 Marks) – Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.*

**Course Outcome:**

*At the end of the course, the student of architecture shall have acquired the knowledge about cost effective building practices.*

## 13AR1606.4 DIGITAL ARCHITECTURE (Elective I)

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objectives:

- *To introduce the applications of computer in architecture.*
- *To familiarize with the various methods of computer aided design and drafting.*
- *To instruct on the process and tools employed in contemporary design and fabrication.*

### Module – I

Introduction: Computer aided design in contemporary architectural practice.

Algorithm and Use of Flow Chart

Structure of a Program: Variables and Constants, Data Types, Control Branching, Control Looping, Functions, Array.

### Module – II

Layout Generation in Architecture: Expert Systems (Flemming, Coyne), Shape Grammar (Stiny, Mitchell, Duarte), Generative (Gero, Fraser) and Constraint-Based (Gross, Medjdoub and Yannou, Hsu).

**Exercise:** Layout generation process.

### Module – III

Fundamentals of two and three dimensional drafting.

Parametric design

Transformations: Translations, rotations and reflections

Object oriented programming.

Lessons from Nature – Biomimetic design

**Exercise:** Design and present a Product / Exhibit using parametric software of choice.

### Module – IV

Fabrication

Use of: 3d printer, Laser Cutter, CNC machine

**Exercise:** Fabricate the designed product / exhibit.

### References:

1. Ravichandran D., *Programming with C++*, Tata McGraw Hill, 2007.
2. Morris Mano M., *Digital Logic and Computer Design*, PHI, 2003.
3. Dromy R. G., *How to Solve it by Computer*, Pearson.

4. Lionel March & Philip Steadman, *The Geometry of Environment*, RIBA Publications Limited London, 1971.
5. Neal Panchuk, *An Exploration into Biomimicry and its Application in Digital & Parametric [Architectural] Design*, 2006.
6. Danny Lobos, Dirk Donath, *The Problem of Space Layout in Architecture: A Survey and Reflections*, 2010.

**Internal Continuous Assessment (Maximum Marks - 50)**

*20% - Tests (minimum 2)*

*40% - Class work*

*20% - Term-project based on Module IV.*

*20% - Regularity in the class*

**University examination Pattern:**

*Examination duration: 3 hours*

*Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each, from modules I, II and III. All questions are compulsory. There should be minimum two questions from each module and not more than three questions from any module.*

*Part B (60 Marks) – Two Questions each from modules I, II and III. Candidates have to answer any one full question out of the two from each module. Each question carries 20 marks.*

**Course Outcome:**

*At the end of the course, the student will be able to:*

- *Recall and make use of the process of algorithmic design.*
- *Utilize tools to independently design and fabricate a product / exhibit.*

## 13AR1607.1 RESEARCH METHODOLOGY (Elective II)

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objectives:

- *To introduce research concepts to students enabling them to identify research questions and formulate hypothesis. They should be able to evolve research strategies for their dissertation and thesis projects.*
- *To inculcate ethical practices in research, report writing and publishing.*

### Module – I

Introduction to research, Research Paradigms, Types of research and Aims of research  
Quantitative and Qualitative research  
Literature search, Literature Map, Writing Literature review  
Ethics in Research, Plagiarism.

### Module – II

Formulating Research Questions and Hypothesis  
Study of examples of Research questions and Hypothesis  
Research Design, Qualitative and Quantitative Research Designs.

### Module – III

Collecting Data, Types of Data, Documents, Interviews, Observations, Experiments  
Sampling for data collection, Different types of sampling  
Analysis of Data –Qualitative and Quantitative  
Statistics for research, Statistical Packages.

### Module – IV

Writing the Research Report  
Structure of Research Report, Research Paper, Research Proposal  
Study of research papers in Refereed Journals  
Recent research in Architecture, Urban Planning, Urban Design, Landscape and Environment  
Behavior.

### References:

1. Creswell, John W. 2003 *Research Design: Qualitative, Quantitative and Mixed Methods Approach* Sage Publications
2. Day R A 1989 *How to Write and Publish a Scientific Paper* Cambridge University Press

3. Groat L.& Wang D. (2002), *Architectural Research Methods*, John Wiley and Sons Inc
4. Kothari C. R. 1990 *Research Methodology* Sultan Chand & Sons, New Delhi
5. Manna, Chakraborti 2012. *Values and Ethics in Business Profession* Prentice Hall of India, New Delhi
6. Panneerselvam 2012 *Research Methodology* Prentice Hall of India, New Delhi
7. Ranjit Kumar 2005 *Research Methodology: A step by step Guide for Beginners* Sage Publications

**Internal Continuous Assessment** (*Maximum Marks - 50*) (*Group 2 Subject*)

*50% - Tests (minimum 2)*

*30% - Assignments (minimum 2) such as home work, quiz, seminar, term-project, etc.*

*20% - Regularity in the class*

**University Examination Pattern:**

*Examination duration: 3 hours*

*Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Part B (60 Marks) – Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.*

**Course Outcome:**

- *At the end of the course, the students shall be able to apply the theoretical knowledge in small research projects. They shall be able to prepare research reports and technical papers in accepted formats.*
- *Students shall get familiar with recent research in Architecture and relate fields of Built environment.*
- *Students shall be confident to publish their research reports in journals.*

## 13AR1607.2 ARCHITECTURAL CRITICISM (Elective II)

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objectives:

- To sensitise the student into the necessity for architecture criticism.
- To examine the leading architecture discourses that drives the practice & production of architecture.
- To learn the methods employed in architecture criticism.
- To learn how to present architecture criticism.

### Module – I

**Introduction to Architecture Criticism:** The need for critical thinking and reasoning for Architecture- The theoretical basis for architecture criticism- Critical discourses in Architecture.

The interdisciplinary nature of Architecture theory- Power to draw from arts and science.

### Module – II

Examinations on normative theories of Architecture: Modernism, Structuralism, Post Modernism- Post Strcuturalism- Deconstructivism.

### Module – III

Modes of architectural criticism- Descriptive, Analytical, the influence of different ideologies and power structures on architecture – how architecture influence power structure.

### Module – IV

Communicating the architectural criticism- Developing a schema for the criticism- presentation of the criticism- analysis of critical writings in Architecture- The power of rhetorical in criticism.

### References:

1. Hays, K. Michael, ed. *Architectural Theory Since 1968*, Cambridge, Mass.: MIT Press, 1998.
2. Aldo Rossi, *Architecture of the City*, The MIT Press; Reprint edition (September 13, 1984)
3. Tom Spector, *Ethical Architect: The Dilemma of Contemporary Practice*, Chronicle Books, 2001
4. Bernard Tschumi, *“The Architectural Paradox”*, MIT Press, 1996.
5. Michel Foucault, *“Space, Knowledge and Power”*, Ashgate Publishing, Ltd., 2012.

**Internal Continuous Assessment (Maximum Marks - 50) (Group 2 Subject)**

*50% - Tests (minimum 2)*

*30% - Assignments (minimum 2) such as home work, quiz, seminar, term-project, etc.*

*20% - Regularity in the class*

**University Examination Pattern:**

*Examination duration: 3 hours*

*Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Part B (60 Marks) – Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.*

**Course Outcome:**

*The learner is enabled to critically analyse the theories and discourses prevalent in architecture. The learner is enabled to methodologically criticize a work of architecture. The student can effectively present a critical work.*



## 13AR1607.3 ARCHITECTURE JOURNALISM AND PHOTOGRAPHY (Elective II)

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objective:

*To create an awareness in architectural journalism and photo journalism.*

#### Module – I

Brief account of the origin and development of Architectural Journalism in India. History of the development of electronic media in India, Radio & TV Introduction, Scope of journalism in architectural education.

Introduction to photo journalism. Application of photo journalism in architectural reporting.

#### Module – II

Communication: Definition, meaning, concept, elements, process, functions and scope. Types and forms of communication, Barriers to communication. 7 C's of communication.

#### Module – III

Ethics: Meaning & definition, Ethics of architectural reporting, its positive and negative impact on society.

#### Module – IV

An architectural documentation.

**(Evaluation may be done by internal assessment)**

### References:-

1. Agarwal V. B., *Handbook of Journalism*.
2. Kamath K. V., *Professional Journalism*.
3. Kamath K. V., *Journalist hand book*
4. Harold Evens, *Handling News Paper Text*.
5. Roger Hicks, *Practical Photography*, Cassel. London 1996.
6. Atoe Wayne, *"Architecture and Critical imagination"*, John Wiley & sons, Ltd., 1978.

### Internal Continuous Assessment (Maximum Marks - 50) (Group 2 Subject)

40% - Tests (minimum 2)

20% - Assignments (minimum 2) such as home work, quiz, seminar etc.

20% - Term-project based on Module IV.

20% - Regularity in the class

**University Examination Pattern:**

*Examination duration: 3 hours*

*Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each, from modules I, II and III.*

*All questions are compulsory. There should be minimum two questions from each module and not more than three questions from any module.*

*Part B (60 Marks) – Two Questions each from modules I, II and III. Candidates have to answer any one full question out of the two from each module. Each question carries 20 marks.*

**Course Outcome:**

*Upon completion of the course, the student of architecture shall develop an interest in Architectural journalism and photography and shall be able to work in the profession of architectural reporting and new media.*

## 13AR1607.4 PRODUCT DESIGN (Elective II)

Teaching Scheme: 2(L) - 0(T) - 0(P)

Credits: 2

### Course Objective :

*To understand the importance of product design in different fields of application.*

#### Module – I

Introduction to product design and development, Fundamentals of 3D modeling, Basic designing processes Visual Perception and gestalt theory.

#### Module – II

Product Ergonomics - Introducing Ergonomics. Discipline approach: Ergonomics and Human factors. Human physical dimension concern. Posture and movement. Behaviour and perception Study of Ergonomics and Anthropometrics.

#### Module – III

Occupational safety and stress at workplace in view to reduce the potential fatigue, errors, discomforts and unsafe acts. Workstation design. Furniture support. Vertical arm reach and design application possibility. Humanising design: Design and human compatibility, comfort and adaptability aspects

#### Module – IV

Project: Simple Product Design

Generation of themes, product brief and presentation.

*The student has to conceptualize a product and through the various stages of development reach a design for the product. It has to be presented as a working or non-working prototype in a 1:1 scale (exceptions as decided by the faculty).*

#### References:-

1. Koos Eissen and Roselien Steur, *Drawing Techniques for Product Designers*.
2. Brenda Laurel, *Methods and Perspectives -*
3. DebkumarChakraborty, *Indian Anthropometric Dimensions for Ergonomic design Practice - (for Indian body dimensions)*.
4. Donald A. Norman, *Emotional Design: Why We Love (or Hate) Everyday Things*.
5. Richard Morris, *Fundamentals of Product Design*.

**Internal Continuous Assessment (Maximum Marks - 50) (Group 2 Subject)**

*40% - Tests (minimum 2)*

*20% - Assignments (minimum 2) such as home work, quiz, seminar etc.*

*20% - Term-project based on Module IV.*

*20% - Regularity in the class*

**University Examination Pattern:**

*Examination duration: 3 hours*

*Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each, from modules I, II and III.*

*All questions are compulsory. There should be minimum two questions from each module.*

*Part B (60 Marks) – Two Questions each from modules I, II and III. Candidates have to answer any one full question out of the two from each module. Each question carries 20 marks.*

**Course Outcome:**

*Upon completion of the course, the student shall acquire a basic awareness in conceptualizing the design of a product and presenting it and develop a general understanding of the basic rules of product design as well as the physical and psychological requirements of design.*

## **13AR1608 STRUCTURAL DESIGN V**

### **(Advanced Structural Systems)**

**Teaching Scheme:** 2(L) - 1(T) - 0(P)

**Credits:** 3

#### **Course Objective :**

- *To understand limit state design of RCC structures*
- *To make the student capable of designing members like beams, slabs, columns and footings.*

#### **Module – I**

Design philosophy of Limit state method - Design of singly reinforced beams under flexure and shear by limit state method.

Design of Doubly reinforced beams under flexure and shear by limit state method

#### **Module – II**

Design of T-beam under flexure and shear.

Check for deflection in beams.

#### **Module – III**

Design of One Way slab under flexure and shear.

Design of Two way slab under flexure and shear under both conditions of corners free to lift up and corners prevented from lifting up.

Check for deflection in slabs.

#### **Module – IV**

Design of short column subjected to axial loads

Design of column subjected to combined axial load and uniaxial bending by limit state method.[ Use SP 16 Charts].

Design of column subjected to biaxial moment.

Design of Footings- Square and Rectangular shapes only. Subjected to Axial compressive loads.

#### **References:-**

1. Ashok K Jain, Limit state Design
2. Unnikshna Pillai and Devdas Menon, Design of concrete structures
3. Rama Chandra, Limit state Design

**Internal Continuous Assessment (Maximum Marks - 50) (Group 2 Subject)**

*50% - Tests (minimum 2)*

*30% - Assignments (minimum 2) such as home work, quiz, seminar, term-project, etc.*

*20% - Regularity in the class*

**University Examination Pattern:**

*Examination duration: 3 hours*

*Maximum Total Marks: 100*

*The question paper shall consist of Two Parts*

*Part A (40 marks) - Eight Short answer questions of 5 marks each. All questions are compulsory. There should be two questions from each module.*

*Part B (60 Marks) – Two Questions from each module. Candidates have to answer any one full question out of the two from each module. Each question carries 15 marks.*

**Course Outcome:**

*Upon completion of the course, the student shall be able to analyse and design beams, slabs, columns and footings.*

## 13AR1609 BUILDING SCIENCE LABORATORY

Teaching Scheme: 0(L) - 0(T) - 2(P)

Credits: 2

### Course Objective :

- To familiarize the students with building science, related parameters and its application in buildings.
- To understand various equipment and their principles for the determination of functional efficiency of buildings.
- To understand prevailing ISO Standards related to the above parameters.

### Module – I

Measurements of Air Temperature (indoor and outdoor), Relative Humidity (indoor and outdoor), Mean Radiant Temperature (MRT), Air movement indoors, Wind velocity outdoors, Solar Radiation, Surface Temperature and Thermal Insulation of materials.

### Module – II

Study of relationship between MRT and Solar Radiation, Study on comfort parameters and comfort indices,

Evaluation of thermal comfort using Architectural Evaluation System

Measurement of illumination indoors – natural and artificial, Study of Sun path and shading devices.

### Module – III

Measurement of sound indoors and outdoors.

Determination of acoustical properties of materials.

### Module – IV

Non Destructive Tests for Concrete - Measurement of compressive strength of concrete using Rebound Hammer, Determination of cavities in concrete using Ultra Sound Method, Locating reinforcement bars embedded in concrete using Rebar Locator, Determination of degree of corrosion using Corrosion Analyser.

### References:-

1. Laboratory Manual
2. Otto Koenigsberger *et al.*, “Manual of Tropical Housing and Building”, Orient Longman, India, 2003.
3. Givoni B, “Man, Climate and Architecture”, Prentice Hall, New York, 1981.
4. Martin Evans, “Housing, Climate and Comfort”, Thames and Hudson, New York, 1984.

5. David Egen, "*Architectural Acoustics*", J Ross Publishers, Canada, 2008.
6. BIS, "*SP 41: Handbook on Functional Requirement of Buildings*", BIS, New Delhi, 2005.
7. Relevant Indian Standard Codes

**Internal Continuous Assessment** (*Maximum Marks - 50*)

*40% - Test*

*40% - Class/Field work and Record*

*20% - Regularity in the class*

**Course Outcome:**

*Upon completion of the course, the students shall have acquired the concept of various parameters related to the functional efficiency of buildings and their measurements. The student shall acquire knowledge in both the principles of equipment as well as the ISO standards*