

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ORISSA

Architecture Engineering

<u>5th SEMESTER</u>				<u>6th 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
Credits (Theory)			15	Credits (Theory)			15
<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
Credits (Practicals / Sessionals)			14	Credits (Practicals/Sessionals)			14
TOTAL SEMESTER CREDITS			29	TOTAL SEMESTER CREDITS			29
TOTAL CUMULATIVE CREDITS				TOTAL CUMULATIVE CREDITS			

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 Blaif
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
