

**COURSE STRUCTURE: SECOND YEAR B.ARCH PROGRAMME**

<b>IIIrd SEMESTER</b>				
<b>Sl.No.</b>	<b>Code</b>	<b>Theory</b>	<b>Contact Hrs (L-T-P)</b>	<b>Credit</b>
1.	AH312	Environmental Psychology	2-0-0	2
2.	AS323	Building Services – I (Water supply and Sanitation)	3-0-0	3
3.	AS333	Structural Analysis	3-0-0	3
4.	AR343	History of Architecture- II	3-0-0	3
5.	AR352	Climatology	2-0-0	2
<b>TOTAL</b>			<b>13</b>	<b>13</b>

<b>Sl No.</b>	<b>Code</b>	<b>Sessionals</b>	<b>Contact Hrs (L-T-P)</b>	<b>Credit</b>
6.	AR366	Architectural Design – I & Measured Drawing	0-0-9	6
7.	AR372	AutoCAD – I	0-0-3	2
8.	AR382	Climatology Lab	0-0-2	2
9.	AR394	Bldg Const - III	3-0-3	4
<b>TOTAL</b>			<b>20</b>	<b>14</b>
<b>Credits</b>				<b>27</b>

<b>IVth SEMESTER</b>				
<b>Sl.No.</b>	<b>Code</b>	<b>Theory</b>	<b>Contact Hrs (L-T-P)</b>	<b>Credit</b>
1.	AH412	Sociology	2-0-0	2
2.	AR423	Building Services – II (Acoustics)	3-0-0	3
3.	AS432	Surveying	2-0-0	2
4.	AR443	History of Architecture- III	3-0-0	3
5.	AR452	Environmental Studies	3-0-0	2
<b>TOTAL</b>			<b>13</b>	<b>12</b>

<b>Sl No.</b>	<b>Code</b>	<b>Sessionals</b>	<b>Contact Hrs (L-T-P)</b>	<b>Credit</b>
6.	AR466	Architectural Design – II	0-0-9	6
7.	AR472	AutoCAD – II	0-0-3	2
8.	AR484	Bldg Const - IV	3-0-3	4
9.	AS492	Surveying Lab	0-0-3	2
10.	AR4102	Architectural Photography	0-0-2	2
<b>TOTAL</b>			<b>23</b>	<b>16</b>
<b>Credits</b>				<b>28</b>

# AH312 **Environmental Psychology (2-0-0)**

Human beings are in constant interaction with the environment. With the growth of civilization, men are making more and more artificial environments, and architects and planners play a significant role in this process. The present course is designed to acquaint the students with some fundamental aspects of the course content.

## **Module-1**

Environmental Psychology- What is it and its relation to Architecture and planning. Meaning of environment; Measurement of environmental stimuli from psychological aspect

Behavioral effects of Environmental conditions.

- a. Physical - Noise, Temperature and air pollution
- b. Social- Overcrowding and isolation.
- c. Extra ordinary- Catastrophe.

## **Module-2**

Perceptual factors of environment- perception of distance. Size and movement. Meaning of colour and form. Social and Cultural influences on environmental perception.

## **Module-3**

Personal space- individual and situational as determinants of personal space. Consequences of too much or too little of

Personal space. Personal space and environmental space as implications for design aspects.

## **Module-4**

Psychological aesthetics - Measurement of communication through art; determination of pleasantness and unpleasantness as psychological factors in environmental design.

Adaptation to environment - Behavioral aspects of adaptation to familiar and unfamiliar environment.

## **References:**

*Francis D.K. Ching, Architecture-Form Space and Order, Van Nostrand Reinhold Company, New York.*

*Wicius Wong, Principles of colour composition*

*Robert Gill, Rendering With Pen and Ink*

*Ramsay and Sleeper, Architectural Graphic standards*

*V.S Parmer, Design fundamentals in architecture.*

*Bell, P.A Fisher, J.D. Leomis, R.J- Environmental psychology*

*Munn, N.C. Psychology, Fundamentals of Human adjustment.*

# AS323 **Building Services-I (3-0-0)**

(water supply and sanitation)

To impart the knowledge and skills required for understanding the building services of water supply and sanitation and their integration with architectural design.

## **Module-1**

*Water supply* - General idea of sources of water supply: qualitative and quantitative aspects, Impurities, hard and soft water treatment and distribution systems  
Domestic water supply systems, sump, overhead tank, pipe size, pipe fittings.  
Cold water and hot water supply for multistoried buildings, types of taps, types of valves etc. provision for fire fighting and code requirements.

## **Module -2**

### *Sanitation*

Importance; refuse types; collection and disposal. Basic principles of sanitation and disposal of waste water from buildings. Urban and rural drainage and sanitation, different collection and disposal systems.

## **Module - 3**

A brief on sewage treatment, septic tanks, oxidation ponds, soak pits, aqua privy, manholes, inspection chambers, intercepting chamber, cast iron manholes, Self cleansing velocity, drains on sloping sites, subsoil drainage, garage drainage and layout of simple drainage systems and testing of drains.

## **Module - 4**

Sewers, materials, workmanship, laying and testing of sewers; Cleaning of sewers; ventilation of sewers; sewer recycling of water.

**Site visits** - Water treatment plant, Sewage treatment plant.

Multistoried apartments for studying water supply and sanitary arrangements.

## **References:**

*S. Birdi, Water supply and sanitary engineering*

*B.C. Punmia, Water supply and sanitation*

*S.C. Rangwala, Water supply and sanitation*

# AS 333 **Structural Analysis-I (3-0-0)**

## **Module 1**

1. Introduction to Statically determinate/ indeterminate Structures with reference to 2D and 3D structures. Free body diagram of structures.
2. B.M. and S.F. diagrams for different loading on simply supported beam, cantilever, propped cantilever and overhanging beams. Three hinged arches, tangential shear and normal thrust

## **Module 2**

3. Deflection: Different methods, Castigliane's theorems, Reciprocal theorems, Conjugate beam method, Unit load method.
4. (a) Deflection of joints /supports for trusses.  
(b) Application of Clapeyron's three moment theorem; Continuous beams.

## **Module 3**

5. ILD for determinate structure for reactions at supports, S. F at a given section, B.M. at a given section, maximum shear and maximum B. M at a given section; problems relating to series of wheel loads, udl less than or greater than the span of the beam,
6. ILD for B.M., S.F normal thrust and radial shear of a three hinged arch.

## **Module 4**

7. Suspension cables, 3 hinged stiffening girders
8. Introduction to space frames.

## **References:**

*Structural Analysis - C. S. Reddy, TMH Publisher*

*Structural Analysis - Norvis and Wilber*

*Mechanics of Materials - J. M Gere and S. P. Timoshenko, CBS Publishers and Distributors.*

# AR 343 **History of Architecture-II (3-0-0)**

(World Architecture)

To develop strong historical sense of architecture in ancient world and majorly in Europe. Also to understand the link in architectural development in terms of planning principles, material used, techniques involved and effects of socio- cultural, economical and political conditions.

## **Module 1**

1. Development of prehistoric and historic architecture

2. Egyptian Architecture

Characteristic features

Secular Architecture

Mastabas, Ex: Mastaba of Thi Sakkara

Pyramids Ex: Stepped pyramid of Zoser, Sakkara , Bent pyramid of Dahshur, Great pyramid of Cheops.

Temples, Ex: Temples of Khons, Karnak

3. Ancient Near East Architecture

Characteristic features

Sumerian Architecture, Ziggurats, Ex: White Temple, Warka.

Babylonian Architecture, Ex: City of Babylon

Assyrian Architecture, Ex: City of Khorsabad

Persian Architecture, Ex: City of Susa

## **Module 2**

4. Classical Greek Period

Characteristic feature of Aegean Architecture

Hellestic period and Hellenistic period

Greek orders, Doric , Ionic and Corinthian

The Acropolis at Athens, Parthenon, Propylea, Theatre, Stadium and Agora

## **Module-3**

5. Classical Roman Period

Characteristic features of Etruscan and Roman Architecture

Roman Orders, Doric, Ionic, Corinthian

Tuscan and Composite

Temples, Ex: Temple of Saturn and Pantheon

Basilica of Trajan, Thermae of Carcalla

Amphitheatre, Ex: Coliseum

Forum, Circus, Triumphal arch, Aquaduct, Bridge, Road Sewer and Fountain

## **Module-4**

6. Early Christian period

Characteristic features

Basilican Churches, Ex: St. Peter, Rome

7. Byzantine Period

Characteristic feature, Ex: Hagia Sophia

8. Romanesque Period

Characteristic feature, Pisa Cathedral complex

9. Gothic Period

Characteristic features

Early Gothic style and Late Gothic style, Ex Notre Dame, Paris

## **References:**

1. *Sir Banister Fletcher. A History of Architecture. University of London.*
2. *G.K.Hiraskar. World History of Architecture. Dhanpat Rai and Sons*

# AR352 **Climatology** (2-0-0)

To apply the principles of climatology in architectural design

## **Module-1**

Introduction to climatic environment and its effect on human comfort.

Macroclimate and microclimate, study of world climatic zones, tropical climate in particular.

Climatic elements- sun, solar radiation, temperature, wind, humidity, cloud, precipitation etc.

Sun path diagram and uses of sun path diagram, design of shading devices.

## **Module -2**

Ventilation and air flow principles, principles of natural ventilation, air change, wind flow around buildings and air flow patterns inside buildings.

Micro climate and Macro climate.

Tropical climate. Characteristics of warm and humid, hot and dry and composite climates. Orientation of single building. Building material and construction in the tropical climate.

## **Module-3**

Effect of landscape elements on climate /building. Thermal effects of buildings, thermal insulation of building, Techniques of thermal insulation of roofs, exposed walls ;exposed windows, doors and ventilators. Introduction to passive solar techniques of thermal comfort in design

## **Module- 4**

Day lighting- sky as the source of internal light, day light factor,

Components of daylight factor - the sky component, the internal and external reflected Component, glare, recommended levels of illumination for different types of building interiors.

NB: Buildings of architectural value to be measured in details and drawings in appropriate scale to be prepared. Use of different survey instruments to measure the height of building. . Free hand perspective and scio-graphy of the building

## **References:**

*OH Koenigsberger and others. Manual of Tropical housing and building (Part-I) Climatic design. Longmans. London-1974.*

*M. Evans. Housing, Climate and Comfort Architectural Press. London 1980.*

*B.Givoni. Man, Climate and Architecture. Applied science. Barking Essex. 1982.*

*A Konva. Design primer for hot climates. .A.rchitectural Press London.*

*Anthony Sealey. Introduction to building Climatology.*

*Dr. VNarasingham. An Introduction to building physics.*

*C.P.Kukreja. Tropical .A.rchitecture.*

*Olgyayand Olgyay. Solar Control and shading devices.*

## AR366 **Architectural Design-I** (0-0-9)

To continue to develop analytical skills, creative ideas and synthesis of the same.

1. Evolution of plan form in relation to physical, climate and site consideration, form and their relationships to total environment and site, selection of materials and construction.
2. Analysis and formulation of design criteria and concepts for eating places, community gathering places, memorials and pavilions and composite residences. Data collection and analysis, climatic conditions, socio economic and user requirements.

N.B. Minimum two projects and one time problem must be conducted. Time problem is to be of 9 hours duration.

## AR372 **Cad Lab-I** (0-0-3)

To develop an awareness in Computer aided Architectural Design and Drafting.

1. Introduction to computer aided design in architecture. Introduction to two dimensional drafting in CAD.
2. Understanding commands like Draw, Modify, Use of tools, layers, plotting system and its applications etc.
3. Application of CAD in small Architectural projects done in the previous semester design class through site plan, floor plan, presentation plan, elevation and section using appropriate software.

## AR382 **Climatology Lab** (0-0-2)

The course is designed to develop the awareness of students on the problems faced due to the unwanted direct or indirect solar radiation penetration into the building. The main idea of the architect is to utilize daylight to create visual links between indoor and outdoor spaces, to let the direct solar radiation in when is required during under heated periods of the year and to avoid solar radiation entering the building during over heated periods.

The students will learn various solar control methods and their applicability. Various architectural applications are to be added into the course to exemplify the theoretical information and to encourage the students to think of more creative design solutions.

### **Assignment No-1**

Visit to the climatological observatory and study of different Instruments.

### **Assignment No-2**

Function of different instruments with sketches:

- a) Stevenson screen
- b) Sunshine recorder
- c) Anemograph
- d) Wind vane
- e) Rain gauge

**Assignment No- 3**

Study of Psychrometric charts to find the various parameters of air vapour mixture.

**Assignment No- 4**

Relation of climatic elements to comfort conditions.

Bio-climatic chart and climatic evaluation by region.

Solar analysis, Wind analysis and Humidity analysis.

**Assignment No- 5**

Effective Temperature nomograph

**Assignment No-6**

The motion of the Earth around the Sun.

Graphical method to determine Sun path

**Assignment No-7**

Stereographic projection Sun path Diagram

Method of calculating solar altitude, Azimuth angle and Shadow angle.

**Assignment No- 8**

Obstruction of the sky vault and shading mask.

Shadow angle and shadow angle protractor.

**Assignment No- 9**

External solar control and external shading devices

**Assignment No- 10**

Wind effects and air flow patterns

Wind analysis.

Local factors in wind orientation.

Flow pattern inside building.

**Assignment No-11-13**

Case study of five buildings (Group wise)

**References:**

1. O. H. Koenigsberger and others. *Manual of Tropical housing and building (Part-I) Climatic design*. Longmans. London-1974.

2. M. Evans. *Housing, Climate and Comfort*. Architectural Press. London 1980.

3. B. Giovanni. *Man, Climate and Architecture*. Applied science. Barking Essex. 1982.

4. IS:3362-1977 *Code of Practice for natural ventilation of residential building*

5. Victor Olgyay, "*Design with Climate: Bio climatic approach to Architectural Regionalism*", Van Nostrand Reinhold, New York, ISBN - 0 -442-01110-5

## AR 394 **Building Construction-III** (3-O-3)

To acquaint the students with construction practices pertaining to framed RCC structures, understanding of Steel structures, foundation types and form work.

Advanced foundations-combined and eccentric footings, raft foundations, pile foundations, details of pile and pile cap.

Advanced doors and windows, heavy paneled moulded doors in timber, fully glazed sliding and folding doors and windows and bay windows, rolling shutters.

Arches and portals in R.C.C., steel and laminated timber construction

Curtain walls-curtain walls in glass, aluminium, precast concrete units etc.

Folded plates and barrel shells, hyperbolic, parabolic and domes in R.C.C.

Raking shore, flying shore, scaffolding, centering etc.

**References:**

W.B. Mackay, *Building construction*

Barry, *Building construction*



# 4<sup>TH</sup> SEMESTER,

## AH412 **Sociology** (2-0-0)

To understand socio-physical environment and its implication to architectural space planning and design. To give emphasis on concepts and idea in sociology and relate to elements of settlement and built form.

### **Module-1**

Introduction

Man, his social and physical environment, social groups and social structure, utility and relation with architecture.

Indian communities

Rural and Urban communities, their social structure and problems, cultural heritage, rituals and community gatherings etc.

### **Module-2**

Urbanization

Trends and characteristics, dynamics of urban growth and social change, urban attitudes, values and behaviour, review of commissions reports etc.

### **Module-3**

Social aspects of physical environment .

Its implications and limitations on buildings, neighbourhood planning, slum improvement and city fabric, etc. significance of public opinion and participation.

### **Module-4**

Case studies

Sociological studies of communities with their habitats and built environment.

### **References:**

*Vidya Bhusan, Dr.D.R.Sachdeva, An introduction to Sociology*

*G.K.Agarwal, Principles of Sociology.*

## AR423 **Building Services-II** (3-0-0)

(Acoustics)

To develop the knowledge and skill required for understanding acoustics in buildings and its integration with architectural design.

### **Module-1**

Introduction to architectural acoustics-characteristics and measurement of sound, frequency, intensity, decibel scale.

Acoustics and acoustical environment behavior of sound in an enclosed space. Principle of geometrical acoustics, different acoustical defects in auditoriums and its solutions; reverberation & reverberation time calculations-Sabine's formula and its interpretation, dead and live room.

### **Module-2**

Design of auditorium –size, shape, sitting arrangement design criteria for speech and music, acoustical correction, design and modification.

### **Module-3**

Open air acoustics: Free field propagation of sound, absorption from air and natural elements, effects of barriers, effects of landscape elements, design of open air theatre

### **Module-4**

Acoustical material: general description of acoustical materials –acoustical tiles, fibre board, acoustic plaster, composite materials etc –their use, selection criteria and construction methods.

### **References**

*A.B Wood, A textbook of sound.*

*T.M Yarwood, acoustics.*

*David Egan, Architectural acoustics.*

*Perich, Peter, Acoustics: Noise and Buildings.*

## AS432 **Surveying** (2-0-0)

### **Module-1**

1. Linear measurement and chain survey: use of various types of tape measurement etc of correct length of line, direction and indirect ranging, changing along sloping ground. Obstacles in changing, errors, and their elimination

### **Module-2**

2. Compass surveying: Use of prismatic compass, temporary adjustment, bearing of a line, local attractions, correction of bearing.

3. Plane table surveying : Methods of plane table, radiations. Intersections , traversing and resection. 2-point and 3-point problem, adjustment and common error in plane table survey.

### **Module-3**

4. Levelling: Use of dumpy level and leveling staff. Temporary and Permanent adjustments of dumpy level. Reduction of levels by H.I and rise and fall method. Curvature and refraction error, sensitiveness of level tube, reciprocal leveling, leveling difficulties and common errors.

### **Module-4**

5. Contouring: Contour interval and horizontal equivalent . Characteristics of contours, methods of contouring - direct and indirect method, contour gradient.

6. Theodolite Survey: Use of theodolite, temporary adjustment, measuring horizontal and vertical angles, theodolite traversing or measurement of included angles

**References:**

*Surveying and levelling Vol - 1, T. P. Kanetkar and S. V. Kulkarni*

*Surveying - Vol - I, B. C. Punmia*

*Surveying, Husain and Nagnas*

*Surveying and leveling – R. Agor*

## AR443 **History of Architecture-III** (3-0-0)

(Islamic Architecture in India)

OBJECTIVE: to give an understanding of the evolution of Islamic architecture in its various stylistic modes, characterized by technology; ornamentation and planning practices.

**Module-1**

1. Development of Islamic Architecture in India
  2. Characteristic feature of Islamic Architecture
- Islamic Architecture in Delhi
- a. Qutab Complex
  - b. Jama Masjid
  - c. Humayun's Tomb
  - d. Red Fort

**Module-2**

3. Islamic Architecture of Agra and Fatehpur Sikri
- a. Agra Fort
  - b. Taj Mahal
  - c. Moti Masjid , Agra
  - d. Jami Masjid ,Fatehpur Sikri .
  - e. Panch Mahal,Fatehpur Sikri
  - f. Diwan-i-Khas and Diwan-i-Aam, Fatehpur Sikri

**Module-3** Provincial Style of Bijapur

- g. Characteristic features
- h. Gol Gumbaj
- i. Ibrahim Rouza
- j. Jami Masjid

## 4. Provincial Style of Gujarat

- a Characteristic feature
- b. Jami Masjid of Ahmedabad
- c. Teen Darwaza

## 5. Provincial Style of Bengal

- a. Characteristic feature
- b. Adina Mosque
- c. Dakhil Darwaza

**Module-4**

6. Provincial Style of Golconda and Malwa

Characteristic feature and examples

- Golconda
- Charminar
- Malwa
- Jahaz mahal

7. Colonial Architecture influenced by Islamic Style with specific reference to:

- a. Rastrapati Bhawan
- b. Victoria Terminus (CST)

**References:**

*Percy Brown, "History of Architecture-Islamic period"*

*Satis Grover, "Architecture of India: Islamic"*

*G.K. Hiraskar. World History of Architecture. Dhanpat Raj and Sons.*

## AR452 **Environmental Studies** (3-0-0)

Course objectives: To enable the student to understand the ecosystem, effect of pollution, environmental degradation, and eco sustainable development.

**Module-1**

Fundamentals of Ecosystem, our earth's Environment.

**Module-2**

Human impact on Environment, Resources and Environment, Environmental pollution, Management of Environment .

**Module-3**

Environmental legislation, Environmental quality and indicators, International Protocols regarding environmental issues and management.

**Module-4**

Environmental planning and Design guidelines (Green Building and sustainability criteria)

**References**

*-Ecology/ Principle and application ; J.L Chapman and M.J Ress; Cambridge*

*-Environmental Economics; Charles. D Kolstad: Oxford University Press*

*-The Hidden Connection; F.capra , Harper and Collins*

## AR466 **Architectural Design-II** (0-0-9)

To continue to develop the skill of analysis, creative idea finding and their synthesis.

1. Evolution of plan form in relation to physical, climate and site consideration, form and their relationships to total environment and site, selection of materials and construction.
2. Analysis and formulation of design criteria and concepts for design problems such as Primary Schools, Day Care Centres, Health Care Centres, Post offices, Banks, Daily markets/Weekly Haats. Data collection and analysis, climatic conditions, socio economic and user requirements.
3. Minimum two projects and one time problem must be conducted.
4. Time problem is to be of 8 hours duration.

## AR472 **CAD LAB-II**(0-0-3)

To acquire 3D drawing skills using a computer

1. CAD application in 2D and 3D architectural drawings, modeling, UCS generation, creation of entities, dimensioning, application of solids and surfaces
2. Customization of autoCAD, autoCAD express tools, creation of architectural library elements and blocks, applying materials and rendering

## AR484 **BUILDING CONSTRUCTION – IV**(3-0-3)

Different types of trusses and Girders – North light, N-type, K-type, Tubular; Space frames – Hyperbolic paraboloids, Single layer, Double Layer; Expansion and Contraction joints, Water proofing, Rain water Harvesting – Recharge pits.

Structural Glazing, External-Composite- panel- cladding.

Non-conventional construction techniques – Filler slabs, Prefabricated components, Application of Ferro-cement, Bamboo construction techniques, Frameless doors and windows Walling techniques (Laterite and granite stones, Adobe, Rammed earth, Wattle and Daub, Sundried Mud Blocks, Fly Ash, Brick Jaalis, Hollow bricks, Chequerred bricks, etc.)

## AS492 **SURVEYING LABORATORY** (0-0-3)

Testing of chain and measurement of correct length of the line.

Traversing by chain survey.

Traversing by Compass survey.

Intersection method of plane table survey.

Traversing by plane table.

Use of dumpy level and fly leveling.

Longitudinal Section and Cross Section.

Contouring.

Measurement of horizontal and vertical angle of theodolite.

Traversing by theodolite by measurement of included angles.

## AR402 **ARCHITECTURAL PHOTOGRAPHY** (0-0-3)

To enable students to understand photography as a strong medium of visual presentation, documentation work, overlapping images to create illusions and bring in newness in presentation works; to develop skill in 3D perception and presentation.

1. Photography for documentation work. Use of Photography for making audio-visual Presentation projects.

2. Use of Photography for simulating, overlaying or just positioning of building in different background /environments.

3. Special skills and equipment required for photography of buildings-Effects of using various lenses / filters in Photography of buildings.

4. Effects of outdoor light on buildings for photography, study of shadow in architectural photography.

5. Scale relationships in photography of buildings.-Photographing interiors-special skills and equipment required.

Comparative values / effects black and white effects/ colour photography in architecture. .

# BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ORISSA

## Architecture

<u>5<sup>th</sup> SEMESTER</u>				<u>6<sup>th</sup> SEMESTER</u>			
<i>THEORY</i>		<i>Contact Hours</i>		<i>THEORY</i>		<i>Contact Hours</i>	
<i>Code</i>	<i>Subject</i>	<i>L-T-P</i>	<i>Credits</i>	<i>Code</i>	<i>Subject</i>	<i>L-T-P</i>	<i>Credits</i>
AR513	Contemporary Architecture	3-0-0	3	AS614	Steel Structure	4-0-0	4
AE523	Building Services –III (Illumination)	3-0-0	3	AM623	Building Services – IV (Refrigeration & Air Conditioning)	3-0-0	3
AS534	Concrete Structure	3-1-0	4	AR633	Landscape Design	3-0-0	3
AH542	Building Economics	2-0-0	2	AR642	Estimation & Valuation	2-0-0	2
AR553	Specification	3-0-0	3	AR653	Interior Design	3-0-0	3
			<b>Credits (Theory) 15</b>				<b>Credits (Theory) 15</b>
<i>PRACTICALS/SESSIONALS</i>				<i>PRACTICALS/SESSIONALS</i>			
AR566	Architectural Design – III	0-0-9	6	AR666	Architectural Design – IV	0-0-9	6
AR572	Computer Graphics	0-0-3	2	AR674	Working Drawing -II	0-0-6	4
AS582	Material Testing Lab	0-0-3	2	AR682	Landscape Design & Site Planning	0-0-3	2
AR594	Working Drawing -I	0-0-6	4	AR692	Interior Design lab	0-0-3	2
			<b>Credits (Practicals / Sessionals) 14</b>				<b>Credits (Practicals/Sessionals) 14</b>
<b>TOTAL SEMESTER CREDITS</b>			<b>29</b>	<b>TOTAL SEMESTER CREDITS</b>			<b>29</b>
<b>TOTAL CUMULATIVE CREDITS</b>				<b>TOTAL CUMULATIVE CREDITS</b>			

## AR513 **CONTEMPORARY ARCHITECTURE** (3-0-0)

Course objective; History to be studied as development of built form and ornamentation, structural solutions, construction methods, plan and building facade organization in relation to aesthetic/religious/social philosophy and environmental factors.

The study should focus on the general trends and not on specific examples of buildings.

### **Module-1**

Introduction to Contemporary Architecture.

Invention of building materials and techniques-Early glass and iron construction, Introduction of steel frame, influence of prevailing architectural styles in the continent. Industrial revolution and Iron Age. Invention of building materials and techniques. Great exhibitions and achievements in technology and expression.

French revolution and industrial revolution.

### **Module-2**

Search for new forms; Rationalism, Engineering tradition. Art and Craft ideals and Art Nouveau movement. American development, Chicago school, Louis Sullivan, Architectural system of Frank Lloyd Wright, response to mechanization-Deutscher Werkbund, Futurism and Amsterdam school.

New space conceptions, Cubism, Le Corbusier's quest for ideal form, Bauhaus movement and international style.

### **Module-3**

Detailed discussion on Indian architects' works-emphasis on modernity and tradition in the regional context, Birth of post modernism, Deconstruction and Architecture in the age of electronic media, emerging concepts. Futuristic vision about human habitat.

### **References:**

1. Frank Lloyd Wright; Architecture and space-Blake P/720 Blais
2. Charles Correa/Kenneth Frampton



## **AE523 BUILDING SERVICES-III (3-0-0)** (Illumination and electrical services)

Course objective:

This course focuses on the study of artificial lighting system and electrical lay out in buildings and the power distribution in towns and cities.

### **Module-1**

Radiation, colour, eye vision, different entities of Illuminating systems, Lighting sources incandescent/electrical discharge, fluorescent, arc lamps and laser, luminaries, wiring switching, and control circuits. Law of illumination, illumination from point, line and surface sources. Photometry and spectrometry, photocells, environmental and glare.

### **Module-2**

General Illumination design, interior lighting, industrial, residential, office departmental store, indoor stadium, theatre and hospital.

Exterior lighting –Flood, street, aviation and transport lighting, lighting for displays and signaling-Neon signs LED-LCD displays beacons and lighting for surveillance.

### **Module-3**

General distribution of electric power in towns and cities. Substation for small schemes and industrial units, supply undertaking, meter room, electrical installation in buildings, connection with the supply company, mains and meter board installation from the meter board to individual units. Electrical wiring system, different material employed and specifications. Distribution boards lay out of points etc. Domestic electrical appliances, earthing for electrical appliances, electrical installation for services such as air conditioning systems, lifts, elevator and pumps. Selection of cable/wire sizes; potential sources of fire hazards and precautions. Emergency supply-stand by and UPS.

Bye laws pertaining to electrical installations. Application of lighting system for shops and shop window, Offices, class rooms and lecture hall, stage, auditorium etc. Illumination level required in each case, Electrical installation lay out for design project to be done.

References:

1. Phillips lighting in Architectural design, McGraw Hill, New York
2. R.G Hook in son and J.P Kay Lighting of buildings fever and fever London
3. J.A Lynes, Development in lighting applied, science publishing ltd, London.
4. Architectural lighting design-Steffy, Gary R./621.32 STE/AN 90
5. Architectural lighting graphics/Flynn, john E./729.21 FLY/A

# AS534 **CONCRETE STRUCTURE** (3-1-0)

## Objective:

This Course Enables the Student to Understand the Design Principles of Reinforced Cement Concrete Structures and evolution of different design philosophies; Understanding limit state of collapse; knowledge of design of structural elements in limit state method and conversant with R.C.C Code of practice.

## **Module-1**

Introduction to Design Of Reinforced Concrete Structures; Limit State method of design, different limit states; concept of different methods of design; theory of singly reinforced beam for bending; Design of singly reinforced rectangular simply supported and cantilever beams for flexure, bond, shear and torsion; Design of doubly reinforced rectangular sections for flexure; Design of singly reinforced T-sections for flexure.

## **Module-2**

Limit state of collapse in compression; concept of short and long columns, end conditions; design of axially loaded short column  
Types of slabs; Design of One way And Two Way Slabs.

## **Module-3**

Footings: - Types of foundations and footings. Types of soils and their safe bearing capacities. Design of isolated column footing.

Water tank: - Types of water tanks, Design requirements as per std. practices.

Retaining Walls: - Types of retaining wall, Design requirements as per std. practices.  
Preliminary proportioning of dimensions of elements of cantilever retaining wall:  
Understanding the Design principles of different elements of cantilever retaining wall and designing the stem.

## **References:**

- 1) *Syal, I.C And Ummat, R.K, Analysis And Design Of Reinforced Concrete Elements, A.H. Wheelker & Co. Ltd, Allahabad*
- 2) *Dr.S.R Karve and Dr.V.L Shah-Limited state Theory and design of Reinforced Concrete (in S.I units)-structure publishers Jaltarang, Pune.*
- 3) *P.C.Varghese Limit state design of Design Reinforced concrete –Prentice-hall of India-New Delhi*
- 4) *Dr.H.J.Shah,-Reinforced Concrete Vol-I –Charotar Publishing*
- 5) *Dr.B.C Punmia, Ashoka Kumar Jain, Arun Kumar Jain,-Reinforced Concrete Structure-Lakmi Publication(P) Ltd New Delhi*

## AH542 **BUILDING ECONOMICS** (2-0-0)

To Enable The Students to Understand The Fundamentals of Economics and Building Engineering Economics; Issues Pertaining To Low Cost Building Techniques; Gov'ts Economic Plans, Etc.

### **Module-1**

Subject Matter Of Economics-Consumption, Production; Distribution & Exchange: Its Relevance to Urban Economy; Market Demand & Supply: determination to Price Changes & Elasticity; Study of Indian Economy Policy.

Factors of Production & Choice of Techniques; Laws of Return

### **Module-2**

Study of Cost Concepts & Development-Urbanization & Planning Urban Land Values-Land Utilization; Housing Analysis, Public Housing, Urban Public Utility Services-Problems & Perspective: Urban Problem, Poverty, Migration, Unemployment, Pollution.

City Planning & Administration Elements of Economics, Production Of Goods, Distribution Of Wealth, Unemployment Causes and Remedies; Land Distribution & Its Problems. Labour & Its Efficiency .Types Of business Enterprises.

### **Module-3**

Economics Of Building Construction ;Capital Return Form & Project ; Residential Properties, Offices, Cinemas,Hotels,Etc.Relation Between Initial &Recurring expenditure In Building Cost, Low Cost Housing; Examples Illustrating The Economics Of Building Costs; Private and semi- public Organizations; Features Of India's Five Year Plans Including Housing.

*References: The Teacher Shall Develop his References From various Sources.*

## AR553 **BUILDING SPECIFICATIONS** (3-0-0)

### Objectives:

This Course Is Intended To Impart Training In the Mode Of Detailed Clause by Clause Specifications As Complimentary To the Detail Drawings.

### **Module-1**

Introduction-Definition-Importance-Scope Of The Subject; Specification Forming Part Of Building Contract, Drafting Specification, Correct Form Of writing, Avoiding Duplication, Ambiguity And Conflicting Statements. Correct Order of Sequence, Specification Of Simple Building Materials i.e Brick, Stone, Lime, Cement and Wood etc.

### **Module-2**

Detail specification of Excavation In Foundation, Plain Cement Concrete, Masonry in Brick and Stone (Rubble and ashlar), Reinforced Cement Concrete Work  
Materials Quality and Standard, Various Mixes, Cutting Bending and Fixing Of M.S.bars.Centering Shuttering and Its Time Of Removal. Curing of Concrete, Flooring Paving and Tiling Indian Patent Stone. Terrazzo In -Situ, Flag Stone Flooring, Water proofing of Structure, Carpentry and Joinery  
Roof Work in Timber, Paneled Door And Glazed Windows. Specification for Structural steel work, Materials, Quality and Setting Out. Cutting and Welding. Specification of First Class Building .Specification Of Second Class Building.

### **Module-3**

Building Boards- Ply Wood Particle Boards, Block Boards, Acoustic Board. Flooring-Asphalt Rubber cork, Linoleum, Parquet, Etc.Glass- Various types Of Glass Used In buildings. Patent Glazing For Factories .Glass Brick Partitions Pavements Lights. Special Paints-Plastic Emulsion Paints, metal Paints, Cement Paints.  
Standard Specification for Different Institutions Like P.W.D, M.E.S, C.P.W.D, BIS Etc.Abstract Of Quantities And Writing Of Schedules, Rate And Material Analysis. Bill of Quantities.

### *References*

*L.M.Chakroborty: Estimating, costing, Specification & Valuation in Civil Engineering.*

## AR566 **ARCHITECTURAL DESIGN-III AND FIELD TRIP**(0-0-9)

### **Course Objective:**

Methods of space programming, behavioral survey, formulation of design criteria, application of climatic data, socio-cultural factors, behavioral aspects and structural considerations; Site analysis and design concepts, Design evaluation and application of building services .

### **Module-1**

Introduction to Design Problem1 of buildings like Banks , District level Post Offices, Architect's Office, Old age home,SOS village, Community centre, Rural Development Centre, Small auditorium, Large Guest House, Students' Hostel ,Small Hotel ,Holiday Resort ,Motel, Nursing Homes Etc  
Data collection, Programming, Analysis Case Study and Literature review

### **Module-2**

Concept Formulation and Preliminary Design.

### **Module-3**

Final Design Development and portfolio

### **Module-4**

Time Problem 18 Hours - -2 weeks

### **Module-5**

Documentation of heritage buildings

### **References:**

1. Time Saver Standards Of Building Type-Joseph De Chiara And Others.
2. Architects Data-Ernest Neufert
3. Hand Book Of Planning And Design Data.
4. Barrier Free residential Design –Albert Peloquin
5. Site Planning For Cluster Housing –Richard Untermann Robert Snall.

## AR572 **COMPUTER GRAPHICS** (0-0-3)

Objectives: To enable the students to understand the fundamentals of computer aided presentation techniques.

### **Module -1**

Introduction to architectural presentation and soft wares.

Fundamentals of digital presentation: colours, pixels, images and memory (and their properties).

Types of images and graphics: vector graphic, raster graphic.

Types of presentation: soft copy (slide shows, movie), hard copy (sheet, binder/portfolio).

Introduction to various soft wares like- Google sketch up, Adobe Photoshop/ Corel draw

### **Module -2**

Google Sketch up

### **Module- 3**

Adobe Photoshop (X4 or higher version)/ Corel Draw

## Task

1. Photo editing – adjustment of colour, brightness, contrast of a natural photo.
2. Graphical composition-2d.
3. Graphical composition -3d.
4. Shades and shadows of 3d composition.
5. Photo editing in perspective. (Architectural environment).
  - a. Single building.
  - b. Campus.
6. Architectural drawing and rendering (2d) plan, elevation, section.
7. Site plan rendering.
8. Sheet composition- furniture / product designing.
9. Portfolio design/ binder preparation.
10. Power point presentation  
(Slide show/movie presentation of above work.)

## AS582 **MATERIAL TESTING LAB**(0-0-3)

- (1) Standard consistency of mortar by Vicats apparatus
- (2) Initial and final setting of cement
- (3) Fineness modulus of fine aggregate
- (4) Fineness modulus of coarse aggregate
- (5) Compressive strength of cement mortar
- (6) Workability of concrete- slump test
- (7) Casting of concrete cube and testing for compressive strength
- (8) Testing for tensile strength of steel
- (9) Bar bending and binding- Crank, Hook, Stirrups, Space bar.
- (10) Testing for compressive strength of brick.
- (11) Testing for water absorption of brick.

## *References*

- 1) *Neville, A.M., Properties of concrete, the English language book society and Pittman publishers*
- 2) *Shetty, M.S. Concrete technology, S. Chand publication Delhi.*
- 3) *Rangwala S.C, Building Material, Charotar publishing house, Anand*
- 4) *Laboratory manual for building materials, Indian society for technical education, IIT Campus, New- Delhi.*

## AR594 **WORKING DRAWING-I**(0-0-6)

### **Course Objectives:**

This course is intended to impart training in the preparation of working drawings for buildings with specific reference to the code of practice for architectural and structural drawings as per IS code no. 962 of 1969.

### **Module-1**

Building construction drawing to be prepared as a part of the contract documents with proper labeling and dimensioning techniques. The drawing shall be based on building design prepared as design assignment ( previous year design problem) of load bearing structure.

### **Module-2**

Drawing shall include: Excavation and Foundation plan; Ground floor plan; Upper floor plans; Terrace or Roof plan including roof drainage; Site plan, layout plan showing different buildings, internal roads, water supply, sewerage including area drainage plan.

### **Module-3**

Elevations: of all sides (front, back and both the sides).

### **Module-4**

Sections: Transverse and longitudinal sections through staircase, Lift and sanitary units

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## AS614 STEEL STRUCTURE

**Objectives:** This course focuses on the study of principles and the philosophy of advanced steel structures and their design.

### Module- 1

Introduction – Structural system of building; Load path, loading std as per IS: 875 and load combinations; Rolled steel sections and built up sections. Welded and riveted connection-Failure modes.

### Module- 2

Design of tension members; Concept of types of girders and beams; Design of laterally restrained rolled steel beams.

Design of compression members: Effective length, Buckling load; Built up sections, Lacing and Battening.

### Module-3

Concept of types of foundations; Design of slab base and gusseted base: Concept of Plastic design.

### References:

1. A.S Arya & J.L Ajmani, *Design of steel structure*; Nemchand Brothers, Roorkee, 1999
2. S.M.A Kazimi & R.S Jindal : *Design of steel structure, pentice hall(India), New Delhi, 1981*
3. S.N Sinh, *Reinforced concrete design*, Tata Mc. Grawhill, New Delhi, 1990
4. Ramachandra, *Steel structure design, vol-1*
5. L.S Neggi, *Steel structure*.
6. *Steel Strucute* by V.N Vizarani & M.N Ratwani, M/S Khana Publishing, Delhi
7. *Steel Structure* by E.H Gaylord.
8. S.K.Duggal, *Design of steel structures*, by Tata McGrawHill, New Delhi.



# AM623 BUILDING SERVICES-IV

## (Refrigeration and Air Conditioning)

**Objectives:** To enable the students to understand the basics of HVAC systems, principles, types & their deployment, issues pertaining to heat exchanges in buildings, calculating cooling loads etc.

### Module 1

Definition & Units of Thermodynamic quantities: Specific & Latent heat, Absolute, Gauge & Atmospheric Pressure, Temperature, Volume, Work & Energy. Numericals (3 hours)

States & Properties of Water: PH diagram to explain Latent heat, Sensible heat, Superheat, Sub cooling & Enthalpy, Ice point & Triple point, Degree of Superheat & Dryness Fraction. (2 hours)

Laws of Perfect Gases: Boyle's law, Charles'law, Gay Lussac's law, Universal Gas law (1 hour)

Laws of Thermodynamics: Understanding the basic laws, principle of heat engines, refrigerators & heat pumps, Thermal efficiency & COP with numericals. (3 hours)

Heat Transfer: Conductive heat transfer through composite walls & pipes. Numericals (4 hours)

### Module 2

Refrigeration: Definition, Principle, construction & units of Refrigeration. Properties & nomenclature of refrigerants. PH & TS diagram and Working principle of a Vapour Compression Refrigeration System. Numericals (7 hours)

Psychrometry: Definition & units of the various properties of air water vapour mixture such as DBT, WBT, RH, AH, Enthalpy etc. Numericals on Psychrometry. (7 hours)

### Module 3

Air Conditioning: Definition, principle, construction & classification of AC's. Summer & Winter AC (Sensible heating & Cooling, Humidification & Dehumidification, Sensible heat factor & Bypass Factor). Thermal comfort conditions & Comfort Chart. Temperature & Humidity measurement and control devices (thermostats & humidistats). Calculation of cooling loads. Numericals using Psychrometric chart. (9 hours)

Air Distribution Systems: classification, types & construction of Supply & Return Duct systems, selection of duct material. (2 hours)

Air Filters: Air pollutants, Classification, types & construction of air filters. (1 hour)

Ventilation: Natural & Mechanical ventilation systems. (1 hour)

Space Heating: Conventional & Unconventional Heating systems, Active & Passive solar space heating, Green heating systems. (2 hours)

Project: HVAC Plan for a shopping mall, Cineplex etc.

### References:

- 1) William H. Severns and Julian R. Fellows. *Air conditioning and refrigeration*. John Wiley and sons, London
- 2) *Refrigeration and Air Conditioning* by Khurmi, Gupta & Arora, S Chand & Co.
- 3) *Carrier handbook of air conditioning system design*.
- 4) *NBC manual on Fire Safety*, Govt. of India.

## AR633 LANDSCAPE DESIGN

**Objectives:** To enable the student to understand the principles of site planning, analysis techniques and its application in various types of design of buildings and landscape.

### **Module- 1**

Landscape design- definition, objective and scope, aesthetic value of landscape. Theories and principles of space establishment, site survey, analysis and appraisal. Land form design and grading. Drainage design: Planting Design Principles and practice.

### **Module- 2**

History of landscape design and its application in gardens. Indoor landscaping; terrace gardening; industrial landscaping; landscaping of residential areas and urban avenues; surface treatments; landscape elements of construction.

### **Module- 3**

Computer application in landscape. Multi-criteria landscape evaluation and plant selection technique.

#### *References:*

- 1. The art of home landscaping. Mc Graw Hill Co. London*
- 2. Sviva Crow Sheila Havwood. The gardens of Mughal India. Vikas publishing house Pvt.Ltd. India*
- 3. Marcus G.Sims, gardens of Japan, the architectural press London.*
- 4. G.A.Jellicoe. Studies in landscapedisgn. Oxford University press.*

## AR642 ESTIMATION AND VALUATION

**Objectives:** This course focuses on the study of need and methods of estimation and valuation.

### **Module-1**

Introduction to the subject, definition, aim and objective. Scope and importance of subject Principles and methods of estimating. Different types of estimation. Approximate and detailed estimation.

Methods of approximate estimating. Built up or carpet area methods. Cubic contents. Method and numerous systems. Abstract and detailed estimate. Taking out quantities of various items. Common abbreviations. Cost estimates, standards modes of measurements writing schedules rate and material analysis, pricing of bill of quantities, elements of cost accountancy and book keeping.

### **Module-2**

Principles of evaluation of real properties purposes of sale, purchase, mortgage, lease, municipal rate, income tax, wealth tax and death duty. Free hold and lease hold interest, P.G. Values sellers values, fair values, mortgage values, distress sale values, buyer's value, fancy value, annual value, year's purchase, depreciation, dilapidation value, valuation of land, methods belting, methods-front land, recessed land, land building methods of valuation, rack rents, shop premises, properties.

### **Module-3**

Valuation of residential office, commercial, industrial, lease hold agricultural properties, valuation of municipal rate, income tax, wealth tax, death duty and compulsory accusation valuation of industries as going concern factories, mill, electricity undertakings, gas undertaking, easement rights and valuation thereof, development of properties. Arbitration-litigation-arbitration laws governing properties mortgage lease transfer of rights, heritage, constitution and laws.

### **References:**

1. *Estimating, costing, specification and valuation in civil engineering, M.Chakraborti.*

# AR653 INTERIOR DESIGN

**Objectives:** To familiarize the students on interior design principles and theories with specific reference to colour, texture, light and their effect.

## **Module-1**

Introduction to Interior Design. Elements of interior design i.e. floors, walls, ceilings, doors, windows etc. and their transformation. Enveloping space, contained space and residual space. Principles of lines, surfaces and colours for interior.

## **Module-2**

Use of colour in interior. Various color schemes e.g. Analogues, complementary, triadic etc. Colour symbolism. Lighting requirements and their design for interior spaces including direct & indirect lighting, luminaries types and quality of light. Principles of interior landscaping. Plant species.

## **Module-3**

Furniture design and ergonomics. Modular approach in system furnishings. Space saving interiors and furniture. Open office system, style of interiors. Exposure to eminent interior designer's works.

### *References:*

- 1. Architectural interior systems: lighting, Acoustics, Air conditioning Flynn. J/&29.24FI V/A N.88*
- 2. Colour in interior design and architecture/Ladau, Rf/747.94 Lad/C*

## AR666 ARCHITECTURAL DESIGN-IV

**Objectives:** Synthesis of building sciences and architectural space program into design matrix. Introduction of preliminary site planning techniques drawing knowledge from climatology, landscaping, environmental behavior. Introduction of basic social engineering themes on community planning ,historical attributes and lessons, preliminary concepts of urban economics with innovative coordination of building services and building technology.

### **Module-1**

Introduction of Design Problem 1 of building like art gallery, library, museum etc, resorts, tourist centers, Intelligent Office buildings, places of worship  
Data collection, programming, analysis, case study and literature review.

### **Module-2**

Concept formulation and preliminary design.

### **Module-3**

Final design development and portfolio

### **Module-4**

Time problem- 18 hours- 2 weeks

### **Module-5**

Introduction of design problem 2 of building like Auditorium, apartment, Institution of learning-campus with its various departments such as music and dance colleges, business, vocational training institute.

### **Module-6**

Concept formulation and preliminary design.

### **Module-7**

Final design development and portfolio

### *References:*

- 1. Time Saver Standard of building type-Joseph De Chiara and others*
- 2. History of building types – Nikolaus Persner*
- 3. Architects data- Ernest Neufert*
- 4. Hand book of planning and design data*
- 5. Barrier free residential design-Albert Peloquin*
- 6. Site planning for Cluster housing-Richard Untermann and Robert Snall*

## AR674 WORKING DRAWING-II

**Objectives:** This is intended to impart training in the preparation of working drawings for buildings with specific reference to the code of practice for architectural and structural drawings as per IS code no. 962 of 1969.

### **Module-1**

Building construction drawing to be prepared as a part of the contract documents with proper labeling and dimensioning techniques.

### **Module-2**

The drawing shall be based on building design prepared as design studio assignment of frame structure. Drawing shall include: Plan; Ground floor plan; foundation plan; Upper floor plans; Terrace or Roof plan including the Roof drainage.

### **Module-3**

Elevations of all side (front, back and both the sides). Sections Transverse and longitudinal sections through staircase, lift and sanitary units.

### **Module-4**

Scheduling of different finishes, doors and windows including hardware fixtures. Layout of sanitary and plumbing lines scheduling the fixtures in toilets and kitchen etc. layout of electrical lines fixtures on the plan prepared under working drawing-1. lightning arrester.

### **Module-5**

Site plan, layout plan showing different buildings, internal roads, water supply, sewerage including area drainage plan.

### *References:*

- 1. The teacher shall develop his reference from various sources.*

## AR682 LANDSCAPE DESIGN AND SITE PLANNING

**Objectives:** To enable the student to understand the landscape principles, site planning and analysis techniques and their application in various types of designing of buildings.

### **Module-1**

Designing and execution of landscape proposal a)Analysis site, b)Identification of requirement , c) Site development by exploiting mutual forms.

### **Module-2**

Elements in the landscape design, Study of plant material their use and adoption in landscape design,

### **Module-3**

Field identification of a few Indian plants, early experiments and thinking in development and adoption of landscape planning, new concept of landscape planning, integration of building, landscape, outdoor and indoor spaces, form, color and texture.

### **Module-4**

Landscape planning of individual building projects including roof garden.

### **References:**

1. J.O.Simonds, *Landscape architecture Iliffe London*,
2. G.Eckbe *Landscape for living F.W. Dodge Corp Newyork*.
3. Syloia Grawe. *The garden of Mughal India Bikas publishing house New Delhi*.

## AR692 INTERIOR DESIGN LAB

**Objectives:** To familiarize the students on interior design principles and theories with specific reference to color, texture, light and their effect. This should be focused in design problem of residential and commercial use.

### **Module-1**

Introduction to basic physical factors in interior design, furniture arrangements, circulation etc.

### **Module-2**

Two interior schemes of different functional types: Residential / commercial at different scales will form the major design assignment.

### **Module-3**

Furniture layout, electrical layout, details liked false ceiling, partition, flooring, doors and windows, colour scheme to be included in each design portfolio.

### **Module-4**

One time problem of 3 hours (one week) duration to be included.

### **References:**

1. *Time saver standard for interior decoration*
2. *Allen Tata and C.Ray Smith Interior design in the 20th century*.
3. *Contemporary details – Nonie Nirdrwandd*
4. *Interior design- Principles and Practice –M.Pratap Rao*
5. *Fabser Birraen, Colour for interiors, Historical and modern*
6. *IID designers, the official journal of Indian Institute of Interior Designers*.

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# BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ORISSA

## Architecture

<u>7<sup>th</sup> SEMESTER</u>				<u>8<sup>th</sup> SEMESTER</u>			
<i><b>THEORY</b></i>			<i><b>Contact Hours</b></i>	<i><b>THEORY</b></i>			<i><b>Contact Hours</b></i>
<i><b>Code</b></i>	<i><b>Subject</b></i>	<i><b>L-T-P</b></i>	<i><b>Credits</b></i>	<i><b>Code</b></i>	<i><b>Subject</b></i>	<i><b>L-T-P</b></i>	<i><b>Credits</b></i>
AR713	Advanced services	3-0-0	3	AR813	Professional practice	3-0-0	3
AR723	Construction & project Management	3-0-0	3		and building bye-laws		
AR733	Disaster Resistant Architecture	3-0-0	3	AR823	Housing and community Planning	1-0-3	3
AR743	Principles of town planning	3-0-0	3	AR833	Architectural Research Methods	3-0-0	3
	<b>Elective-I (Any One)</b>	3-0-0	3		<b>Elective-III(Any One)</b>	3-0-0	3
EAR753	A) Cost Effective Technology B) Traditional Architecture C) Architectural Journalism			EAR843	A) Urban Design B) Transportation Planning C) Aesthetics and art Appreciation		
	<b>Elective-II (Any One)</b>	3-0-0	3		<b>Elective-IV(Any One)</b>	3-0-0	3
EAR763	A) Green Architecture B) Ergonomics and Product Design C) Pre Fabrication & Modular Coordination			EAR853	A)Barrier free environment B) Industrial Architecture C) Geometry of Forms.		
	<b>TOTAL</b>		<b>18</b>		<b>TOTAL</b>		<b>15</b>
<i><b>Practical / Sessional</b></i>				<i><b>Practical / Sessional</b></i>			
AR776	Architectural Design-V and field trip	0-0-9	6	AR868	Architectural Design-VI	0-0-12	8
AR782	Architectural Details	0-0-3	2	AR872	Seminar/ Dissertation	0-0-3	2
AS792	Structural Drawing & Details	0-0-3	2				
	<b>TOTAL</b>		<b>28</b>		<b>TOTAL</b>		<b>25</b>



## 7<sup>th</sup> SEMESTER

### AR713 **ADVANCED SERVICES** (3-0-0)

**Objectives:** To enable the students to understand the recent developments in building services in the area of vertical transportation system, building automation, waste disposal, adoption of energy efficient techniques etc.

#### **Module 1:**

- a. Mechanical accessibility system: Lift (working methods as per NBC and industry standards, capacity, parts of lift and location of these in the building, types of lifts, passenger, capsule, hospital goods), introduction to Escalator.
- b. General working of following specific services and provision to be made in building.
  - Telephones and EPABX
  - Security system like burglar alarm services and CCTV's, intruder alarms.
  - Cooking gas distribution for bulk cooking application and household as per NBC.
  - Elevated flooring for computer application

#### **Module 2:**

- a. Fire fighting, potable firefighting equipment and built in wet riser system and sprinkler system for fire fighting.
- b. Building automation: central control systems, user interface, lighting systems and controls, Air Conditioning plants, Air Handling Units (constant volume air-handling units, variable volume Air-handling units, VAV hybrid systems), central plant (chilled water system, hot water system), stand by generator, Lightning Conductor.

#### **Module 3:**

Application in any one type of building followed by group assignments:

- a. Residential
- b. Commercial: Hotel
- c. Health Institute: Hospital (waste management)
- d. Office building
- e. High rise building: service core, service floors, water storage, service elevators, communication system.

#### *References:*

- 1) *Heating and air conditioning of building-Oscar Fabes and others*
- 2) *Water and energy resources-Satish Tiwari*
- 3) *Refrigeration and air conditioning-Manohar Prasad.*

## AR723 **CONSTRUCTION AND PROJECT MANAGEMENT** (2-0-0)

**Objectives:** To enable the students to understand the project management techniques.

### **Module-1**

Introduction to construction industry-significance, objectives and function, types, resources, stages, construction team, types of drawings, construction contracts and specifications, construction planning-stages and scheduling, building practices and the current management system.

### **Module-2**

Project estimating, Project planning and project scheduling – Traditional methods, Network analysis, Critical path method and PERT analysis.  
Project time reduction and optimization, resource leveling, project time, cost and finance management.

### **Module-3**

Computer application of project scheduling and management, operation research principles, risk management and finance management.

#### *References:*

- 1) *Pilcher, Principles of construction management, McGraw-Hill, 1981*
- 2) *B.C. Punmia, Building Construction, Sambha and Co., New Delhi, 1986*
- 3) *J.Strand, Advance building construction, B.T. Batsford*
- 4) *National building code of India, Indian standard institution, New-Delhi, 1970*
- 5) *Construction and project management: Clough and sears: A Wiley-Inter-science Publication*
- 6) *Construction Management- Principle and practices: Goldhaber, Jha & Macedo Jr.: A Wiley Inter Science Publication*
- 7) *Construction Management- Basic principles for Architects, Engineers and Owners, DeGoff & Friedman; Awiley series in Construction management and Engineering.*

## AR733 **DISASTER RESISTANT ARCHITECTURE** (3-0-0)

**Objectives:** Aims to focus on the complexities involved in developing disaster resistant buildings, formulating the management plan and understanding the design guidelines in disaster resistant construction.

### **Module-1**

Introduction to over view of disaster, major natural disasters- flood, tropical cyclone, droughts, landslides, heat waves, earthquakes, fire hazards etc. Factors for disasters. Basic understanding on fragile eco system, physiographic and geo chemical data mapping, soil and topography, Hydrological factors, inclement climatic conditions.

### **Module-2**

Strategies for disaster prevention and mitigation. Disaster management plan, National crisis management committee, state management group.

### **Module-3**

Design guidelines in disaster proofing construction. Engineering, Agricultural, Architectural, landscaping and planning solution for different type of calamities. Norms, standard, practice procedure for shelter and settlement. Organizational and management aspect.

### *References:*

- 1) Seismic Design hand book for Buildings*
- 2) Earth quake Architecture: New construction techniques for quake disaster Prevention.*

## AR743 **PRINCIPLES OF TOWN PLANNING** (3-0-0)

**Objectives:** To make the students understand the philosophies and basic components of town planning, and to enable them to develop concepts on preparation of town plan.

### **Module-1**

General decisive factors for any settlement; Definition of a town. Historical background with special emphasis on basic concepts of planning and urban spaces, Egyptian, Greek, Roman, Medieval, Early Indian town planning. Industrial era and its impact on human settlement system

### **Module-2**

Planning concept related to Garden city, Satellite town, Radburn development and neighborhood planning. Planning philosophies of pioneers such as Geddes, Howard, Aber Crombie, Le Corbusier, and other eminent planners

### **Module-3**

Level of planning and steps for preparation of a town plan, Concepts, function, components and preparation of a development plan, master plan, structure plan and perspective plan.

Introduction to analytical technique in town planning; land subdivision regulation and zoning.

### *References:*

- 1) *Urban Pattern-Gallion*
- 2) *Town Planning-G.K.Hiraskar*
- 3) *City Planning-Bandopadhyay*
- 4) *Ekistics: An introduction to the science of human settlements / Doxiadis.C.A*
- 5) *Town Planning in Ancient India/DUTT, Binode Behari*

## EAR753 **A) COST EFFECTIVE TECHNOLOGY**

**Objectives:** To highlight the different cost reduction techniques and to make them familiar with vernacular building materials and construction practices.

### **Module-1**

Basic shelter issues in India. National building Organization- Recommendation of Housing & Urban Development Corporation.

### **Module-2**

Traditional materials and techniques- pressed soil blocks, soil cement blocks and other alternate building materials-fly ash brick, byproduct gypsum, bamboo, jute stalk etc.

### **Module-3**

Building process-Different types of walling, Roofing, foundation, Pre-cast blocks. Laurie Baker's experiments in low – cost housing. Modular construction. Experiments conducted by CBRI, Roorkee

*References:*

- 1) *Low cost housing Technology; L.J Goodman & R.P.Pama*
- 2) *Houses; How to reduce building cost; Laurie Baker*
- 3) *Cost reduction for Primary school, Laurie Baker*

## **B) TRADITIONAL ARCHITECTURE**

**Objectives:** To enable to students to understand the fundamentals of traditional features and constructional techniques of architecture in India.

### **Module-1**

Vastu shastra, its application and validity.

### **Module-2**

Technological & cultural heritage of India. Regional Architectural feature & methods of construction.

Ecology and Environmental aspects of settlement system.

### **Module-3**

Study of vernacular shape, grammar and allied geo anthropological studies. Architecture & social relations symbolism and ornamentation.

*References:*

- 1) *Traditions in architecture/DARA planning. Crouch and June .G.Johnson*

## C) ARCHITECTURAL JOURNALISM

**Objectives:** This course is intended to help those, who have inclination for writing to develop their skills to enable them to record, analyse and evaluate architecture both in its theoretical and practical forms.

The following forms of architectural journalism should be studied and developed.

### **Module-1**

Paraphrasing and summarizing given reports, Editing given materials. Writing or original reports on design projects / buildings/complexes.

### **Module-2**

Writing editorials for magazines and journals. Reporting activities like seminar, panel discussions, and conferences.

Writing captions for pictures, programmes and events. Organizing materials for publication in newspapers, magazines etc.

### **Module-3**

Thesis or research report writing.

### *References:-*

*The teacher shall develop his reference from various sources.*

*NB: The students should be exposed to the work of professional art and architecture. Various forms of architecture Review/record, progressive architecture, Japan architecture etc. and journals of RIBA, American Institute of Architects, IIA, etc. Report writing should be presented to a panel to be chaired by the teachers for discussions. Criticism and consequential changes. Students other than the author should be asked to write a report/review of the discussions.*

## EAR763 A) GREEN ARCHITECTURE

**Objectives:** To familiarize the students with the understanding of recent concepts in building technology and environmental design pertaining to sustainability.

### Module-1

1. Ecological building: concept.
2. Green architecture: concept, technologies, (site efficiency, energy efficiency, water efficiency, material efficiency, indoor environmental quality enhancement, water reduction), energy rating of building materials, rainwater harvesting.
3. Sustainable consulting LEED & energy star for homes.

### Module-2

1. Energy classification, sources, utilization.
2. Principles of energy conservation, non-conventional energy and its utility

### Module-3

1. Passive solar architecture:
  - a. Passive solar heating: distribution of energy in building.
  - b. Passive solar cooling: principles, standard, technologies.
  - c. Site specific consideration during design.
  - d. Passive solar lighting.
  - e. Photovoltaic module: application in buildings.
2. Low energy house: concept, technology- passive solar building design.

*References:-*

1) *Energy conservation standard: for building design construction and operation by/ Duin, Fred S/697 DUBIE*

## **B) ERGONOMICS AND PRODUCT DESIGN**

**Objectives:** The course focuses on anthropometry and design principles for product design

### **Module-1**

Definition of human factors; application of human factor data, human activities-their nature and effects.

### **Module-2**

Visual display-process of seeing, visual discrimination, quantitative and qualitative visual display; Alpha numeric and related display, visual codes and symbols; auditory: tactual and olfactory human mechanism; applied anthropometry, physical space and arrangements; human response to climate.

### **Module-3**

Product design - Form, colour,

#### *References:-*

- 1) Design and technology, James Garratt, Cambridge university Press, U.K*
- 2) Advance Inhuman factors/Ergonomics: William Cushman &D.J.Rosenberg, Elsevier, New York*
- 3) Human factors in engineering and design: Mark sanders and Ernest McCormick; McGraw Hill Inc.New York*



## **C) PRE FABRICATION & MODULAR COORDINATION**

**Objectives:** Aimed to focus on the study of use of pre-fabrication systems, systems developed by CBRI, basic modular planning and the proportioning system in India context.

### **Module-1**

Introduction to system building, mechanization of production of system, building size units with special reference to India condition.

### **Module-2**

Prefabrication; advantages, disadvantages relevance in India context, classification of prefabrication systems developed CBRI, Roorke, skeletal system, Brick panel system, R.C.Panks, non-structural elements, devotions in prefabrication.

### **Module-3**

Introduction to modular practice, basic modular planning and component Module, modular number pattern introduction. System of proportion-introduction of various systems of publication in REM diamante and comprehensive industrialized building-introduction and application.

Hindustan housing factory. Tapsia system and other such contemporary systems in India, development of planning Module and structural Modules for various types of buildings in India.

### *References:*

- 1) *Industrialized buildings: R.M.E Diamant*
- 2) *Building digest notes of CBRI, Roorkee*
- 3) *Standard building; R.Nagarajan; Pitman Press*
- 4) *Le Modular-1&2; Le Corbusier*
- 5) *The reasoning architect, Garry Stevens; Mc Graw Hills*

## AR776 **ARCHITECTURAL DESIGN-V AND FIELD TRIP**

**Objectives:** Methods of space programming, analysis, evaluation of design criteria and fundamentals of composite site planning. Introduction to building services, utilities and building automation and facility planning. Exposure to techniques of post occupancy evaluation and measurement of user's satisfaction . Application of cost effective techniques, innovative structural systems, building materials and systems and application of urban design elements in campus design.

Recommended building types are 5 star hotels, expos, country clubs, complexes for places of worship ,city centre, Management development Center, shopping mall, multiplexes, Service Apartments, Housing of different economic groups.

### **Module-1**

Time problem- 18hours- 2 weeks

### **Module-2**

Introduction of Design Problem of Building like Inter-state or inter-city bus terminal, sports, health and educational complexes, multi-purpose hall, auditorium, community centre, information centre, entertainment centre, museums and art gallery.

### **Module-3**

Concept formulation and preliminary design.

### **Module-4**

Final design development and portfolio

### **Module – 5**

Documentation of a Settlement

#### *References:*

- 1) *Time Saver Standard of building type-Joseph De Chiara and others*
- 2) *History of building types-Nikolaus Persner*
- 3) *Architects data-Ernest Neufert*
- 4) *Hand book of planning and design data*
- 5) *Site planning for cluster housing – Richard Untermann and Robert Snall.*
- 6) *Architects' hand book-Charanjit Shah*
- 7) *Central city malls-Harvey M.Ruknitein*

## AS792 **STRUCTURAL DRAWING AND DETAILS**

**Objectives:** To enable the students to understand various aspects of structural drawing in a small project including the design of different structural element with the following details:

### **Module-1**

Detailing of concrete structure- design and detailing of concrete structure studied in previous semester. Beams, columns, stairs, foundations and pile foundations.

### **Module-2**

Detailing of steel structure: Design and detailing of steel structures studied in previous semester.

### **Module-3**

Joints: Lap joint, Butt joint.

Connections: riveted connections, welded connection

Design of tension members, compression members, trusses.

### *References:*

1. *Building design, A.S.Arora*
2. *Design of steel structure, Vol-III, Vazirani & Ratwani*
3. *Steel structures, Ramachandran.*

***NB: Study tour of minimum two weeks duration is to be arranged to places of architectural interest in India or abroad.***

# 8<sup>th</sup> SEMESTER

## AR813 **PROFESSIONAL PRACTICE AND BUILDING BYE-LAWS**

**Objectives:** To enable the students to understand the logistics of state & central govt. in enhancing better living conditions to all without losing the interest of self. It lays down the criteria for constructing built up spaces in cities & sub-urban; good ph & sanitation; safety & security, etc. and familiarize the students about current professional practice guidelines, codes, ethics as well as norms of professional fees & charges. It will expose them to skills and techniques for organizing a particular project, its preparation and execution etc. The same course will also contribute in getting acquainted with project management, contractual implication as well as legal formalities.

Study and development control regulations, municipal acts, building bye-laws, Indian Standard Codes of Practice related to Design, Drawing and procedure for submission to concerned bodies. Fire prevention, safety and security measures and regulations.

### **Module-1**

Introduction to Architects duties and liabilities, understanding office management and project awarding, various architectural services, additional services and scale of professional fees.

### **Module-2**

Definitions and general principles of Indian Contract Act and building contract documents, Types of tenders, invitation of tender and conditions of tender documents, Condition of contact, Execution of contact, various certifications.

### **Module-3**

Principles of Indian Arbitration Act-1974, Municipal Acts, Building Bye-laws, National Building Codes, Fire prevention, safety and security measures in buildings.  
Study of building regulations relative to submission drawings for concern bodies.

*References: -*

- 1. Professional Practice, Dr. Roshan H. Nanavati.*
- 2. Architects Practice, J.J.Scott.*
- 3. Handbook of Professional Practice, C.O.A publication.*
- 4. Handbook of Professional Practice, Madhav Deobhakta.*

## AR823 HOUSING AND COMMUNITY PLANNING

**Objectives:** To enable the students to understand the fundamentals of housing needs, housing finance and housing techniques in relation to social and environmental effects.

### **Module-1**

Housing situations: Impacts of industrialization and urbanization, slums and squatter settlements, case studies from India and abroad.

### **Module-2**

Housing for economically weaker sections, site and services, self-help housing, integrated slum improvement, slum networking.

Housing for new communities: norms and standard for dwelling, shopping, education, health and recreational facilities. Residential environment: users' satisfaction and behavioral aspects, evaluation of housing development.

A site planning exercise for housing to be done as a studio exercise

### **Module-3**

Neighborhood concept: densities and their optimization. Housing finance.

Cost reduction in housing: Techniques and related issues, alternative building materials.

### *References:*

1. Charles Abrams. *Mans struggle for shelters in an urbanizing world*, Vikas Fetter and Simons pvt. ltd, Mumbai
2. Babur Mumtaz and Patweikly. *Urban housing strategies*, Pitman publishing, London
3. Geoffrev K.Paul, *Low income housing in the developing world*, John Wiley and sons.
4. John F.C Turner, *Housing by people*, Marison Boveros, London, 1976
5. Martin Evans, *Housing, Climate and comfort*.
6. Lewis Davidson Gotlieb, *Environment and design in housing*. The Mc.Millan Corp, New York.
7. *Housing and building in hot-humid and hot dry climate/ 721.06 Brab/H*
8. *Low-cost housing in developing countries/ Mathur, GC/363. 509/72Mat/LN93.*

## AR833 ARCHITECTURAL RESEARCH METHODS

**Objectives:** The orient the students towards research applications in Architecture by making them familiar with various research methods available for design programming, behavioral studies and environmental mapping.

### **Module-1**

Introduction to research Methodology (types of research) Identification of area of interest, Types of dissertations, Appropriate Methodology for respective thesis (Time factor) Pre – thesis studies

### **Module-2**

Building upon a hypothesis, Criteria for selecting thesis guide, Formulating synopsis, Identifying the research component in thesis, Case selection / situation studies,

### **Module-3**

Checklist – questionnaire, Behavioral mapping, semantics, differential scales, Methods of survey: Literature, Visual, sampling, interviewing, Design program/ranking scale/ priority chart Methods of analysis Report summary Bibliography  
Exercise – writing a book review

### *References:*

- 1. Architectural research methods; Linda Groat & David Wang, John Wiley and sons, New York*
- 2. Visual research methods in Design; Henry Sanoff, Van Nostrnad Reinhold, New York*
- 3. Architectural research; Snyder James C; Van Nostrnad Reinhold*

## A) URBAN DESIGN

**Objectives:** To highlight the urban design principles and theories and thereby to make the students understand the role of urban design in planning.

### Module-1

Human Settlement Studies – historical determinants, mobility, socio-cultural beliefs, climate, technology, political situations, geographic locations, etc contributing to development of human settlements

Urban Forms (Historical and contemporary)

Urban Spaces (Historical and contemporary)

Urban form and cities, Definition of urban design

### Module-2

Urban design principles and criteria, image ability.

Urban design theories, visual survey, mental mapping, study of grains, patterns, textures, footprints.

### Module-3

Social aspect of urban design, public participation, Comprehensive role of urban design in planning.

### References:

1. *Design of cities* / Bacon, En/ 711.4 BAC/D
2. *The Architecture of towns and cities* / Spreiregen Paul D
3. *The Image of the city*, Kevin Lynch
4. *Urban Pattern*/ Gallion, ArthurB.
5. *Urban Design Method in techniques*-C.Moughtin
6. *Responsive environment* – Ian Bentley
7. *Emerging concepts in Urban space Design* – Geoffrey Broadbent.
8. *Pattern Language* – C. Alexander

## **B) TRANSPORTATION PLANNING**

**Objectives:** To enable the students to understand the operation, need and management of transportation systems.

### **Module-1**

Study of the movement of human and goods at the intercity and inter-city levels. The need for various kinds of transportation system with their qualitative analysis.

### **Module-2**

Inter city transport system and the problems on countered in trafficking it with special reference to road transport.

### **Module-3**

A study of methods used for resolving traffic problems such as decentralization of work centre, various traffic controls over the over passes etc.

### *References:*

*1. The teacher shall develop his reference from various sources.*



## **C) AESTHETICS AND ART APPRECIATION**

**Objectives:** To enable the students to understand the basic principle of art forms and their relevance to architectural context.

### **Module-1**

Relationship of rural architecture and its environment. Urban design and town planning. Streetscape. Mass housing relationship to building economics specification and construction.

### **Module-2**

Future settlement principle of architectural composition. Appreciation of art e.g. form balance rhythm preparation.

### **Module-3**

Relationship of fine art, sculpture, applied art photography-sensitivity and perception devices of photograph central-lighting-composition-contrast-expression-of movement-architectural photography. Industrial design crafts Bahana principles.

## EAR853 **A) BARRIER FREE ENVIRONMENT**

### **Objectives:**

The course is aimed at design standards and construction techniques for barrier free environment.

### **Module-1**

Types of disability, mobility devices and controls. Construction and maintenance standards, classification of buildings and access provisions.

Design elements within buildings, site planning, parking, approach to plinth levels, corridors, entrance and exit, windows, stairways, lifts, toilets, signage, guiding and warning systems, floor materials.

### **Module-2**

Design elements outside the building – kerb at footpath, road crossing, public toilet, bus stop, toilet booth, and signage.

### **Module-3**

Provision in residential building, auditorium, parks, restaurants, railway station. Modern building bye-laws.

### *References:*

- 1. Building without barriers for the disabled, Harkness, Sarh P/690.554 HAR/B*
- 2. Disability and rehabilitation Handbook/ Goldenson, RM/362.2002 DIS/M*

## **B) INDUSTRIAL ARCHITECTURE**

**Objectives:** Aims to focus on the study of design considerations, environmental factors, structural considerations and safety controls for industrial buildings.

### **Module-1**

Historic development of industrial architecture. Role of architects in the design of modern industrial buildings, a basic knowledge of industrial in respect of type and category. Planning consideration in the development of master plan including site selection and site layout. Design of loading and unloading area.

### **Module-2**

Design consideration in development of industrial buildings considering; flexibility, adaptability, structural selection. Integration of structure and services, roof lighting, internal circulation and material handling; alternative technologies and materials for industrial use.

### **Module-3**

Working environment for industrial workers which will contribute to comfort and productivity by considering: work space and ergonomic, use of color, illumination, light and glare, noise and vibration, ventilation, building fabric.

Visual environment and landscaping.

Safety, security and warning control.

Consideration of other facilities like: rest room, locker room, sanitary, changing room, cafeteria, recreational etc. Health, welfare and child care in industrial premises.

### *References:*

*1. The teacher shall develop his reference from various sources.*

## C) GEOMETRY OF FORMS

**Objectives:** To make the student understand the geometry of complex forms and to generate ideas towards structural solutions.

### **Module-1**

Education of solid with special properties, pairs of related tetrahedral, prism and its specializations-right, equilateral, parallelepiped, antiprism, di-pyramid and trapezoidal as duals of prism and anti-prism.

### **Module-2**

Archimedean solids and their dual intersections and compounds of reciprocal solids,

### **Module-3**

Regular compounds Stella Tet, truncations and directions solids spaces filters and honey combs.

Close spacing of spheres and cylinders. Tensile structures. Ellipsoid hyperboloids and parabolic intersections etc.

### *References:*

1. *Geometry of spatial forms*; Gasson Peter C. ELLIS HORWOOD, New York

## AR868 **ARCHITECTURAL DESIGN-VI**

**Objectives:** Methods of space programming, analysis, evaluation of design criteria and concepts for large projects. Detailed study of methodology for design conception, development and detailing –with special emphasis on site planning, building services, HVAC systems and architectural detailing

### **Module-1**

Time problem- 18hours- 2 weeks

### **Module-2**

Introduction of design problem of buildings like institutional or educational campuses, such as Medical college campus, engineering college campus, Housing, Hospital, complexes for sports, cultural centers, city center, transportation facilities ,complex office buildings like court, secretariat, Software Technological park, Centre for Renewable energy, Trade Centre, Planetarium, Science city etc.

### **Module-3**

Concept formulation and preliminary design

### **Module-4**

Final design development and portfolio

#### *References:*

- 1. Time saver Standard of Building type- Joseph De Chiara and others*
- 2. Image of City, Kevin Lynch*
- 3. Architects data-Ernest Neufert*
- 4. Handbook of planning and design data*
- 5. Site planning for cluster housing-Richard Untermann and Robert snall*
- 6. Architects' hand book- Charanjit Shah*
- 7. Play ground and recreational spaces- Hedderman Alfred*
- 8. Campus Architecture*
- 9. Defensible Space, Oscar newman*

## AR872 **SEMINAR/ DISSERTATION**

Independent study and documentation of architectural and allied subjects related to proposed thesis work by individual student.

# BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ORISSA

## Architecture

<u>9<sup>th</sup> SEMESTER</u>				<u>10<sup>th</sup> SEMESTER</u>			
<i><b>THEORY</b></i>			<i><b>Contact Hours</b></i>	<i><b>THEORY</b></i>			<i><b>Contact Hours</b></i>
<i><b>Code</b></i>	<i><b>Subject</b></i>	<i><b>L-T-P</b></i>	<i><b>Credits</b></i>	<i><b>Code</b></i>	<i><b>Subject</b></i>	<i><b>L-T-P</b></i>	<i><b>Credits</b></i>
				AR013	Real Estate Management	3-0-0	3
				AR023	Theories of Design	3-0-0	3
				EAR033	<b>Elective V (Any One)</b>	3-0-0	3
					A) Facility planning and management		
					B) Architectural conservation		
				<b>TOTAL</b>			<b>9</b>
<i><b>Practical / Sessional</b></i>				<i><b>Practical / Sessional</b></i>			
AR914	Architectural office Training		4	AR0412	Thesis/ Dissertation	0-0-18	12
AR923	Site Supervision Training		3	AR052	Comprehensive viva voce		2
AR932	Field Observation Studies		2	AR061	Seminar	0-0-2	1
AR942	Critical Appraisal of Building Projects		2		(Paper Presentation)		
AR953	Field Documentation and Architectural details		3	<b>TOTAL</b>			<b>24</b>
				<b>TOTAL</b>			<b>14</b>

## 9<sup>th</sup> SEMESTER

**Note: Compulsory practical professional training of 24 week duration**

### AR914 **ARCHITECTURAL OFFICE TRAINING**

Students are required to be involved in all aspects of office works-Sketch, design, presentation drawings, and detail working drawing, model of the project, estimation and specification of a small building.

### AR923 **SITE SUPERVISION TRAINING**

The aim of this training is to give exposure to the students on different stages of on the site and to learn how the drawings of design is executed at the site construction by preparing a report to facilitate set of working drawings, sketches, photographs etc. to supplement their observation.

### AR932 **FIELD OBSERVATION STUDIES**

Aim of field observation is to systematically study any particular architectural phenomena or an element to see how it behaves. Idea is to systematically observe record and analyze the observation and to draw lessons from the study of any particular aspect. Aspects can be space types, system, materials, and visual aspects. Some examples are: spaces – outdoor recreation area in a housing community., square in a village, plaza in a city, types- slopping roof in a particular place, system- movement in a shopping area, circulation system in a situation, material-paving material in public squares, flooring in a workshop, visual aspects-way-finding in a market, signage in a hospital. Study should emphasize on relationship between physical layout, details and efficiency, highlighting performance under different conditions, maintenance and fixing problems.

### AR942 **CRITICAL APPRAISAL OF BUILDING PROJECTS**

An exercise in critical observation on an existing project. A student may select any small project and trace down its development on early concept design. procedure adopted in decision making at inception level, series of changes in the process of approval, constraints such as financial, human and building bye-laws. Changes during the execution and changes done by the client after occupation-reason there of. Users' reaction on different aspects, students' personal remark based on the flagellation of balanced critical appraisal. The study is to be presented in the form of series of sketches, photographs supported by brief analysis and observation etc.

## AR953 **FIELD DOCUMENTATION AND ARCHITECTURAL DETAILS**

Documentation of at least 20 details of innovative details from personal observation, office record or field studies. This may include historical as well as contemporary details. Critical observation of performance, usefulness etc. the selection of details should be based on their special nature due to practical field situation and must be presented in a folder.

**X<sup>th</sup> SEMESTER**

## AR013 **REAL ESTATE MANAGEMENT**

**Objectives:** To enable the students to understand the fundamentals of Real Estate Management and land-use issues and planning in an urban area.

### **Module-1**

Land use planning & urban land management. Basic components of urban land policy. Land as a resource of urban development and management aspects.

### **Module-2**

Land related legislation. Land assembly / land pooling techniques. Real Estate laws- Apartments' Act, Society Registration Act. etc.

### **Module-3**

Real Estate Management concepts. Master plan guidelines in relation to real estate growth. Concept of condominium and serviced apartments.

### *References:*

- 1. Urban Landuse planning by S.Chapin & L.Keeble*
- 2. Urban Development management-I.T.P.I.*
- 3. Reading Material on Land Economics-I.T.P.I.*



## AR023 THEORIES OF DESIGN

**Objectives:** To make the student understand the concepts and philosophies of design process and thinking by exposing them to various methods of analysis, synthesis and evaluation.

### **Module-1**

Definition of design. Nature of good design. General discussion on form inanimate nature, biological nature and human environmental. Understanding of the determinants of physical forms as known to architects and environmental planners-concepts of space, structure, organization, symbolism etc.

### **Module-2**

Design process and thinking; goals and objectives, value judgments defining problems, information gathering, creative, thinking techniques-convergent, lateral ,interactive thinking, graphic thinking, checklists, analysis and synthesis, simulation, action ability and implementation of intentions. Blocks in creative thinking.

### **Module-3**

Introduction to the study of aesthetics through an introduction to the enquiries initiated by various western and Indian philosophers.  
Design theories-enunciated by Vitruvius, Alberti, Palladio, John Ruskin, William Morris, Le Corbusier, Mies Van der Rohe, Walter Gropius, Robert Venturi, Charles Jencks, Gautam Bhatia, Kenneth Frampton, Rob Krier,William Curtis etc.

### *References:*

- 1. Design in architecture-Geoffy Broadent*
- 2. Introduction to architecture-James C.synder*
- 3. Lateral thinking-Edward de Bono*
- 4. Pattern language-Christopher Alexander*
- 5. Redefining designing: From form to experience-Thomas Mitchell*
- 6. The language of post Modern architecture –Charles Jencks*

## A) FACILITY PLANNING AND MANAGEMENT

**Objectives:** Exposing the students the basic of planning and management of the special service oriented spaces in relation to types of spaces, services, standards and management systems.

### Module -1

#### Health Care

Introduction to hospital planning and types of hospitals. Aesthetic and emotional needs of patients, spaces norms and requirements of a hospital.

Introduction to spaces like

1. Public entrance, lobby area, reception and information lounge, waiting space.
2. Vertical and horizontal transportation system.
3. Various departments of a hospital- OPD, IPD, Emergency, CSSD, Wards etc.
4. Hospital crowd management during extreme condition.
5. Hospital waste management.
6. Signal and signages.
7. Hospital management systems.

### Module-2

#### Commercial Spaces

Introduction to the spaces like theatre, multiplex, mall, super market, hyper market and office spaces.

Circulation and crowd management. External and internal traffic management. Vertical and horizontal transportation system.

#### HOTELS

Introduction to spaces like –restaurant, dining hall, coffee shops and bars, conference spaces, meeting room, auditorium, gymnasium, healthcare, swimming pools, dance floors, discotheques, shopping, emporia, kitchens and toilet, recreation, Party lawns, gardens, terrace garden, open air dining area etc.

Hotel types, size, location criteria, administration.

Integrated services planning incorporated all the above.

### Module -3

#### High Rise Buildings

Introduction, location criteria, land and building bye-laws.

Horizontal and vertical spaces distribution and transportation, parking systems, Communication and control system.

#### References:

1. The teacher shall develop his reference from various sources

## **B)ARCHITECTURAL CONSERVATION**

**Objectives:** To enable the students to understand the various concepts in conservation and expose them to various techniques of conservation, preservation and restoration.

### **Module-1**

Definition and concepts- Conservation, preservation, restoration, reconstruction, and adoption. International frame work-Venice charter, Burra charter. Introduction to traditional building material and their decaying chareacteristics due to environmental conditions.

### **Module-2**

Composite materials- type of composites, mechanics of composite behavior. Environmental influences thermal effect, corrosion and oxidation, irradiation.

### **Module-3**

Investigation, documentation and analysis of decaying feature preparation of inspecting report. Listing and grading of heritage structures.

Techniques of restoration, preservation and rehabilitation. Legal provisions. Managment and phasing, presentation of heritage buildings.

### **References:**

*The conservation of historical buildings, B.M Feilden*

## **AR0412 THESIS/ DISSERTATION**

Each student is expected to prepare a design thesis under a department approved guide/ advisor. The thesis should be a design-oriented project approved by the department. The thesis should reflect the knowledge gained from the entire course taken by the student in all the previous semester. The topic should be preferably related to the students' elective stream. The particular of schedule, content presentation, format etc. as decided by the department time to time shall be strictly followed. At the end of the semester each student is expected to submit all original drawings prepared as per the department specification, 3 copies of the report in the specified format and a model should be submitted to the department after obtaining the approval of the respective guide / advisor. The department shall schedule the final viva voce at its convenience only after the Thesis submission by a student.

## **AR052 COMPREHENSIVE VIVA VOCE**

A viva voce test would be conducted by a panel of teachers of the department. The test would cover the topics related to the various subjects taught to the students throughout their all previous year of academic session and would also contain topics of general nature related Architecture.

## **AR061 SEMINAR (Paper Presentation)**

The objective of the course is to enable students to write book reviews and learn the technicalities of paper publication.

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