SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

BACHELOR OF ARCHITECTURE

PROGRAMME CURRICULUM

JULY 2016

CONTENTS

BARCH CURRICULUM-2016: PREFACE

The revised curriculum for Under-Graduate program of Architecture at School of Planning and Architecture, Bhopal is based on international and national best practices of education, institute charter and faculty feedback. The curriculum is first step towards 'Outcome Based Education' to bring substantial equivalency of the architectural education offered at the institute with international standards. To plan the substantial equivalency, each course is written with expected educational outcomes followed by details, so that it provides a clear outline of the academic experience received by the students and its compliance with acceptable standards and practices. To prepare the curriculum two faculty workshops were conducted to connect with Outcome Based Education and Learning Theories. Then there were several faculty meetings to plan vertical progression and horizontal integration of subjects, pedagogical approach (distribution of skill, knowledge and value), credit based system, relation of credit to contact hours and expectations of Council of Architecture norms. Several national and international architectural curriculums were referred to make this. The process was led by a core committee from the department.

The ten semester B.Arch. programme has 300 credits, and each semester have 30 credits based on 30 contact hours per semester.

Salient features of this curriculum are-

- The curriculum is prepared in such a way that the graduate attributes (GAs based on-knowledge, skill and attitude) can be mapped in five years/ten semesters of graduation in architecture. In initial semesters of the programme, the courses are mainly knowledge and skill based, whereas in later semesters the curriculum emphasizes more on attitude development. On one hand there are various knowledge based theory subjects which are named as width and depth theory subjects (based on their connection with the studio subjects), on the other hand it has studio subjects to develop attitude and help integrate knowledge and skills earned in past semesters. It is to be noted that though the revision is initiated with a note to connect with Outcome Based Education, it does not claim to address it in totality. There are several components like teaching strategies, assessment

techniques etc., which may be covered in subsequent revisions after experiencing it for a few years.

- The curriculum also tries to connect with the learning theories, models and taxonomies. The subject contents are written to include various levels of learning happening in a particular course.

- The subjects are grouped into vertical components which grow incrementally in knowledge, skills and attitude (value) at different semester levels (*Refer Table: 1 for Subjects with emphasis on different Learning Domains*). These vertical groups connect with the SPA Bhopal's charter, UIA/ UNESCO charter and Council of Architecture's architectural education norms in India.

- The architectural design subjects form the central-vertical of the entire curriculum along with another vertical comprising of building material, construction and techniques (*Refer Table: 2 for Vertical & Transverse connections in subjects*). All courses connect with these two verticals through assignments, tutorials or discussions. The design and construction studios grow incrementally in scale and complexities in higher semesters. The students would also demonstrate the learning's from the previous semesters through their attitude/ design thinking in these studios (*Refer Table: 3 for Architectural Design Matrix and Table: 4 for BMC Matrix*).

- The curriculum offers flexibility to the students and they are provided with lot of choices after initial grooming. The flexibility is offered through theory electives and studio electives (*Refer Table: 5 for Subjects that offer flexibility in the syllabus*).

Other than this, the students can earn credits by attending short term academic courses offered in allied institutions or allied disciplines. The students can also earn credit by writing papers, attending workshops, doing integral studios, winning national/international student competitions or participating in any other such activities, after the approval of the supervising faculty.

Also, the design studios would offer opportunities by doing two studio exercises every semester, one major and one minor. This will allow faculty/ student to experiment/ innovate through the minor design problems.

To provide opportunities for Under-Graduate research, the curriculum has seminars which will help students to explore their interest and connect with design. These seminars are so arranged that students get research training which finally culminates into design thesis.

- All subjects have different components like L-lecture, T-tutorial, P-practical/ studio and all are given equivalent credits as per the contact hours. These components are defined as below:

Lecture (L)

Lecture is a one- way mode of transferring information/ concepts/ theory to students, usually delivered by an instructor. To check the understanding of concepts, frequent tests and quizzes are supplemented with lecture.

Tutorial (T)

For completing class assignments, one -to-one practice sessions conducted by and with faculty member(s) are tutorials.

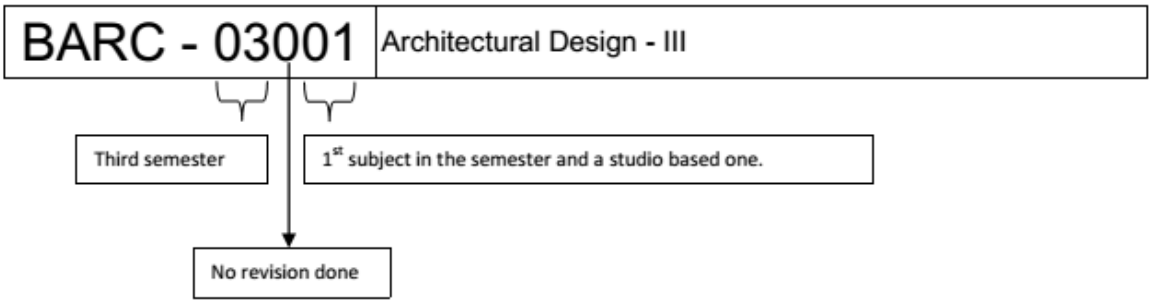
Practical/ Studio (P/S)

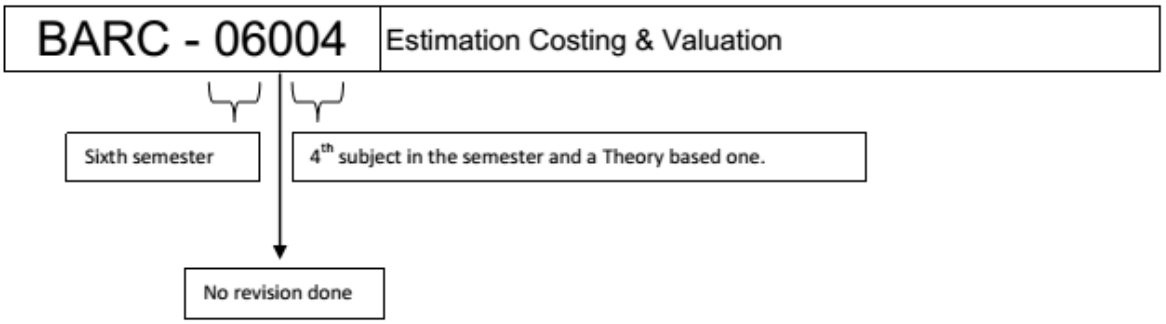
Practical / Studios are sessions where students use various mediums and modes to define real life problem(s) and solution(s) for the same, individually or in group.

- The curriculum includes professional training in the eight-semester. This is given equivalent credit compared to a regular semester, based on the professional training received in equivalent contact hours.

- The **subject coding system** adopted for the syllabus is as follows:-
    - Every subject code has 5 Arabic numeric digits:- BARC- XXXXX
    - Each code starts with the semester number, i.e.; 01 to 10 (1st two digits, where 01 denotes 1st semester)
    - The third digit denotes the number of times the subject/ subject content has gone through minor revisions (a scope of 9 revisions have been assumed before the entire syllabus get revised again).
    - Last two digits denote the subject number where, even stands for studio/ practice based subjects and odd number stands for theory based subjects;

For example:-





- The semester evaluation pattern comprises of three distinct schemes.
- WR- (Written exam) Evaluation based on written examination, mostly for the theory papers and as a component for some studio courses.
- VV- (Viva Voce) Evaluation based on oral/verbal / visual presentation. Typically can be taken for any type of course.
- TP- (Time Problem) Evaluation based on drawing / construction / demonstration of the learning that can have duration range from 3 hours to 7 days. Typically is taken for most studio based subjects and some theory subjects.
- The entire syllabus structure along with the Contact hours- showing the Lecture-Tutorial-Studio breakup, Credits and Subject Codes is given as an annexure along with syllabus.

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BACHELOR OF ARCHITECTURE
PROGRAMME CURRICULUM
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1st SEMESTER

SUBJECTS OFFERED

1ST SEMESTER										
S.No.	**SUBJECT CODE**	**SUBJECTS**	**L**	**T**	**P/S**	**CREDITS**	**MARKS**	**SEMESTER EVALUATON (WR/VV/TP)**		
	SESSIONAL SUBJECTS									
1	BARC - 01001	Architectural Design - I	**1**	**0**	**7**	**8**	**800**	----	VV	TP
2	BARC - 01003	Building Materials & Construction - I	**1**	**0**	**4**	**5**	**500**	WR	VV	---
3	BARC - 01005	Graphics - I	**1**	**2**	**2**	**5**	**500**	WR	VV	TP
4	BARC - 01007	Workshop	**0**	**0**	**2**	**2**	**200**	----	VV	----
	THEORY SUBJECTS									
1	BARC - 01002	Society, Culture and Architecture	**2**	**1**	**0**	**3**	**300**	WR	---	---
2	BARC - 01004	Ecology and Environmental Science	**2**	**1**	**0**	**3**	**300**	WR	---	---
3	BARC - 01006	Structural Mechanics	**1**	**1**	**0**	**2**	**200**	WR	---	---
4	BARC - 01008	Mathematics for Architecture	**2**	**0**	**0**	**2**	**200**	WR	---	---
	TOTAL CREDITS		**30**							
	TOTAL CONTACT HOURS		**30**							

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Subgroup: Architectural Design

Sem.	Course No.	Course Title	Credit	L	T	P/S
01	BARC-01001	Architectural Design - I	8	1	0	7

Course Overview :

- The aim of this subject is to familiarize students with visual grammar, elements of design and methods of visual composition with various mediums and color. In addition to the earlier, the intention of space design activity will be limited to the level of visual composition of architectural spaces considering human activity and anthropometry. There would be several studio/ design thinking exercises based on the module contents as is described below. The module may be taken up by the faculty in order of preference. The order should be common in both the sections of the same year. The faculty may achieve stated minimum outcome using various strategies and approaches.
- Parallel subjects would give assignments connected with the current design exercise(s) as part of their course work.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	To **understand** the application of visual grammar in the domain of Visual design
Psychomotor	Precision	To **create** composition with various 2D and 3D media with various mediums
Affective	Responding	To **critique** basic design composition
Affective	Valuing	To **evaluate** the human activities in built environment

Module 1: Colour theory and its application

Learning Resources / References & Learning Strategy

- Lecture on Elements of Design, Visual Grammar & Gestalt principles

Module Contents

Creation of Color wheel and relationships among various color

- Application of colors in built form and objects

Module 2: Study and Application of elements of design, visual grammar and gestalt principles in basic composition

Learning Resources / References & Learning Strategy

- Lecture on Elements of Design, Visual Grammar & Gestalt principles

Module Contents

- Elements of Design in basic composition
- Application of visual grammar and gestalt principles
- Evaluation of two dimensional composition with the help of above aspects

Module 3: Application of colour theory and visual grammar in composition

Module Contents

- Design of two dimensional composition in black and white medium
- Design of two dimensional composition in color medium
- Evaluate the composition with Visual Grammar

Module 4: Transformation from two dimensional shape to three dimensional form

Module Contents

- Form generation techniques – from 2D to 3D, Additive and Subtractive form
- Construction of 3D form with various material and colors
- Evaluation and Analysis of 3D form with visual grammar

Module 5: Anthropological study of human activity space
Module Contents • Study of relationship between human body movement and human activity • Relationship between human activity and built space • Measured drawing of human activity space – a case study
Module 6: Study of design related book/ article and its review
Module Contents • Study of one book/ article about design • Presentation of review in written/ verbal/ any other form of the above

Learning Resources/References
• Form, Space and Order by Francis D. K. Ching • Rendering with Pen and Ink by Robert W. Gill

Subgroup: Techniques

Sem.	Course No.	Course Title	Credit	L	T	P/S
01	BARC-01003	Building Materials & Construction - I	5	1	0	4

Course Overview:

- To familiarize students with building elements of superstructure and foundations, materials and construction techniques.
- The students will apply the construction techniques involved in masonry work with different materials like brick, stone and composite materials in different locations like T- junctions, independent piers and corner junctions. Students will understand the importance of various bonds through brick models and the assembling of these brick models in the form of courses and bonds. The subject will also introduce spread and stepped foundations in a building and their construction techniques.
- The subject is to be integrated with the ongoing subject of Architectural Design- I through one or many assignments.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	To **define** basic building elements
Cognitive	Remembering	To **recognize** the various types of masonry and foundation made up of suitable materials
Cognitive	Understanding	To **explain** the types and necessity of stone masonry
Cognitive	Analyzing	To **apply** composite materials for masonry works
Cognitive	Understanding	To **be aware of** the properties and applications of various materials

Module 1: Introduction to Super and Sub- Structure

Learning Objectives

- To make students familiar with basic building elements.

Module Contents

- Introduction to basic elements of buildings and their importance.

Module 2: Introduction to different types of Masonry & Brick Masonry

Learning Objectives

- To introduce brick as building material for super and sub structure construction.

Module Contents

- Different types of Bricks
- Introduction to bonds, principle and applications
- Brick walls in different bonds, ends, corners and junctions.
- Composition of brick earth and their properties, manufacturing process of bricks, classification of bricks, test for bricks, special type of bricks, substitutes for bricks, etc.

Module 3: Stone Masonry

Learning Objectives

- To make familiar with stone as a basic building material and the various construction techniques involved in stone masonry.

Module Contents

- Rubble work: Random Rubble, built-to-course and coursed masonry, miscellaneous
- Classification, characteristics and properties of stones, quarrying of stone, artificial stones

Module 4: Composite Masonry

Learning Objectives

- Students will identify the construction methods and details of composite masonry

Module Contents

- Explanation, construction methods and details of construction of composite masonry with various material as follows:

  Lime: Sources of lime, Classification and manufacturing process of lime, Fat and hydraulic lime – properties and use, tests on lime, etc.

  Cement: Composition of ordinary cement, function of cement ingredients, properties of cement – soundness, setting time, strength, etc. Grade of cement and different types of cement used in construction. Manufacturing process of ordinary cement in dry and wet method, packing and storage of cement, use of cement.

  Mortar: Sand, sources of sand and its classification, tests on sand, classification of mortar – lime mortar, mud mortar, *surkhi* mortar, cement mortar, preparation of mortar and its properties, use and selection of mortar for different construction work, etc.

Module 5: Foundation: Introduction to Shallow and Spread Foundations

Learning Objectives

- To introduce foundation as foremost step to any construction and making student aware of shallow and spread foundations.

Module Contents

- Definition, safe bearing capacity of different types of soils, depths and widths of foundations, simple footings, etc.

Module 6: External Wall Section

Learning Objectives

- Learning the Construction details of external brick wall section

Module Contents

- Construction details of external brick wall section

Learning Resources / References & Learning Strategy

**** Each module should include market survey and construction site visit compulsorily.***

- Building Construction Illustrated by Francis D. K. Ching
- Building Construction by W B Mackay (Volume 1 and Volume 2)
- Building Construction by Rangwala
- Engineering Materials by Rangwala
- Building Construction by B C Punmia, Ashok K. Jain and Arun K. Jain
- Building Materials by Gurcharan Singh
- Building Construction Handbook by R. Chudely

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Subgroup: Techniques

Sem.	Course No.	Course Title	Credit	L	T	P/S
01	BARC-01005	Graphics - I	5	1	2	2

Course Overview:

- Introducing and familiarizing students with drafting tools and accessories and provide basic knowledge and skill to draft a drawing manually.
- Developing drafting skills through different types of lines, their intensity and interpretation. Also understanding the scale of drawing, dimensioning, lettering techniques and layout of sheets.
- Visualizing and drawing geometric forms in different positions using orthographic projections and sciography will help the student to understand and develop drawings for various design proposals.
- Familiarizing students to three dimensional drawings/objects and its application used to enhance and communicating design ideas.
- Development of surfaces to develop understanding of 2-dimensional drawings and 3-dimensional models.
- Introducing the importance of rendering and exploring different methods/ techniques of rendering in various exercises. The subject will be taught in congruence with the current Design studio and other subjects like Mathematics for Architecture and Workshop. The assignments for the subject may be linked to design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	To **recognize** and select drawing tools and techniques for drafting basic drawing
Psychomotor	Imitation	To **identify** a type of line, intensity, thickness, text to draw a shape.
Psychomotor	Manipulation	To **implement** a scale, dimension for a layout of sheet or drawing
Psychomotor	Precision	To **demonstrate** a line, plane or solid into drawing using orthographic projections
Psychomotor	Articulation	To **construct** the drawings of complex compositions
Psychomotor	Articulation	To **integrate** the 2 dimensional drawings and 3 dimension form using development of surfaces
Psychomotor	Articulation	To **formulate** the 2 dimension into 3 dimension drawing using metric projection

Module 1: Introduction

Learning Objectives

- To become familiar with various drawing instruments and its uses to draw geometric and non-geometric shapes

Module Contents

- Drawing instruments and its uses
- Sheet layout and sketches
- Lines, lettering , scales and dimensioning

Module 2: Orthographic Projections

Learning Objectives

- To understand orthographic projections of points, lines, planes and solids located at various positions.
- To apply the concept of Sciography on objects, building elements and small buildings.

Module Contents

- Introduction to Projections
- Concept, Principle and Methods of Projections
- Orthographic Projections of Point, Line and Plane
- Projections of Solids in different positions

- Application of Projection for preparing architectural drawings
- Application of Sciography in 2 dimensional drawings with rendering techniques

Module 3: Application of Sections in Architectural Drawings

Learning Objectives

- To understand and draw the sections of solids and its application to building drawings.

Module Contents

- Introduction of section of solids with simple forms
- Concept and methods of drawing section of solids
- Application of sections for simple building drawings
- Section of complex form or structures

Module 4: Metric Drawing - Architectural Drawing Techniques

Learning Objectives

- To draw architectural 3-dimensional drawings in metric projections and discuss the benefits of perspective projections over metric projections.

Module Contents

- Types used & advantage
- Isometric, Axonometric & Oblique view
- Metric drawings, projections and their dimensions
- Difference between perspective and metric projections

Module 5: Development of Surfaces

Learning Objectives

- To draw and fold at the required positions to prepare the 2- dimension shape into 3- dimension model

Module Contents

- Introduction to development of surfaces and its uses.
- Methods of development of surfaces
- Development of lateral surfaces of simple solids as cube, cone, pyramids and prism.
- Development of complex solids, when two or more simple solids are joined together.

Learning Resources / References & Learning Strategy

- Elementary Engineering Drawing: Plane and Solid Geometry by N. D. Bhatt
- Rendering with Pen and Ink by Robert W. Gill
- Architectural Graphics by Francis D. K. Ching
- Engineering Drawing by B.V.R. Gupta
- Engineering Drawing: With Creative Design, Volume 2, by Hiram. E. Grant
- Architectural Drawing: Perspective, Light and Shadow, Rendering by Sherley W. Morgan
- Rendering in Pen and Ink by Arthur L. Guptil

Lecture, Models, Presentation and Videos are among the few strategies that may be adopted for the teaching-learning process.

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Subgroup: Art and Workshop

Sem.	Course No.	Course Title	Credit	L	T	P/S
01	BARC-01007	Workshop	2	0	0	2

Course Overview:

- The aim of this subject is to familiarise students with different types of materials and manufacturing techniques for creating art forms/ models.
- Students will be able to use different kinds of tools and machinery for production of design models.
- The subject will be taught in congruence with subjects like Design and Graphics. Assignments for the subject will be linked to design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Sensitize	To **sensitize** the usage of various materials for production of art work
Psychomotor	Apply	To **apply** different mediums and machine tools for production various types of art work
Psychomotor	Create	To **create** art forms with different mediums

Module 1: Development of Art and Craft Skills (manual skills)

Learning Resources / References & Learning Strategy

- Suggestive Materials: Materials like paper, thermocol, clay, ceramic, plastic sheet, sheet metal, wood etc.
- Discover Origami by Rick Beech

Module Contents

- Introduction to different hand tools and their process
- Rules, safely and precautions
- Learning the usage of various materials in 2D and 3D art work
- Create an art work with the above materials by hand.

Module 2: Application of Manual and Automated Tools in Art Work

Learning Resources / References & Learning Strategy

- Suggestive Material: Plastic sheet, Sheet metal, Wood
- Color on Metal by Tim Mc Creight & Nicole Bsullak
- The art of polymer clay, by Donna Kato & Natson Guptill

Module Contents

- Learning to handle machine tools
- Application of machine tools for art work

Module 3: Art Work in Design

Learning Resources / References & Learning Strategy

- The complete book of drawing techniques, by Eugene Felder & Emmett Elvin
- Paper Scissor Glue by Catherine Norman, Ryland Peters & Small
- Color on Metal by Tim Mc Creight & Nicole Bsullak

Module Contents

- Study of application of art work in design field
- Creation of art work for design presentation

Module 4: Art Work in Built Environment

Learning Resources / References & Learning Strategy

- Students can explore any material related to architectural built environment to various assignments unless specified by instructor
- Paper Scissor Glue by Catherine Norman, Ryland Peters & Small

• Color on Metal by Tim Mc Creight & Nicole Bsullak • The art of Polymer Clay by Donna Kato & Natson Guptil
Module Contents • Study of application of art work in built environment • Creation of art work for Architectural presentation
Module 5: Evaluation of Art Work
Learning Resources / References & Learning Strategy • The complete book of drawing techniques, by Eugene Felder & Emmett Elvin • Paper Scissor Glue by Catherine Norman, Ryland Peters & Small • Color on Metal by Tim Mc Creight & Nicole Bsullak • The art of polymer Clay by Donna Kato & Natson Guptill
Module Contents • Discuss and debate by presentation • Design of exhibition for art work
All the above modules will be evaluated in the form of verbal or written presentation of art work, drawing work, model making, photography, etc

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Subgroup: Ethics

Sem.	Course No.	Course Title	Credit	L	T	P/S
01	BARC-01002	Society, Culture and Architecture	3	2	1	0

Course Overview:

- This course draws on concepts, methods, and findings from the broad field of cultural anthropology to address these questions.
- Case studies and examples are drawn from a wide range of architectural traditions around the world for which there is significant ethnographic literature with special emphasis on India and other Asian countries.
- Topics include the ideational and formal relationships between folk and monumental traditions in complex societies. The structure of the ideal social order and its refraction in the material world, cosmological models and architectural form, geometries of non-Western traditions and the relationship between indigenization and culture change.
- The course will act as threshold to more advanced subjects of architecture in later semesters.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**To recognize** importance of architecture and design through time and across cultures
Cognitive	Understanding	To **comprehend** what have been the major issues in the development of architectural design in socio- cultural context
Affective	Analyzing	To **illustrate** the place specific nature of architectural design
Affective	Evaluating	To **appraise** about architecture and its relationship to its historical, political, social, economic, technological contexts
Affective	Evaluating	**To Interprete** the aesthetics related to more general systems of ordering within a particular society or group

Module 1: Culture

Learning Objectives

- Gain an understanding of anthropological theory and its lateral application
- Develop an appreciation for and understanding of cultural difference
- To gain a relativistic view of themselves and their own culture as one particular system.

Learning Resources / References & Learning Strategy

- Conformity and Conflict: Readings in Cultural Anthropology by McCurdy, David W., Dianna Shandy, and James Spradley, eds.
- Case examples of research on cultural anthropology
- Field studies of communities

Module Contents

- Fundamentals of sociology and its relationship to architecture.
- Culture and social identity with reference to architecture
- Fundamentals of society, culture and politics with reference to architectural history.
- Forms of social organization in history
- Various definitions of culture and civilizations

Module 2: Architectural Traditions

Learning Objectives

- To appraise the potential dimension of architecture as medium of (spatial) communication and mediation

- To recognize architecture to be approached as a cultural practice.
- Develop an awareness of the evolution of architecture across the centuries

Learning Resources / References & Learning Strategy

- House, Form and Culture by Amos Rapoport
- Case studies of various examples from India, Madhya Pradesh Region and Bhopal district

Module Contents

- Cosmological models and architectural form
- Articulation of people and built environments
- House form and communication
- Asian traditions in architecture
- Concept of vernacular architecture

Module 3: Society and Civilisation

Learning Objectives

- To gain understanding of society, culture and civilization
- To appraise the dynamic relationship between these three attributes.

Learning Resources / References & Learning Strategy

Case studies of various examples on social and cultural issues relating to architectural history in India and world.

Module Contents

- Architecture and its context
- Social and cultural aspects of building practices
- Architecture-expression of power
- Architecture as an agent of change
- Architecture as an identity

Module 4: Indigenization and Cultural Change

Learning Objectives

- To make architects respond and develop an attitude that emphasizes the needs and experiences of people over concerns of form or aesthetics.
- To equip the students for comprehending process of transformation of forms in history and culture.

Learning Resources / References & Learning Strategy

- Architecture in Cultural Change: Essays in Built Form and Culture Research by David G. (ed). Saile (Author)

Module Contents

- Transformations and changes in forms of historical architecture
- Localization and globalization –cases and examples
- Loss of architectural identify and role of culture
- Definition of Renewal, transformation, redevelopment, rejuvenation in architectural context and basic concepts

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Subgroup: Building Science

Sem.	Course No.	Course Title	Credit	L	T	P/S
01	BARC-01004	Ecology & Environmental Science	3	2	1	0

Course Overview:

- To provide fundamental knowledge about natural and built environment.
- To introduce the students to fundamental concepts to understand environmental processes.
- The curriculum further incorporates understanding in relation to Indian context.
- An attempt to have a detailed understanding of India's natural environment and the threats to them.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	To make the students **aware** about the scientific knowledge and current debates on the environment at three nested scales, including their interlink ages – Global, Regional and Local.
Cognitive	Remembering	To **enable** the students to understand cause-and-effect relationships between various human, natural and climatic factors that impinges upon ecological systems and their linkages. Through its focus on real-life examples and through the medium of studio exercises, the student learns ways in which ecological and environmental concerns can be **integrated (synthesis)** into Architectural programs.
Affective	Receiving	To be able to be **sensitive** with global & national environmental issues, the scale of impacts, important conventions, laws and policies in the field of biodiversity, and environmental protection.
Affective	Valuing	To **develop** and integrate higher level studios with that have complex briefs, including environmental and ecological concerns.

Module 1 : Fundamentals of Environment & Ecology

Learning Objectives

- **Knowledge –** Identify & state the threats to the World's Biological Diversity.
- **Comprehension –**Demonstrate regional differences in impacts of environmental problems

Learning Strategy

Illustrated Lectures, Films, and Introduction of Texts on Environmental Science and Human Ecology

Module Contents

- Environment definition, Environmental Segments, Concepts of Ecosystem: Fundamentals of Ecology and Ecosystem, Components of ecosystem, definition of Ecology, ecosystem processes in a site, Organisms and the Environment, Habitat and Niche, Environmental Factors, Ecological Adaptations, Population, Biotic Community and Succession
- Introduction, types, characteristic features, structure and function of different ecosystems: Forest, Grassland, Desert and Aquatic ecosystem.
- Effects of human activities on environment: Agriculture, Housing, Industry, Mining and Transportation activities,
- Cite the known threats to India's & the World's Biological Diversity

Module 2 : India's Bio-geographic regions

Learning Objectives

- ***Knowledge –*** Knowledge of India's biological diversity and bio geographic zones, ecoregions & ecosystems
- ***Comprehension*** –Demonstrate the differences between the environments in neighboring regions

Learning Strategy

Illustrated Lectures, Films, and Introduction of Texts on Environmental Science and Human Ecology

Module Contents

- List India's Biological Diversity in relation to the physio-geographic regions
- Identification of Principal Bio-geographic Zones of India and their description
- List of Eco-regions of India –Floristic and Physiographic (eg. IMI0301 etc.)
- Distinguish Between Floristic differences in an eco-region say Narmada Valley Dry Deciduous Forest, say Topical Moist Deciduous Forest (Pachmarhi)
- Evaluate the importance of biological diversity to all Life – Interconnections between Biological diversity and Human life – sustenance

Module 3 : Environmental Degradation and Human Impacts

Learning Objectives

- **Understand;** cause-and-effect relationships between various human, natural and climatic factors that impinge upon ecological systems and their linkages.

Learning Strategy

Illustrated Lectures, Texts, Case Studies and examples

Module Contents

- Analyse Global Climate Change & impacts – with respect to your rural/urban community (Increased risk/ vulnerabilities)
- Analyse the impacts of environmental degradation on traditional communities by abstracting from published reports. Write an essay on the theme

Module 4 : Applications of Ecological Methods and Techniques in Architecture

Learning Objectives

- **Application and Synthesis:** IUCN Conservation status of important species facing habitat loss & extinction; ecological conservation methods at site planning and master planning scale

Learning Strategy

- Illustrated Lectures, Texts, Case Studies and examples

Module Contents

- Develop a Site Plan for Wildlife, Landscape and environmental conservation
- Develop a Master Plan for Wildlife, Landscape and environmental conservation

Module 5 : Techniques and Details

Learning Objectives

- To understand implementation of ecological architecture at unit level

Learning Strategy

Illustrated Lectures, Texts, Case Studies and examples

Module Contents

- Rain water harvesting (contour bunds, wells, bunds, etc)
- Techniques of waste water management (house level, bio swales etc)
- Ecological planting (planting for wildlife, land improvement etc)

Module 6 : Environmental Movements

Learning Objectives

- To understand history of environmental movements

Learning Strategy

Case studies of Best management practices, environmental movements

Module Contents

- Environment movements in world and in India (Chipko movement etc)
- Environmental activists and their contribution (water conservation movements)

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Subgroup: Structure

Sem.	Course No.	Course Title	Credit	L	T	P/S
01	BARC-01006	Structural Mechanics	2	1	1	0

Course Overview:

- The course would enable students to understand various principles of strength of materials especially in the case of beams, columns and trusses.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	Study of stresses and strains and their effect in various elements
Cognitive	Remembering	Inter-relationship between Young's modulus of elasticity. Bulk modulus of elasticity and modulus of rigidity
Cognitive	Understanding	Analytical method for determining stresses and strains in the oblique section.
Cognitive	Understanding	To learn why we provide a particular type of footing, beam, slab or retaining wall in a building.
Cognitive	Remembering	Basic study of resolution of forces as well as various study of various theorem related with equilibrium
Cognitive	Remembering	To learn how to draw and make shear force and bending moment diagrams.

Module 1: Simple Stresses and Strains

Learning Objectives
Study of stresses and strains and their effect in various elements.

Module Contents

- Introduction to stresses and strains
- Types of stress and strain
- Elasticity and elastic limit
- Hook's law and elastic moduli
- Modulus of elasticity (Young's Modulus)
- Factor of safety
- Constitutive relationship between stress and strain
- Analysis of bars of varying sections
- Analysis of uniformly tapering circular rod
- Analysis of uniformly tapering rectangular bar.
- Analysis of bars of composite sections
- Thermal Stresses
- Thermal stresses in composite bars
- Elongation of bar due to its own weight
- Analysis bar of uniform strength

Module 2: Elastic Constants

Learning Objectives
Inter-relationship between Young's modulus of elasticity. Bulk modulus of elasticity and modulus of rigidity

Module Contents

- Longitudinal strain
- Lateral Strain
- Poisson's Ratio
- Volumetric Strain
- Volumetric strain of cylindrical rod
- Bulk modulus
- Principle of complementary shear stresses

Module 3: Principal Stresses and strains

Learning Objectives

Analytical method for determining stresses and strains in the oblique section.

Module Contents

- Introduction
- Principal planes and Principal Stresses
- Methods for determining stresses on oblique section.

Module 4: Centre of gravity and Moment of Inertia

Learning Objectives
To learn why we provide a particular type of footing, beam, slab or retaining wall in a building.

Module Contents

- Centre of gravity
- Centroid
- Centroid or centre of gravity of simple plane figures
- Centroid of plane figures by plane of moments
- Area moment of inertia
- Radius of gyration
- Theorem of perpendicular axis
- Theorem of parallel axis
- Determination of area moment of inertia
- Mass moment of inertia
- Product of inertia
- Principal axes
- Principal moments of inertia

Module 5: Elements of Static

Learning Objectives
Basic study of resolution of forces as well as various study of various theorem related with equilibrium.

Module Contents

- Parallelogram Law of Forces
- Resolution of forces- Triangular Law of forces, Polygon Forces.
- Theorem of Resolved Parts.
- Resultant of concurrent coplanar forces.
- Equilibrium.
- Moment of a Force.
- Moment and Arm of a Couple.

Module 6: Shear force and bending moment diagrams

Learning Objectives
To learn how to draw and make shear force and bending moment diagrams.

- Shear force and bending moment diagrams
- Types of beams
- Types of load
- Sign conventions for shear force and bending moment diagram
- Important points for shear force and bending moment diagrams
- S.F and B.M. diagram for a cantilever with a point load at the free end.
- S.F and B.M. diagram for a cantilever with a uniformly distributed load.
- S.F and B.M. diagram for a cantilever with a uniformly varying load
- S.F and B.M. diagram for a simply supported beam with a point load at the mid point.
- S.F and B.M. diagram for a simply supported beam with an eccentric point load.
- S.F and B.M. diagram for a simply supported beam carrying a uniformly distributed load.
- S.F and B.M. diagram for a simply supported beam carrying a uniformly varying load.
- S.F and B.M. diagram for overhanging beams
- S.F and B.M. diagram for beams carrying inclined load.
- S.F and B.M. diagram for beams subjected to couples.
- Relationship between load, shear force and bending moment diagrams.

Learning Resources / References

Strength of Materials by Dr. R.K. Bansal
Strength of Materials by R.S. Khurmi
Engineering Mechanics by R.S. Khurmi
Structure II by Bhavikutti.
IS Codes:
1. IS 465: 2000.
2. SP-16
3. SP-34

Subgroup: Theories

Sem.	Course No.	Course Title	Credit	L	T	P/S
01	BARC-01008	Mathematics for Architecture	2	2	0	0

Course Overview:

- The design of a building relies on a clear understanding of shapes, lines and angles, which is why mathematics is essential part of learning an architectural degree.
- Four primary areas of Maths study namely – geometry, trigonometry, Calculus and finite Maths are required to become a well rounded and successful architect.
- Each of these core concepts will teach students the skills needed to design a building and more importantly to design a building that can be constructed properly by following that design.
- Architectural connect could be established by taking examples from historical/ contemporary buildings designed using geometry.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Applying	**To develop** the foundation for Interior Design, architecture, artistry and design.
Psychomotor	Precision	**To develop** concern for working precisely (both models and drawings)
Psychomotor	Precision	**To practice** clear and concise drawings
Psychomotor	Articulation	**To develop** analytical thinking skills
Cognitive	Analyzing	**To relate** connections between images and numbers
Cognitive	Applying	**To develop** foundation for Interior Design, architecture, artistry and design.
Psychomotor	Precision	**To show** concern for working precisely (both models and drawings)

Module 1: Basic Geometry

Learning Objectives

- Develop precision with compass and ruler
- Widen arithmetic skills

Module Contents

- Study of shapes
- Linear Progression
- Artistic expression (Using geometry in architectural elements)
- Three dimension (3D shapes from 2D)

Module 2: Trigonometry

Learning Objectives

- To include angles and corners in architectural design.
- Enables to draw properly load-bearing walls in the right places in the building.

Module Contents

- Angles of intersection for components of structure
- Use of trigonometry in arches, domes, support beams, and suspension bridges.
- To find the length of wall using trigonometry
- Tangents

Module 3: Using Geometries to Apply Trigonometry

Module Contents

- Pythagoras
- Pythagoras Theorem

- Measure of cube and other solids
- Trigonometric applications
- Exercises

Module 4: Calculus

Module Contents

- Differentiation and methods of differentiation
- Applications to rates of change and small errors
- Successive differentiation
- Tangents and Normal: Angle of intersection of curves
- Radius of curvature in Cartesial coordinates.
- Polar coordinates: Angle between radius-vector and tangent
- Simple curves tracing and ideas of asymptotes.
- Taylor's and Macluaurins's expansions
- Maxima and minima of functions of one variable.
- Determination: Solution of linear simultaneous equations, Partial differentiation
- Euler's theorem: Total differentials: small errors
- Taylor's series for two variables: Maxima and minima of two variables.
- Fractional exposition, Conversions, Graphs, Circumscribing a circle

Module 5: Finite Maths

Learning Objectives

- To make mathematical models
- Calculate probability
- Make statistical equations

Module Contents

- Mathematical Models
- Linear Programming (relationship between a design and its construction and its profit potential)Statistical Equations

Learning Resources / References

- The Power of Limits: Proportional Harmonies in Nature, Art, and Architecture by Gyorgy Doczi
- Mathematics for the Non-mathematician by Morris Kline
- The Fractal Dimension of Architecture (Mathematics and the Built Environment) by Michael J. Ostwald and Josephine Vaughan
- New Mathematics of Architecture by Jane Burry and Mark Burry
- Architecture and Mathematics from Antiquity to the Future: Volume I: Antiquity to the 1500s by Kim Williams and Michael J. Ostwald

SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

BACHELOR OF ARCHITECTURE
PROGRAMME CURRICULUM
JULY 2016

2nd SEMESTER

SUBJECTS OFFERED

2ND SEMESTER										
S.No.	SUBJECT CODE	SUBJECTS	L	T	P/S	CREDITS	MARKS	SEMESTER EVALUATON (WR/VV/TP)		
	SESSIONAL SUBJECTS									
1	BARC - 02001	Architectural Design - II	**2**	**1**	**5**	**8**	**800**	----	VV	TP
2	BARC - 02003	Building Materials & Construction- II	**1**	**0**	**4**	**5**	**500**	WR	VV	---
3	BARC - 02005	Graphics-II	**1**	**2**	**2**	**5**	**500**	WR	VV	TP
	THEORY SUBJECTS									
1	BARC - 02002	Environmental Behavioral studies	**2**	**1**	**0**	**3**	**300**	WR	VV	---
2	BARC - 02004	History of Architecture- I	**2**	**1**	**0**	**3**	**300**	WR	---	---
3	BARC - 02006	Strength Of Materials	**1**	**1**	**0**	**2**	**200**	WR	---	---
4	BARC - 02008	Communication Skill	**1**	**0**	**0**	**1**	**100**	WR	---	---
5	BARC - 02010	Surveying & Leveling	**1**	**2**	**0**	**3**	**300**	WR	VV	---
	TOTAL CREDITS		**30**							
	TOTAL CONTACT HOURS		**30**							

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

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Subgroup: Architectural Design

Sem.	Course No.	Course Title	Credit	L	T	P/S
02	BARC-02001	Architectural Design - II	8	2	1	5

Course Overview:

- The aim of this subject is to familiarise the students with architectural design process through small scale projects of human habitat. The design activity will be limited to the level of visual composition of architectural spaces considering human activity and anthropometry, building material exploration, colour etc. There would be several studio/ design thinking exercises based on the module contents as is described below. The module may be taken up by the faculty in order of preference. The order should be common in both the sections of the same year. The faculty may achieve stated minimum outcome using various strategies and approaches.
- **Examples of project:** Small living space, Home stay, Small showroom, Shop, Small Activity space, Exhibition space etc.
- Parallel subjects would give assignments connected with the current design exercise(s) as part of their course work.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	To **understand** the application of the architectural design process for small scale projects of human habitat
Psychomotor	Articulation	To **transform** the human behavioural needs into architectural program requirements
Affective	Valuing	To **analyse** the information on context and the human-space relationship
Affective	Valuing	To **compose** the architectural spaces in a design project
Psychomotor	Precision	To **communicate** architectural drawings with the help of various mediums

Module 1: Design process and human as user of space

Module Contents

- Study and differentiate human needs, wants and desire
- Study of cases for different user's requirements
- Transform the behavioural requirements into space form
- Study of relationship among spaces with proximity chart, storytelling etc.

Module 2: Human activity and context

Module Contents

- Study of a context and its surroundings and collect information
- Analyse the above information in favour of the usage perspective
- Understanding of human scale to the context

Module 3: Planning of Spaces

Module Contents

- Distribution of the human activity spaces along the context considering the context as visual

background
- Analyse the relationship among the spaces
- Verbal presentation on planning of built environment with different mediums

Module 4: Architectural Composition

Module Contents

- Composition of spaces with geometric or non-geometric forms
- Visualisation of Architectural composition from different positions on context
- Colour composition of exterior and interior spaces
- Application of building materials according to colour composition and texture
- Verbal presentation with technical drawings of built form

Module 5: Detail design of interior spaces with a theme

Module Contents

- Detail planning and design of Interior spaces considering human needs and human anthropometric data with a theme
- Application of building materials with colour and texture in detail design
- Verbal presentation of Interior spaces

Learning Resources / References/ Learning Strategy

- Audio/visual presentation, model making, sketching with different techniques, photography
- All the above modules will be evaluated in the form of verbal presentation of design work, write up material, drawing work, model making, photography etc.
- Architectural Design by Jane Anderson
- Elements Of Space Making by Yatin Pandya

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Techniques

Sem.	Course No.	Course Title	Credit	L	T	P/S
02	BARC-02003	Building Materials and Construction - II	5	1	0	4

Course Overview: ‘

In this semester, study of foundation is continued with introduction to wooden opening and knowledge about joinery details

- To introduce students to details of shallow and deep foundations.
- The study in the semester increases in complexity from shallow and spread foundations to deep foundations and from introduction to building elements to a more detailed study of building elements like sills, copings, lintels, arches and timber doors and openings. Corresponding learning of carpentry joints is also a major course content of the semester.
- Students will also learn about water proofing methods and techniques at all building levels and a detailed study of construction building materials like concrete, clay used for flooring materials and timber. The subject will act as direct aid for Design exercises which involves requirement of knowledge of architectural drawings for small projects in the current semester.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	To **develop** understanding about complex foundations and the constructions techniques involved.
Cognitive	Remembering	To **recognize** openings used as different situations made up of timber from day to day life.
Cognitive	Understanding	To **understand** the importance of wooden carpentry joinery details used in openings. To **comprehend** the details/ arrangements of joinery in openings.
Cognitive	Evaluation	To **evaluate** the best suitable Joinery in openings
Cognitive	Understanding	To **learn** properties of various construction materials like waterproofing materials, clay used as flooring materials and timber used in the building industry.

Module 1: Foundations: Shallow & Deep

Learning Objectives

To develop understanding about the principles, construction techniques in shallow and deep foundations.

Module Content

Shallow foundation: Types, Isolated, combined and raft foundations and their construction techniques.
Deep Foundation: Grillage foundations, Piles foundations, Caisson foundations, etc.

Module 2: Carpentry Joinery Details

Learning Objectives

- Make students aware of various types of carpentry joints and their applications.

Module Content

- Different types of joints in timber and their applications to understand the function of joints with respect to load condition. (Lengthening and widening joints, Lap joints, tongue and groved joints, mortise and tenoned joints, Haunched tenon and mortise joints, dove tail joints, oblique tenon joints, etc.)

Module 3: Timber Doors and Windows

Learning Objectives

- To know and understand the basic characteristics and classification of timber as a construction material.
- To understand openings and the use and construction details of doors and windows with timber shutters and frames. Carpentry details in timber develop understanding in fixing of doors and windows.

Module Content

- **Timber**: Structure and timber trees, varieties of timber, defects in timber, decay of timber, Qualities of timber for construction, seasoning, storage and preservation of timber, properties and strength of manufactured products, veneers, plywood, block boards, fiberboard, etc.

- **Doors:** classification of doors; (a) paneled doors. (b) ledged and battened doors, (c) ledged, braced and battened doors, (d) framed, ledged, braced, and battened doors (e) flush doors
- **Windows:** Timber windows; Casement window and its details

Module 4: Arches

Learning Objectives

Study of openings will proceed to the study of Arches and its classification.

Module Contents

Classification of Arches on the basis of geometrical shape, materials, construction techniques, viz. flat, segmental, semicircular, Tudor, circular, elliptical, semi-elliptical, venetian, florentine arches, etc. Illustration of terminology for arches, construction detailing and methods of centering.

Module 5: Concrete

Learning Objectives

- To introduce concrete as mixture of cement sand and aggregate.

Module Content

- **Concrete:** Composition, properties of PCC and RCC, methods of concrete construction – various stages involved like – batching, mixing, transporting, compacting, curing, shuttering. Also study of collared concrete, light weight concrete precast concrete, quality control of concrete.

Module 6: Water Proofing Materials

Learning Objectives

- To understand importance, stages, methods and techniques of waterproofing,
- To understand the components and varieties of waterproofing used in the building industry.

Module Contents

- Waterproofing details in different levels: details in simple foundations, walls, roofs, sills, lintels and roofs in RCC, RB and steel, damp proof details of plinth, sill, lintel, and roof level.
- Water proofing materials and systems for basement

Module 7: Clay Products

Learning Objectives

- To understand importance, manufacturing process of the role of clay and clay products in the building industry.
- To become aware of conventional and new clay products used.

Module Contents

Flooring and roofing tiles, their properties, manufacturing process, laying of tles, etc.. Clay products like terra-cotta, earthenware, stoneware, porcelain, mud – its stabilization and uses, etc.

Learning Resources / References & Learning Strategy

- Building Construction Illustrated by Francis D. K. Ching
- Building Construction by W. B. Mckay
- Building Construction by Sushil Kumar
- Building Construction by Rangwala
- Engineering Materials by Rangwala
- Building Construction by B. C. Punmia
- Building Materials: Materials of Construction by Gurcharan Singh
- Building Construction Handbook, R. Chudely

*** Each module should include market surveys and construction site visits compulsorily.**

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Techniques

Sem.	Course No.	Course Title	Credit	L	T	P/S
02	BARC-02005	Graphics-II	5	1	2	2

Course Overview:

- Architectural Graphics-II intends to develop essential manual skills such as proficiency in drawing, largely used as primary mode of communication of ideas in architectural design.
- Students will be introduced to a variety of tools and techniques for visual expression with emphasis on manual drawing.
- A continuation of Architectural Graphics-I, Architectural Graphics-II intends to introduce the students to various essentials of architectural drawings such as principles, tools and techniques for communicating design ideas.
- The course would help students identify suitable methods of representation and methods in different built environment scenarios.
- Architectural Graphics-II introduces advanced techniques for architectural drawing such as perspective projection, mix-media renderings etc.
- The course would help students identify suitable methods of representation and methods in different built environment scenarios.
- The subject will be taught is congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**Recognize** the need to combine the use of manual drawing tools and techniques for drafting and freehand drawing for architectural design communication
Cognitive	Applying	**Apply** the projected drawing method of exterior and interior perspective
Cognitive	Applying	**Construct** one and two point perspective drawings from floor plans and elevations
Cognitive	Application	**Produce** by Drawing/sketching 3- Dimensional Architectural drawings using and freehand techniques.
Psychomotor	Precision	**Demonstrate** an understanding of furniture, people and accessories in one and two point projected perspective drawing.
Psychomotor	Construct	**Construct** conceptual and presentation drawings as a design presentation tool for various purposes

Module 1: Basics of perspective drawings

Module Contents

- Anatomy of perspective: Station point, Eye level, Cone of vision, Picture plane, Horizon line, Ground line, Vanishing points
- Types of perspectives : One point, Two point, Three point

Module 2: Perspective drawings for exteriors

Module Contents

- 2 point perspectives of building exterior
- 3 point perspectives of simple architectural forms

Module 3: Perspective drawings of interior spaces

Module Contents

- One point and two points perspectives of interiors
- Perspectives of simple household furniture items

Module 4: Perspective drawing by innovative methods

Module Contents

- Preparation of Perspective by innovative methods like approximate method, Diagonal Method, Grid Method etc. Other innovative methods of perspective presentation.
- Introduction to shortcut methods in perspective drawing.
- Perspectives of Residences.
- Sciography in perspectives

Module 5: Freehand presentations and rendering techniques

Learning Objectives

- Sketch using freehand techniques
- Draw views demonstrating the play of light and shadows.
- Demonstrate use of various presentation mediums

Module Contents

- Freehand perspective sketching. Rendering, shades and shadows.
- Introduction to represent different textures and finishes in plan and elevation of interior and exterior spaces.
- Graphical representation of furniture, automobiles, human figures, etc. in plans and elevations and 3-dimensions.

Module 6: Manual techniques for painting/colouring of Architectural Drawings

Learning Objectives

- Sketch using freehand techniques
- Draw views demonstrating the play of light and shadows.
- Demonstrate use of various presentation mediums

Module Contents

- Techniques Colouring of architectural presentation drawings in various medium
- Monochromatic shades, Shades and shadows in multi-coloured drawings

Learning Resources / References & Learning Strategy

- This course employs a lab strategy where instructor introduces, demonstrates use of a tool/techniques. Students are supervised on-to-one basis. Primarily stress is given to skill development by hands-on experience with support of reference material.
- Architectural Graphics, 4th Edition by Francis D.K. Ching
- Design Drawing by Francis D.K. Ching

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Ethics

Sem.	Course No.	Course Title	Credit	L	T	P/S
02	BARC-02002	Environmental Behavioural Studies	3	2	1	0

Course Overview:

- The main intention of the course is to equip students with basic study of human behavior and interaction with environment.
- The course includes topics such as beliefs, meanings, values and attitudes of individuals or groups concerning various environments such as neighbourhoods, cities, transport routes and devices, or recreational areas; evaluation and effectiveness of environments designed to accomplish specific objectives; Interrelationships between human environments and behavioural systems; practises aimed at controlling environments and behaviour.
- The subject will have assignments in line with the understanding obtained from design studio, building materials & construction and history of architecture.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	To **Describe** the elements of behavior and their relationship to the environment.
Cognitive	Understanding	To **Interpret** the traditional built environment in context with community /neighborhood behavioral pattern
Cognitive	Understanding	To **distinguish** between built habitats based on community behavior.
Cognitive	Understanding	To **identify** man-environment cognition phenomena
Cognitive	Understanding	To **interpret** space design with social aspects (like age, gender, ability, economy)
Cognitive	Applying	To **relate** built spaces with human interpretations
Cognitive	Analyzing	To **illustrate** the differences in social space design with the help of examples.

Module 1: Introduction

Module Contents

- Psychology and its relation to built space
- Behavioral Science and modern movement
- Elements of behavior

Module 2: User group and built environment

Module Contents

- Family, gender and group social behavior, Community behavior patterns
- Behavioral concept in neighborhood and communities

Module 3: Man-environment relationship

Module Contents

- Development of perception, Memory and thinking, mental map
- Gestalt theory of Perception – environmental cognition and effect, spatial behaviour,
- Failure of Gestalt theory in complex phenomena,

Module 4: Environment-behavior information

Module Contents

- Environment as interacting system, Environmental perception,
- Environmental cognition, Field theory and Lewinian space.

• Semantic and Semiotic approaches to environmental design.
Module 5: Environment – Behavior: phenomena and design
Module Contents • Behavior Settings: Fits and Misfits, Anthropometrics and ergonomics • Proxemics and Personal Space • Territoriality and Defensible space
Module 6: Environment – Behavior: phenomena and design
Module Contents • Privacy, Density, Crowding and Stress • Social space, Small group Ecology
Module 7: Social design aspects
Module Contents • Safety, equity • Age and built space • Making space and place

Learning Resources / References & Learning Strategy
• Hidden Dimensions by T. Hall • Personal Space by Sommer • House Form And Culture by Amos Rappoport • A Pattern Language by C. Alexander • Life and Death of Great American Cities by Jane Jacobs

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

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Subgroup: Architectural Evolution

Sem.	Course No.	Course Title	Credit	L	T	P/S
02	BARC-02004	History Of Architecture - I	3	2	1	0

Course Overview:

- The architecture of the world can be categorised as per the timeline of the respective regions of the world with the rock shelters and ancient civilisations of the world with a theoretical framework and the prominent people of architecture who have significantly contributed in the establishment of major distinct architectural styles and features thereby, resulting in a holistic approach and comprehensive and exhaustive analysis of the world architecture.
- All the modules of this course should be studied by discussing the following features first before discussion of architecture/building types:
- Geography of Building Materials/Resources
- Methods of Construction
- Sociological Background- Degree of Dominance of Religious/Political/ Economical class.
- The understanding of space development and structural quality based design approach would enable students to design smaller basic structures / houses with applicable structural principles and construction techniques in mind. Innovation in the use of conventional material in non-conventional way, as portrayed in the landmark historic buildings, would also help students to think out of the box.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**Identify** different styles of historic architecture.
Cognitive	Remembering	**Identify** prominent / important historic buildings by their components / style of design
Cognitive	Remembering	**Describe** prominent / important historic buildings
Cognitive	Analyzing	**Analyze** the contributing factors for the design development of different styles.
Cognitive	Analyzing	**Compare and Contrast** various styles on the basis of the contributing factors responsible for their development
Cognitive	Creating	**Design** buildings in the historic architectural styles.

Module 1 : Introduction to Mesopotamian and Egyptian Architecture

Module Contents

- Introduction to Mesopotamian civilizations, their social systems and cultures
- Salient building types – Mesopotamian:
  - Ziggurats and their development – White Temple, Ziggurat of Ur, Urnammu and Khorsabad
  - Generic Temple Layout - Temple Oval and Khafaje
  - Palace Complex/Citadel of Khorsabad, Nebuchadnezzar's Babylon, Persepolis
- Introduction to Egyptian civilization, their social systems and cultures
- Salient building types – Egyptian:
  - Temples & temple complexes - Cult Temple and Mortuary Temple
  - Mastaba – development and typical components
  - Pyramids – Complex of Zoser, Pyramid of Cheops and Cephren, Standard mortuary complex layout of pyramids

Module 2: Greek Architecture

Module Contents

- Introduction to Greek civilization, their social systems and cultures
- Classical Order – Doric, Ionic, Corinthian
- Salient building types:
  - Temple types on basis of column layout – case example of Acropolis, Athens
  - Discussion of Hellenic Temple (Parthenon, Athens) versus Hellenistic Temple (Athena Polias, Priene)
  - Public Buildings and Square – Agora, Stoa, Prytaneum, Bouleuterion, Tholos, Gymnasium, Theatre

Module 3: Roman Architecture

Module Contents

- Introduction to Roman civilization, their social systems and cultures
- Contribution in new materials and new construction/structural systems, eg, Pozzolana, Cementae, Stone Blocks, Stone Masonry, Arch, Vault, Dome
- Salient buildings:
  - Forums of Rome
  - Pantheon
  - Aqueduct
  - Colosseum
  - Bath of Caracalla
  - Basilica of Trajan

Module 4: Early Christian & Romanesque Architecture

Module Contents

- Introduction to society and culture of 400 -1150 AD in Europe
- Early Christian Architecture
  - Development of Early Christian Church from Roman Basilica
  - Salient building – St. Peter's Basilica
- Romanesque Architecture
  - Development of Romanesque architecture from Early Christian architecture

Module 5: Byzantine Architecture

Module Contents

- Contribution of Byzantine architecture in the development of structural system – dome construction over square plan,
- Adoption of Greek cross in church layout
- Use of mosaic and mural in interior
- Salient buildings – Santa Sophia, Istanbul; St. Mark's Cathedral, Venice

Module 6: Gothic Architecture

Module Contents

- Introduction to society and culture of 1150 – 1350 AD in Europe
- Development of Gothic church and its new elements:
  - Pointed Arch window
  - Different arch types – lancet, equilateral, depressed
  - Trefoil arch
  - Cluster column and intersecting vault roof
  - Clerestory window and triforium

- Flying buttress
- Glazed window, stone and metal trellis, flamboyant window, rose window
- Entrance of church

- Salient buildings:
  - Cathedrals of St. Dennis,
  - Cathedrals of Chartres,
  - Cathedrals of Notre Dame (Paris)
  - Cathedrals of Reims

Module 7: Basic Introduction to Renaissance Architecture and its Classical Revivalism, Neo-Classicism

Module Contents

- Introduction to society and culture of 1400 -1800 AD
- Division of Renaissance architecture into Early, Mature and Late periods.
- Contribution in structural system, e.g., ribbed dome, lantern dome
- Revival of classical orders an principles – Neo-Classicism

Learning Resources / References & Learning Strategy

- History Of Architecture by Sir Bannister Fletcher
- The Story Of Architecture by Patrick Nuttgens
- Space, Time And Architecture by Siegfried Gideon

Subgroup: Structure

Sem.	Course No.	Course Title	Credit	L	T	P/S
02	BARC-02006	Strength of Materials	2	1	1	0

Course Overview:

- Understanding the basic principles of structural mechanics that would be pertinent to simple design elements and understanding the structural behavior of buildings.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**Develop** understanding of shear and bending stresses in Trusses.
Cognitive	Remembering	**Calculate** of Shear stress distribution in various sections
Cognitive	Understanding	**Calculate** deflection in beams through analytical method
Cognitive	Understanding	**Develop** understanding various equation of column design

Module 1: Simple Stresses in trusses

Learning Objectives

- Study of stresses and strains and their effect in various elements of trusses.

Module Contents

- Forces in members- analytical method
- Method of joints
- Method of sections

Module 2: Bending Stresses

Learning Objectives

- Study of bending moment and their effect in various elements of trusses.

Module Contents

- Bending equation
- Bending stresses in symmetrical and unsymmetrical sections

Module 3: Shear Stress

Learning Objectives

- Analytical method for determining shear stresses in various section of building structure.

Module Contents

- Introduction
- Shear stress distribution in various sections.

Module 4: Deflection of Beams

Learning Objectives

- Analytical method for determining deflection in various sections of building structure.

Module Contents

- Differential Equation of deflected beam.
- Double Integration method,
- Macaulay's method.
- Statically determinate beams and propped Cantilever.
- Moment Area Method.
- Conjugate beam method.

Module 5: Column and Struts

Learning Objectives

- Understanding various equations to design columns.

Module Contents

- End conditions
- Effective length
- Slenderness ratio.
- Euler's formula

Learning References/Resources

- IS Code 465: 2000.
- Strength Of Materials by Dr. R.K. Bansal
- Strength Of Materials by R.S. Khurmi
- Engineering Mechnaics by R.S. Khurmi
- Structure II by Bhavikutti.

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Theories

Sem.	Course No.	Course Title	Credit	L	T	P/S
02	BARC-02008	Communication Skills	1	1	0	0

Course Overview:

- The course intends to build the required communication skills of the students having limited communicative abilities, so that they may communicate effectively in real-life situations.
- This will help the students to equip themselves for better performance in all subjects that require verbal communication and written explanations.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**Identifies** the important aspects on verbal communication
Cognitive	Understanding	**Recognizes** common errors in verbal and written skills.
Psychomotor	Imitating	**Identifies** differences in intents within communication
Cognitive	Understanding	**Paraphrase** the written documents and verbal ly
Psychomotor	Applying	**Demonstrate** role-play based on different situations
Psychomotor	Articulation	**Formulates** the verbal and non verbal communications
Psychomotor	Precision	**Demonstrate** the dictions and meanings through effective communication
Affective	Characterization by a value or value set	Able to **revise** judgments and change behavior in light of new evidence

Module 1: Understanding the basics of communication skills

Learning Resources / References & Learning Strategy

- Ice-breaking Exercises, practicing accents, exercises on listening skill, and exercises on writing skills.

Module Contents

- Scope and Importance of communication
- Listening, Speaking- 2 important parts of communication
- Reading & Writing

Module 2: Command on simple grammar and building up vocabulary

Learning Resources / References & Learning Strategy

- Assignments on Time and Tense, Agreement, Active-Passive

Module Contents

- Time and Tense, Agreement, Active-Passive, Narration,
- Use of Determiners, Prepositions & Phrasal Verbs
- Word-formation, Synonyms, Antonyms, Homonyms, One-word Substitutes, Idioms and Phrases.
- Collocations, Abbreviations of Scientific and Technical Words

Module 3: Introduction to sounds and science of speaking

Learning Resources / References & Learning Strategy

- Laboratory Session on Narration, Use of Determiners, Prepositions & Phrasal Verbs, Revisionary Exercises & Quiz

Module Contents

- Organs of Speech, Place and Manner of Articulation, Stress & Intonation,

- Listening Comprehension (Practical Sessions in Language Laboratory)
- Countering Stage-fright and Related Barriers to Communication.

Module 4: Soft Skills

Learning Resources / References & Learning Strategy

- Non-Verbal Communication in Cross-Cultural Situations, Case Studies.
- Assignments on E-mail Etiquette, Social Networking, Blog Writing, Discussions on Current Issues

Module Contents

- Interpersonal Communication.
- Verbal & Non-verbal communication, Body language, Persuasion.
- Negotiation, Neuro-Linguistic Programming

Module 5: Communication and media (social and popular)

Learning Resources / References & Learning Strategy

- Group Discussions and Readings on Topics Related to Race, Ethnicity, and Diaspora

Module Contents

- The Social and Political Context of Communication
- Recent Developments and Current Debates in Media

Module 6: Rhetoric and public communication

Learning Resources / References & Learning Strategy

- Individual Presentations (Audience Awareness, Delivery and Content of Presentation)

Module Contents

- Audience Awareness, Emotionality, public speech.

Learning Resources / References & Learning Strategy

- A Practice Course In English Pronunciation by J. Sethi, J & et al.
- Communication Skills by Leena Sen.
- Communication Skills by P. Prasad
- Spoken English, Orient Language by R. K. Bansal and J.B. Harrison.
- English Phonetics And Phonology by Peter Roach
- Oxford Advanced Learners Dictionary of Current English by A.S. Hornby.
- The Functional Aspects Of Communication Skills by P. Prasad

Subgroup: Building Management

Sem.	Course No.	Course Title	Credit	L	T	P/S
02	BARC-02010	Surveying & Leveling	3	1	2	0

Course Overview:

- The Surveying & Leveling of potential site/ land is essentially required to understand the ground situation before preparing an architectural design of any type of structure.
- The survey maps will be foundation documents for selection of technique of design based on ground elevation and contour pattern of proposed site.
- This subject covers the conceptual theory and practical application of surveying and leveling on ground with help of various survey concepts, techniques, methods and instruments.
- The subject will be taught is congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Outcomes:

The course will equip the students to understand the role of surveying and leveling in architecture and will be introduced to the techniques and equipments for land surveying.

Module 1: Introduction to surveying

Learning Objectives

- Enable the students to understand land topography and its connection with surveying & leveling exercises.
- Types of surveys in practice and overview of various survey techniques & equipments.

Learning Resources / References & Learning Strategy

- Based on the knowledge acquired the student should be able to identify and determine the relevance of surveying in Architecture.

Module Contents

- Concept of surveying & levelling and its tactical importance for Architecture profession
- Overview and classification of various survey techniques & equipments
- Scaling of survey measurements and Errors in Surveying
- Concept of Trigonometry, Traversing & Tacheometry in Surveying

Module 2: Elementary Surveying Techniques

Learning Objectives

- Enable the students to understand the primary basic surveying techniques adopted in past years

Learning Resources / References & Learning Strategy

- History of evolution of surveying from elementary techniques

Module Contents

- **Chain Surveying:** Principles of survey, equipment required selection of station, methods of taking offsets. Booking the field notes, obstacles in chaining, errors in chaining, chaining on sloping ground and reciprocal ranging.
- **Compass Surveying:** The prismatic compass, its construction and uses. Other types of compasses. Reduced and whole circle bearing, magnetic declamation, effects of local attraction. Compass traverse and balancing the closing error.

Module 3: Conventional Surveying Techniques

Learning Objectives

- Enable the students to understand the conventional surveying techniques adopted in past years

Learning Resources / References & Learning Strategy

- History of evolution of surveying from elementary techniques to new age modern conventional techniques

Module Contents

- Plane Table Surveying: Equipments, methods, advantage & disadvantage, errors etc.
- Theodolite Surveying: Theodolite's temporary & permanent adjustment, measuring of magnetic bearings, horizontal & vertical angles. Theodolite traverse & balancing closing error.
- Tachometric Surveying: General instruments, different systems of tachometric measurements, stadia method, Subtense method.

Module 4: Levelling & Contours

Learning Objectives

- Enable the students to understand basics of leveling with various instruments & methods and concept of contouring.

Learning Resources / References & Learning Strategy

- Role of elevations and determination of levels at various surface patterns

Module Contents

- Levelling: Different types of levels, their temporary and permanent adjustment, levelling staff. Book of the readings and reduction of levels. Errors in levelling. Curvature and refraction reciprocal levelling profile, levelling cross sections.
- Contouring: Characteristics of contour lines, direct and indirect methods of contouring and interpolation of contours. Interpretation and preparation of contour maps.

Module 5: Advance Survey Techniques

Learning Objectives

- Enable the student to understand the concept of **Total Station Survey** and its multi-functioning in surveying
- Use of satellite for measurements of survey points with help of **DGPS**

Learning Resources / References & Learning Strategy

- Combine measurement of coordinates and distances with digital technology
- Understanding of latest satellite based survey techniques to overcome the limitation of conventional surveys techniques

Module Contents

- Limitations of traditional surveys techniques, limitations of DBMS and CAD packages
- Site modeling with total station survey (TSS) and exercises in setting out of building works.
- Measurements of coordinates and elevations of objects from various points and minimising the errors with traversing with TSS
- Introduction to Remote sensing & GIS- concept and definition,
- Concept of DGPS and its applications & Site modeling with DGPS

Learning Resources / References

- Surveying And Surveying (Volume I & II) by Dr. B. C. Punmia, Ashok Jain, Arun K. Jain
- Elementary Engineering Surveying by J. K. Ghosh
- Surveying And Levelling for Architects by Prof. Harbhajan Singh
- Online Latest Manual On Application Of Land Surveying Instruments, i. e. Total Station Survey, DGPS etc.

SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

BACHELOR OF ARCHITECTURE
PROGRAMME CURRICULUM
JULY 2016

3rd SEMESTER

SUBJECTS OFFERED

3rd SEMESTER										
S.No.	SUBJECT CODE	SUBJECTS	L	T	P/S	CREDITS	MARKS	SEMESTER EVALUATON (WR/VV/TP)		
	SESSIONAL SUBJECTS									
1	BARC - 03001	Architectural Design - III	1	0	7	08	800		VV	TP
2	BARC - 03003	Building Materials and Construction - III	1	0	4	05	500	WR	VV	
3	BARC - 03005	Computer as Tool in Architecture- I	1	0	2	03	300		VV	
4	BARC - 03007	Art Appreciation	1	0	1	02	200		VV	
	THEORY SUBJECTS									
1	BARC - 03002	Climate Responsive Architecture	2	1	0	03	300			
2	BARC - 03004	History of Architecture -II	2	1	0	03	300	WR		
3	BARC - 03006	Theory of Structures	2	1	0	03	300	WR		
4	BARC - 03008	Water supply & Sanitation	2	0	1	03	300	WR		
	TOTAL CREDITS		30							
	TOTAL CONTACT HOURS		30							

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

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Subgroup: Architectural Design

Sem.	Course No.	Course Title	Credit	L	T	S/P
03	BARC-03001	ARCHITECTURAL DESIGN- III	8	1	0	7

Course Overview:

The students are now well versed with visual grammar dealt in the previous semesters. The current semester will involve the formulation of design concepts and developing simple single storied load bearing structures in the immediate or observable environment. The semester focuses on the understanding of context and elements of the built form in an existing setting. The projects would connect horizontal circulation reflecting their creative approach drawn from data analysis and climatic consideration to the physical setting. They will address spatial requirements from activities and known spaces to sites without formal byelaws.

There will be at least one major and one minor design exercise. The faculty can take up the exercises as per their order of preference. The order should be common in both sections. The faculty may achieve the stated minimum outcomes using appropriate strategies.

The subject will be integrated with Visual Arts, Art Appreciation, History, BMC, Climate Responsive Architecture, Water Supply and Sanitation and Structures. The design process should result in form and function.

Suggested typologies: residences, community centre, aanganwadi, primary health centre, public toilet, etc.

Parallel subjects would give assignments connected with the current design exercise(s) as part of their course work

Course Outcomes:

Domain	Category	Outcome
Cognitive	Apply	To **apply** the learning of the previous semesters
Affective	Valuing	To **develop** sensitivity towards existing informal settings and elements of built space.
Psychomotor	Articulation	To **map** gathered information of visited physical setting
Cognitive	Evaluation	To **critique** the materials, construction techniques and structural systems used in the elements of built forms.
Cognitive	Apply	To **apply** climate responsive techniques to simple single storied load bearing structures.

Module 1 :

LO1: To develop sensitivity towards existing habitat spaces with its building elements

LO2: To map gathered information of visited physical setting

LO3: To critique the materials, construction techniques and structural system used in the elements of built forms**.**

Module Contents

- This module will involve the study of the context and elements of built and un- built spaces in an observable setting to develop the understanding of socio-cultural attributes of the physical environment, methods of construction emerging out of the way of life of the people in a given place including topographical and climatic survey.
- To achieve LO2 and LO3, students will present the documentation work through visual, verbal and graphical communication skills. The students may work in groups at this stage. They may use some of the techniques like measured drawings, rendered hand drawn sheets, models, role play, etc. Students will integrate attributes in terms of facilitation, plan form, volume, orientation, climatic considerations and space organization.
- The assessment/ evaluation strategy for the module may be based on reviews in the form of desk crits/ informal crits /interim crits/group crits.

Module 2 :

LO4: To apply climate responsive techniques to simple single storied load bearing structures.

Module **Contents**

Students will integrate knowledge from other associated subjects mentioned earlier to evolve a design for simple single storied load bearing structures. Students will keep in mind the spatial requirements emerging out of activities,

aesthetic appeal, functional quality and elementary structural concepts required to evolve the specific form.

Climatic consideration for the design, orientation of building on site their application in elevations as functional/aesthetic solutions will also be a part of the design exercise.

Learning Resources / References

- Encyclopaedia Of Vernacular Architecture by Paul Oliver
- Vernacular Architecture In The Twenty First Century by Macel Vellinga & Lindsay Asquith
- Architecture without Architects by Bernard Rudofsky
- Architecture For The Poor by Hassan Fathy

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Techniques

Sem.	Course No.	Course Title	Credit	L	T	S/P
03	BARC-03003	Building Materials and Construction - III	5	1	0	4

Course Overview:

- To familiarize the students with the temporary supporting structures required for construction.
- To give knowledge about the various Arch forms and their methods of construction.
- To introduce to the students with the classification and types and details of construction of roofs.
- And to give complete knowledge about the various types of flooring and its construction details.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	To **recognize** the various types of temporary supporting structures used in different locations in the building industry.
Cognitive	Understanding	To **understand** timber single and double roofs and timber floors.
Cognitive	Understanding	To be **updated** with the properties and applications of various special materials.
Psychomotor	Manipulation	To **implement** the details/ arrangements of temporary structures.
Psychomotor	Precision	To **create** drawings and designs based on the acquired knowledge base.

Module 1: Temporary Supporting Structures

Learning Objectives

Make students aware of temporary structures.

Module Contents

- Form work and shuttering for different types of RCC elements, trench timbering, scaffolding, shoring and underpinning.

Module 2: Timber Roofs

Module Contents

- Classification of roofs: (a) Single roofs; flat roofs, lean-to roofs, double lean-to, couple, close couple and collar roofs (b) Double or Purlin Roofs. (c) Trussed rafter roofs (d) Triple or framed roofs (e) Common roof coverings with its laying
- Waterproofing, rainwater gutter details.
- King post and Queen post roof trusses

Module 3: Timber Floors

Module Contents

- Timber floors: construction techniques, types of timber floors: single, double and triple joist timber floors,
- Furnishing of floors with different floor finishes like cement, coloured cement, mosaic, terrazzo, tiles etc. special consideration for rubber and PVC flooring, methods of laying

Module 4: Timber Partitions

Module Contents

- Types of timber partitions: Single, double and flushed timber partitions

Module 5: Introduction to RCC elements like Columns, Beams and Slabs

Learning Objectives

To familiarize students with basic information about construction procedures and reinforcement detailing about RCC elements like Columns, Beams and Slabs. Also to make students aware of joining details of columns, beams and slabs.

Module Contents

Reinforcement detailing of RCC building elements like columns, beams and slabs through sketches and site visits.

Module 6: Materials

Learning Objectives

Learning of various materials like panel walls, ferrous and non ferrous Metals and roofing material.

Module Contents

- Hollow and Panel walls: Economy and advantages over solid load bearing walls, practical consideration during construction hollow concrete block construction, different types of partition wall. Reinforced brick work.
- Ferrous Metals: Pig iron, cast iron, wrought iron – types, properties, steel – properties, types and uses of steel in construction, properties of mild steel and hard steel, defects in steel.
- Nonferrous Metals and alloys: Aluminium, copper, lead Nickel Important alloys like - brass, bronze, etc.
- Corrosion of both ferrous and non ferrous metals – types and preventive measures.
- Roofing Material: Study of contemporary roofing materials

Learning Resources / References

- Building Construction Illustrated by Francis D. K. Ching
- Building Construction by W. B. Mckay
- Building Construction by Sushil Kumar
- Building Construction by Rangwala
- Engineering Materials by Rangwala
- Building Construction by B. C. Punmia
- Building Materials: Materials of Construction by Gurcharan Singh
- Building Construction Handbook by R. Chudely

Each module should include market surveys and construction site visits compulsorily.

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Subgroup: Techniques

Sem.	Course No.	Course Title	Credit	L	T	S/P
03	BARC-03005	Computer As Tool In Architecture- I	3	1	0	2

Course Overview:

- To develop theoretical understanding of AutoCAD and its relevance in Architecture. Students would develop skills of 2D drafting using various tools and techniques. They would be able to generate 3D from 2D drawing using the rendering skills like material, lighting, background etc.
- This course will help learners to prepare presentation drawings, generating 3D and rendered views in a short time. This would finally help them in Design studio to develop conceptual as well as final model.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	**Develop** understanding of computer aided drafting
Cognitive	Applying	**Comprehends** computer aided drafting and its parameter as tools and its application in architecture
Psychomotor	Imitation	**Demonstrate** the concepts of CAD drafting methods and techniques in 2D and 3D through various architectural projects of progressive complexity
Psychomotor	Manipulation	**Evaluates** CAD techniques for quicker methods and presentation skills

Module 1: Introduction To Computer Aided Drafting

Module Contents

- Introduction to computer aided drafting
- To develop and understand tools and basic set up for computer aided drafting
- Theoretical understanding of CAD

Module 2: Computer Aided Drafting Methods And Techniques – 2D

Module Contents

- To comprehend tools and systems for 2d drafting
- Develops and draws various architectural plans, elevations and sections through 2 d Cad
- Manipulate and alter through various tools and techniques existing architectural drawings in 2D Cad

Module 3: COMPUTER AIDED DRAFTING METHODS AND TECHNIQUES – 2D – DEMONSTRATION

Module Contents

- To apply more complex tools and methods to edit drawings in 2D Cad
- Demonstrate presentation drawings in 2D Cad
- Draw and create a complete set of architectural drawings for a dwelling unit in 2 D Cad

Module 4: Computer Aided Drafting Methods And Techniques – 3d

Module Contents

- To comprehend tools and systems for 3d modelling in CAD
- Develops and draws various architectural volumes, forms and surfaces through 2 d Cad
- Convert and draw 2 d architectural drawings to 3d forms

Module 5: Computer Aided Drafting Methods And Techniques – 3d – Demonstration

Module Contents

- To apply more complex tools and methods to edit drawings in 3D Cad
- Demonstrate presentation drawings , material application and lighting in 3D Cad
- Draw and create a complete set of architectural drawings for a dwelling unit in 3 D Cad

Learning Resources / References
• Photoshop 7 Bible Professional Edition 2000 by McClelland Deke • Fundamentals Of Three-Dimensional Computer Graphics by Watt • Computer Aided Design guide For Architecture, Engineering And Construction by Aouad • The Illustrated AutoCAD 2002 Quick Reference First Edition by Ralph Grabowski • Autocad 2000: A Problem-Solving Approach by Tikoo Sham • CAD For Interiors Beyond The Basics by J.A. Fiorello

Subgroup: Art and Workshop

Sem.	Course No.	Course Title	Credit	L	T	S/P
03	BARC-03007	Art Appreciation	2	1	0	1

Course Overview :

- To develop an appreciation for varied art forms and bring the knowledge to the domain of the built environment.
- To develop a body of knowledge through study of historical evolution of artistic productions.
- To develop artistic capacity to enhance design skill.
- Summarize/synthesize an appreciation framework of the arts and put in various social, cultural and environmental contexts.
- The learning from this subject will help in developing analytical approach towards design projects.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	**Understanding** philosophical aspects of art from a historical perspective.
Cognitive	Understanding	The students will **learn** various art forms, genres and historical periods.
Cognitive	Analyzing	The students will **develop analytical skills** in art appreciation.
Affective	Valuing	The students will be **sensitized** to various artistic expressions.

Module 1: Philosophical Approach to Art Appreciation

Learning Objectives

To recognize various philosophical positions in art and aesthetics

Module Contents

- Historical review of aesthetic theories and concepts.
- Study of seminal texts in aesthetic theoretical works.

Module 2: Classification of the Arts and Art Forms

Learning Objectives

To define and classify different art forms

Module Contents

- Understanding and classification of various art forms.
- Comparative analysis and interfaces.
- Study of visual art forms and comprehending the essence in design thinking.

Module 3: Historical Survey and Analysis of the Arts

Learning Objectives

Study of art forms in various historical periods and contexts from the antiquities to the contemporary

Module Contents

- Survey and comparative analysis of Western high art.
- Survey and comparative analysis of Indian high art.
- Survey and comparative analysis of folk traditions of indigenous communities.
- Survey of contemporary art and influences.

Module 4: Skill Development Based on Study of Art/Master's Work

Learning Objectives

Material and technical exploration based on study of master artists

Module Contents

- Study of master's work.
- Representation in various mediums.

Module 5: Art Appreciation as a Tool In Design Thinking
Learning Objectives • To develop design thinking processes through discussion and debate in the form of presentation. • Align understanding with running design studio.
Module Contents • Exploring relationship of art and design. • Developing/creating design methodology with aesthetic sensitivity in the context of the running design studio.

Learning Resources / References
• History Of Art by Janson and Janson • Humanities Through The Arts by F. David Martin and Lee A Jacobus • Indian Art by Partha Mitter • Introduction To Indian Art by Ananda k Coomaraswamy • Ways Of Seeing by John Berger • History of Beauty by Umberto Eco et al • The Story of Art by E.H.Gombrich

Subgroup: Building Sciences

Sem	Course No.	Course Title	Credit	L	T	S/P
03	BARC-03002	Climate Responsive Architecture	3	2	1	0

Course Overview:

Obtain knowledge required for understanding the influence of climate on architecture. To familiarize students with the design and settings for buildings for daylight and factors that influence temperature. The students are exposed to the various design strategies for building in different types of climatic zones. The subject will be taught is congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

The subject will be taught is congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**List** the different elements of climate
Cognitive	Understanding	**Classify** the factors of comfort
Cognitive	Understanding	**Infer** the impact of climatic forces on built structures
Cognitive	Analyzing	**Examine** through mathematical formulae the thermal comforts levels of built form
Cognitive	Evaluating	**Assess** the effects of site, sun and wind in building response
Cognitive	Creating	**Design** of shelters in different climatic conditions.
Affective	Receiving	**Identify** the unique design requirements according to climate
Affective	Valuing	**Forms** a connection with the responsibility of environment friendly design

Module 1: Introduction

Module Contents

- Climate and Weather
- Elements of Climate
- Classification of tropical climates
- Climate balanced Architecture

Module 2: Bio-Climatic Approach

Module Contents

- Human Comfort- definitions and concepts
- Thermal Comfort Factors
- Bioclimatic Requirements
- Relation of climatic elements to comfort
- The Bio-Climatic Chart

Module 3: Environment and Building Forms

Module Contents

- Impact of External forces on Building
- Reading of Psychometric chart and its applicability.
- Building configuration and climate response.

Module 4: Site & Building Design

Module **Contents**

- Site Selection, Site Planning

- Building Orientation and Placement
- Effect of Landscaping

Module 5: Sun & Building Design

Module Contents

- Basic Principles of Heat Transfer
- Numerical based on heat transfer in buildings.
- Day lighting & Solar Control
- Thermal Insulation

Module 6: Wind & Building Design

Module Contents

- Wind effect and Air Flow Pattern
- Ventilation Techniques
- Air movement around the buildings
- Stack Effect and Thermally induced air currents

Module 7: Architectural Application

Module Contents

- Shelter for warm-humid climates
- Shelter for hot-dry climates
- Shelter for composite climate
- Shelter for cold –cloudy and cold- sunny climates.
- Application of software in climate responsive design

Learning Resources / References

- An Introduction To Building Physics by Narashimhan
- Manual Of Tropical Housing And Building – Part I – Climatic Design by O.H. Koenigsberger
- Housing Climate & Comfort by M.Evans
- Man, Climate And Architecture, Applied Science, Banking Essex by B. Givoni
- Climatic Design by Donald Watson

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Subgroup: Architectural Evolution

Sem.	Course No.	Course Title	Credit	L	T	S/P
03	BARC-03004	History of Architecture-II	2	1	1	0

Course Overview:

The architecture of the India can be categorised as per the timeline and should be studied with the other civilizations of the world. Indian architecture progressed with time and assimilated the many influences that came as a result of India's global discourse with other regions of the world throughout its millennia-old past. The architectural methods practiced in India are a result of examination and implementation of its established building traditions and outside cultural interactions. The syllabus discusses the expanse of these styles spread across the time period from the Vedic era to the nineteenth century.

Learning from this subject will provide analytical tool to students to overview the historical evolution of designing and construction technique.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**Identify** different styles of historic architecture.
Cognitive	Remembering	**Identify** prominent / important historic buildings by their components / style of design
Cognitive	Remembering	**Describe** prominent / important historic buildings
Cognitive	Analyzing	**Analyze** the contributing factors for the design development of different styles.
Cognitive	Analyzing	**Compare** and **Contrast** various styles on the basis of the contributing factors responsible for their development
Cognitive	Applying	**Design** buildings in the historic architectural styles.

Module 1: Vedic Architecture

Module Contents

- Introduction to vedic era, society and culture, later vedic era:, janapadas, rise of mahajanapadas, Magadha,
- Architectural treaties and writings : Vedas, Upanishads, Brahmanas, Aranyakas, Mahabaharata, Ramayana
- Architectural features
- Prominent Sites: Inamgaon in Maharashtra, Vajji in Bihar
- Study of vedic panels of gateway No.2 Sanchi and Beirut
-

Module 2: Jainism and Buddhism

Module Contents

- Introduction to new religion and ideas
- Architectural treaties and writings : Digha Nikaya, Lotus sutra of Mahayana, angas and upangas
- Architectural features: Sanghas and Viharas, temporary shelters
- Prominent Sites:
    - Karli caves Maharashtra
    - Nalanda and Taxila

Module 3: Mauryan Empire

Module Contents

- Introduction to Mauryan empire, life and culture, important rulers: Chandragupta Maurya, Bindusara, Ashoka, Post Maurayan empire Rulers Shungas, Kanvas, Indo Greeks, Shakas, Kushanas, Satvahanas, Sangam age, Cholas, Pandyas, Cheras, foreign rulers and trade through silk route, Architecture of Karnataka, Kalinga architecture, Dravidian architecture, Western Chalukya architecture, and Badami Chalukya Architecture
- Architectural Treaties and Writings : Indika, Arthashastra, Buddhacharita, Sangam literature, Jatakas

- Architectural features: stupas, rock edicts, pillar edicts,
- Prominent Sites:
    - Sanchi stupa
    - Rock edicts: Maski, Kaushambi, Jaugada, Dhauli etc
    - Pillar edicts:Lauriya, Rummindei,Rampurva etc
    - Ancient towns: Girnar, Sarnath etc

Module 4: Gupta Empire

Module Contents

- Introduction to Gupta empire, life and culture, important rulers, life and culture
- Architectural Treaties and Writings : Meghduta, Raghuvamsha, Kumarsambhava, Abhijana shakuntala, Mudrarakshasa, Mrichchakatika, Amaroksha, Panchasiddhantika, Aryabhatiyam, Devichandraguptam
- Architectural features:

  Prominent Sites:
    - Ajanta caves
    - Iron pillar in Mehrauli
    - Bhitragaon temple and Deogarh temple
    - Hindu and Buddhist temples at Sarnath

Module 5: Harshavardhana Era

Module Contents

- Introduction to new religion and ideas
- Architectural Treaties and Writings : Harshacharita
- Architectural features: Gandhara and Mathura school of art, temples, cave temples and shelters
- Prominent Sites:
    - Durga Temple Aihole
    - Ratha Temple Mahabalipuram
    - Kailashnath temple Kanchipuram
    - Virupaksha temple Pattadakal

Module 6: Early Islamic Architecture

Module Contents

- Introduction to Islamic culture worldwide; early Islamic architecture in India beginnings under the slave kings (cir. A.D. 1200 to 1290), The Sayyid (1414-51) and the lodi (1451-1526) dynasties, Provincial styles (Bengal, Gujrat, Malwa, Deccan, Sasaram)

- Architectural Treaties and Writings: al-Bīrūnī (d. 1048) - Kitab fi Tahqiq ma li'l-Hind (Researches on India), Fazl, Abu'l (1877). Akbarnamah (Persian), Vol. 1. Asiatic Society, Calcutta. (Online book), Fazl, Abu'l (1879). Akbarnamah (Persian), Vol. 2. Asiatic Society, Calcutta, Akbar nama by Abul Fazl, Travel in the Mughal empire, Travels of Pietro Della Valle in India

- Architectural features: Minars, minarets, towers and turrets, domes, The buildings of the Khalji dynasty, the Delhi or imperial style The Tughlaq dynasty (1320 to 1413), Lodhi, Sayyid

  Prominent Sites:
    - Tomb of ghiyias ud din Tughlaq, three cities of Tughlaq
    - Khirki Masjid
    - Stepped well Bai Hari, Rauza, Sayed mosque Ahmedabad
    - Qutub complex
    - Jaunpur mosques
    - Jami masjid (1470)
    - Atala masjid (1408)
    - Cambay : jami masjid (1325)
    - Ahmedabad: tin darwaza (c. 1425),
    - Ahmedabad : jami masjid (1423)
    - Bijapur : Ibrahim rauza (c. 1615)

Module 8: Colonial Architecture

Module Contents

- Colonial architecture, Indo Saracenic architecture, Indo gothic, French, Dutch and Portugese architecture in India
- Architectural Treaties and Writings
- Architectural features
- Prominent Sites:
  - French colony Pondicherry
  - The Basilica of Bom Jesus (Good Jesus), Goa Portugese
  - Old Amritsar : Golden Temple (1764 & after).
  - Chhatrapati Shivaji terminus

Learning Resources / References

- Architecture Of Mughal India by Catherine Asher
- Indian Architecture (Buddhist Hindu) Vol. 1 by P. Brown
- Indian Architecture (Islamic Period) Vol. II by Percy Brown
- A History Of Indian And Eastern Architecture by J. A. Fergusson
- The Architecture Of India, Buddhist & Hindu by S. Grover
- The Architecture Of India (Islamic) by S. Grover
- Islamic Architecture, Form, Function and Meaning by Robert Hillenbrand
- The Hindu Temple by George Michell,
- Architecture Of the Islamic World by GeorgeMichell
- Architecture Of World , India by Henry Sterlin
- Architecture Of World, India (Islamic) by Henry Sterlin
- The History Of Architecture In India by Christopher Tadgell
- The tradition Of Indian Architecture Continuity, Controversy – Change since 1850 by G.H.R.Tillotson

Other References

- Module 1 - Vedas, Upanishads, Brahmanas, Aranyakas, Mahabaharata, Ramayana
- Module 2 - Digha Nikaya, Lotus Sutra Of Mahayana, Angas And Upangas
- Module 3 - Indika, Arthashastra, Buddhacharita, Sangam Literature, Jatakas
- Module 4 – Meghduta, Raghuvamsha, Kumarsambhava, Abhijana Shakuntala, Mudrarakshasa, Mrichchakatika, Amaroksha, Panchasiddhantika, Aryabhatiyam, Devichandraguptam
- Module 5 – Harshacharita
- Module 7 – Akbar Nama By Abul Fazl, Travel In The Mughal Empire, Travels Of Pietro Della Valle In India

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Structure

Sem.	Course No.	Course Title	Credit	L	T	S/P
03	BARC-03006	Theory of Structures	3	2	1	0

Course Overview

To understand the various methods used in the structural analysis we require a good understanding of various equations and theorems. On the basis of these theorems only we are able to design simple as well as complicated structures. The learning's in this course will work as the foundation for the upcoming semester.

Course Outcomes

Domain	Category	Outcome
Cognitive	Understanding	**Distinguish** between determinate and indeterminate structures.
Cognitive	Remembering/Applying	**Identify** various forms of strain energy principles**.** **Application virtual** work.
Cognitive	Remembering	**Describe** Three Moment theorem and their application in fixed and continuous beams.
Cognitive	Remembering/Applying	**Describe** Slope deflection method and their application in fixed and continuous beams.
Cognitive	Remembering/Applying	**Understanding** and analysis of Moment distribution method. Describe simple frames and sway frames.
Cognitive	Remembering/Applying	**Apply** Approximate method of analysis.
Cognitive	Remembering/Applying	**Identify** Construction material

Module 1: Determinacy and Indeterminacy

Module Contents

12. Introduction to the theory related with determinate and indeterminate structures and also to know that which structure is determinate or indeterminate.
13. To make sure that structure satisfies the fundamental criteria of strength, stiffness, economy, durability and compatibility for its existence.

Module 2: Energy Principles:

Module Contents

- Forms of Elastic Strain Energy, Strain energy in members
- Energy relation in structural theory, Virtual work
- Betti's and Maxwell's laws of reciprocal deflection
- Application of Virtual work
- Castigliano's Theorems

Module 3: Three-moment theorem.

Module Contents

- Analysis of fixed and continuous beams

Module 4: Slope Deflection method

Module Contents

- Analysis of fixed and continuous beams
- Yielding of supports.

Module 5: Moment Distribution:

Module Contents

- Analysis of indeterminate beams and simple frames
- Sway frames

Module 6: Approximate methods of Analysis

Module Contents

- Substitute frame method

Module 7: Overview of construction

Module Contents

- Cement
- aggregate
- Water
- reinforcement
- various materials
-

Learning Resources / References

- **IS Codes:**
  1. IS 465: 2000.
  2. SP-16
  3. SP-34

Recommended Books:

- Structural Analysis III by S.S Bhavikutti.
- S. Unnikrishna Pillai & Devdas Menon; *Reinforcement Concrete Design, Tata McGraw Hill, New Delhi.*
- N.Krishna Raju; *Structural Design and Drawing, Reinforced Concrete and Steel, University Press (India) Ltd.*
- Limit State Sesign of Reinforced Concrete by P.C. Varghese.
- Strength of Materials by Dr. R.K. Bansal.

Subgroup: Building Services

Sem.	Course No.	Course Title	Credit	L	T	S/P
03	BARC-03008	Water Supply & Sanitation	3	2	0	1

Course Overview:

- Building services are the systems installed in buildings to make them comfortable, functional, efficient and safe. Building services might include: Building control systems. Energy distribution. Energy supply (gas, electricity and renewable sources such as solar, wind, geothermal and biomass).
- This course is designed to give architects an overview and introduction to Plumbing systems; and architectural considerations and their coordination with other services and architectural designs.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Comprehending	**Discuss** the active and passive components of plumbing.
Affective	Valuing	**Value** the importance of building services
Cognitive	Comprehending	**Develop** understanding of water supply system at city levels
Cognitive	Evaluating	**Design** water supply in residential and other small buildings
Cognitive	Applying	**Design** rain and waste water system in domestic building
Cognitive	Applying	**Design** of water-sewer system in buildings (except hydraulics design calculation parts)

Module 1: Importance of Building Services

Learning Objectives

To understand the need and importance of building services.

Module Contents

- Importance of water supply and sewerage.
- Historical overview of development of water/ sewerage systems.

Module 2: Water Supply for Urban Area

Learning Objectives

To understand the water supply system at urban level.

Module Contents

- Sources of water
- Quality of water, impurities in water and its treatment.
- Water demand calculations; norms and standards.
- Water storage, over head tank, and sump.
- Water distribution system at city/ neighbourhood overview.
- Water treatment plant.
- Types of water distribution networks.
- Water pipe materials, apparatus, joints, fixtures and valves.
- Guidelines for laying of water mains, distribution.

Module 3: Domestic Water Supply

Learning Objectives

- To apply knowledge gained on water supply system in small buildings.
- To design water supply system in a residential building.

Module Contents

- Principles of water supply in domestic buildings.
- Water supply in low-rise and multi-storeyed buildings.
- Hot-cold water supply network and connections.
- Pipe materials, fixtures, joints, equipments.
- Roof top water drainage.

Module 4: Domestic Sewage System

Learning Objectives

- To understand components of various sewage systems at domestic level.
- To design sewage system for a residential building.

Module Contents

- Principles of domestic sewer systems norms and standards.
- Types of pipe systems.
- Types of traps, use and water seal.
- Domestic sewer conveyance network.
- Components of sewer conveyance network.
- Basic terminology, Gully trap, inspection chamber, intercepting trap, man holes etc.
- Calculation for Gradient and slope in sewage disposal.
- Various sanitary fixtures and its connections.
- Sewage disposal to septic tank, cess pool, soak pit.
- Connection of house drainage to public sewer.

Module 5: Rain Water and Storm Water Disposal System

Learning Objectives

- To understand rain water disposal system in small buildings.
- To design rain water disposal system for a residential building.

Module Contents

- Techniques to divide surface area for rain water disposal.
- Details of collection point/ Khurra.
- Conveyance network for waste / rain water.
- Apparatus for conveyance of water, catch basin, gully traps, calculation for gradient/ slopes.

Module 6: Design of Domestic Water Supply and Sewage Network

Learning Objectives

- To design domestic water supply and sewage network for a small residential building.

Module Contents

- Applications of knowledge water supply and sewage design
- Preparation of drawings excluding hydraulic design

Learning Resources / References

- Plumbing Engineering by Dr. Subhash Patil
- International Plumbing Code by Indian Code Council
- Modern Plumbing by E. Keith Blankerbaker
- Plumbing Basics byDr. Rick Peters
- Building Construction Illustrated by Dr. F.D.K Ching
- Building Construction by Sushil Kumar
- Building Construction by B.C Punmia
- Building Construction by Rangwala
- Mechanical And Electrical Equipment For Building by Walter T. Gondzik
- Building Construction by P.C Varghese

SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

BACHELOR OF ARCHITECTURE
PROGRAMME CURRICULUM
JULY 2016

4th SEMESTER

SUBJECTS OFFERED

4th SEMESTER										
S.No.	**SUBJECT CODE**	**SUBJECTS**	**L**	**T**	**P/S**	**CREDITS**	**MARKS**	**SEMESTER EVALUATON (WR/VV/TP)**		
	SESSIONAL SUBJECTS									
1	BARC - 04001	Architectural Design - IV	**1**	**0**	**7**	**08**	**800**	---	VV	TP
2	BARC - 04003	Building Materials and Construction - IV	**1**	**0**	**4**	**05**	**500**	WR	VV	---
3	BARC - 04005	Computer as Tool in Architecture-II	**1**	**0**	**2**	**03**	**300**	---	VV	---
	THEORY SUBJECTS									
1	BARC - 04002	Site Planning & Landscape	**2**	**0**	**1**	**03**	**300**	WR	VV	---
2	BARC - 04004	Contemporary Architecture	**2**	**1**	**0**	**03**	**300**	WR	VV	---
3	BARC - 04006	Concrete Structures	**2**	**1**	**0**	**03**	**300**	WR	---	---
4	BARC - 04008	Electrical & Lighting	**2**	**0**	**1**	**03**	**300**	WR	---	---
5	BARC - 04010	Theory of Design	**2**	**0**	**0**	**02**	**200**	WR	---	---
	TOTAL CREDITS		**30**							
	TOTAL CONTACT HOURS		**30**							

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Architectural Design

Sem.	Course No.	Course Title	Credit	L	T	S/P	
04	BARC-04001	ARCHITECTURAL DESIGN-IV	8	1	0	7	

Course Overview:

The study of design shall continue with further progress and complexity in aesthetic qualities with more emphasis on architectural and functional aspects. The semester will focus on studying functional patterns in horizontal and vertical circulation for double storied framed structures with application of services. The design project will involve complexities like site restrictions and introduction to basic byelaws. The subject will be integrated with Art Appreciation, BMC, Contemporary History, Site Planning and Landscape Architecture, Electrical and Illumination, Concrete Structures.

There will be at least two design problems, one major and one minor, arranged in sequence leading to more and more complexity. The faculty can take up the exercises as per their order of preference. The order should be common in both sections. The faculty may achieve the stated minimum outcomes using appropriate strategies.

Suggestive Typologies: school, nursing home, hostel, homestead, motel

Course Outcomes:

Domain	Category	Outcome
Cognitive	Apply	To **demonstrate** the learning of the previous semesters
Cognitive	Understand	To **understand** the given project in terms of the design process with requirements for the same
Cognitive	Analyze	To **collect** data from standards, case studies and site visits for the current project.
Cognitive	Analyze	To **analyze** data collected with relevance to the current project.
Cognitive	Create	To **generate** design concepts required for the given project
Psychomotor	Articulation	To **integrate** learning from other allied subjects to the design proposal
Psychomotor	Articulation	To **develop** architectural drawings for the given project.
Affective	Valuing	To **complete** the architectural project with all given requirements for the given project.

Module 1:

Module Contents

This stage will involve at least two projects- one major and one minor in continuation with the previous semester in an increasing order of complexity with considerations relating to horizontal and vertical circulation to a double storied framed structure.

Introduction to byelaws with site restrictions is also initiated at this stage. Functional aspects of building services like drainage, water supply and electricity with structural concepts in the design will be a major part of the exercise. Site Planning and Landscape intentions shall also be involved in related stages of the design process.

The student will study and collect data using case studies through literature reviews, site visits and gathering of data/ information through literary sources. The project outcome / design solutions will be in the form of sheets, elevations- sections, perspective views, etc.

Module 2: Presentation of the previous module

Module Contents

- 1. Documentation of historical- socio- cultural information,
- 2. Use of locally available materials leading to construction techniques in elements of built forms and in response to the climate of the region.
- 3. Structural System in the built forms
- 4. Identification of possible design intervention in the region/ settlement.

Module 3: Design Intervention in the Region mentioned in the above modules

Module Contents

- Justification of the Design Intervention
- Conceptual Design
- Design development/ Form Development
- 4. Presentation/ Crits

Module 4: Introduction to the Design Problem, Site study and Area Programming

Learning Resources / References & Learning Strategy

- Lecture/ Presentation/ Creative Exercise by the Instructor
- Precinct studies through literature reviews and gathering of data through literary sources
- One to one as well as group discussions between students and instructors.

Module Contents

- Introduction to the Design Exercise/ Problem
- Site Visit and Site Analysis
- Case studies
- Collecting relevant data for the given design problem
- Synthesising and Analysing the above data
- Deriving Area Requirements for the Design Exercise

Module 5: Design Development

Module Contents

- Relation to various functional aspects of the design problem: Use of bubble diagrams, flow diagrams, zoning of site, etc.
- Conceptual Design
- **3.** Finalization of design proposals: schematic 2D/ 3D / single line/ conceptual level site plan, floor plan, elevations and sections should be finalized

Module 6: Final Design Proposals

Learning Resources / References & Learning Strategy

- Lectures leading to generation of multiple concepts and design solutions can be given/ introduced through creative exercises. Input in the form of lectures/ presentations/ movies/ videos/discussions/etc. related to special issues can be given by the design instructor.

Module Contents

1. Final developed to- scale drawings- site plan, plans, elevations, sections, elevations
2. Facilitation to the floor plan for justification of provided spatial proposals
3. Detailed Site Plan with built and un-built spaces and landscaping features
4. Development of views and construction details
5. Model of the proposed design

Sessional work: Exercise on one or few aspects at a time followed by at least two design problems arranged in sequence leading to more and more complexity. Type of Design Problems: a) Small Residence, Guesthouse, Block of Flats. b) Primary School, Dispensary, Club. c) Post office, Bank, Office etc.

Subgroup: Techniques

Sem.	Course No.	Course Title	Credit	L	T	P/S
04	BARC-04003	Building Materials and Construction - IV	5	1	0	4

Course Overview:

This semester will provide knowledge about vertical circulation with carrying forward learning of RCC from previous semester.

- To familiarize students with the different types of vertical circulation possibilities in the form of Stairs, Escalators, Auto Walks/ Travelators and Elevators. Also types and construction details of all vertical circulation elements will be dealt with in detail. Market survey and site visit studies shall be an essential part of the teaching – learning strategy.
- To give complete knowledge about the various types of Cladding and surface finishes.
- The subject will be integrated with other core subjects like Architectural Design and Building Services of previous and same semester.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	To **comprehend** the various modes of vertical circulation through live examples.
Cognitive	Understanding	To **understand** the applications, construction details and varieties of various modes of vertical circulation in the building.
Cognitive	Analyzing	To **compare and analyze** various materials used for cladding purposes for building components along with their construction details.
Cognitive	Understanding	To be **aware** of properties of various materials.

Module 1: Introduction to Vertical transportation and Staircases

Learning Objectives

Make students aware of vertical circulation through staircases with all technical terms related to it.

Module Contents

- Description of staircases, technical terminology involved, classification of staircases based on shape, material and its construction details.
- Vertical section through staircases with detailing at various levels

Module 2: Staircases

Learning Objectives

Make students aware of various types of staircases with reference to its placement, geometry and material used.

Module Contents

- Technical terminology involved, Different types of staircases-Dog legged, Circular, Open Well, Spiral, Elliptical, etc. Classification also based on materials like wooden, steel and RCC
- Staircase layout and its construction details, different elements of staircases, etc.
- Design and details of construction of staircases in timber, stone, RCC and steel.
- Cladding materials using traditional and contemporary materials

Module 3: Elevators

Learning Objectives

To understand the working of different types of elevators.

Module Contents

- Design criteria for provision of Elevators
- Details of construction

Module 4: Escalators, Travellators and Auto Walks

Learning Objectives

Critically analyzing building to provide mechanical mode of circulations, installation detail with live examples

Module Contents

Installation, working mechanism of Escalators, Travellators and Autowalks

Module 5: Cladding

Learning Objectives

- Make student aware of the various materials and fixing details of surface cladding
- To understand the concept of Thermal comfort and construction detail of Cavity Wall.

Module Contents

- Details of cladding of wall with stone, tiles, timber and steel framing
- Construction of cavity wall with different thermal and acoustical insulative system

Module 6: Finishing Materials

Learning Objectives

Learning of various vertical and horizontal surface finishes, their properties and construction details

Module Contents

- **SURFACE FINISHES:** Paints and surface finishes; Composition, properties and methods of application of different types of paints: Oil, synthetic enamels, acrylic and other plastic emulsions and formulations, interior and exterior grade paints. Natural and synthetic clear varnishes, French polish. Cement based paints
- **FLOOR FINISHES**: PCC, terrazzo, stone slabs, brick and terracotta tiles, Synthetic materials (PVC, Timber). Floors of industrial buildings & warehouses. Ceramic wall & floor tiles.
- **PLASTIC**: Classification of plastic, moulding and fabrication, properties of plastic, use of plastic, PVC. Fiber glass.
- **MISCELLANEOUS MATERIALS:** Cork, rubber, Gypsum, sealants, heat and sound insulation materials.
- **GLASS AND GLASS PRODUCTS:** Plain, sheet, plate, textured, laminated, wired and shock resistant glass. Glass blocks, glass tiles, mirrors, heat reflecting glasses and Glass wool.

Learning Resources / References

- Building Construction Illustrated by Francis D. K. Ching
- Building Construction by W. B. Mckay
- Building Construction by Sushil Kumar
- Building Construction by Rangwala
- Engineering Materials by Rangwala
- Building Construction by B. C. Punmia
- Building Materials: Materials of Construction, Gurcharan Singh
- Building Construction Handbook, R. Chudely

Each module should include market surveys and construction site visits compulsorily.

Subgroup: Techniques

Sem.	Course No.	Course Title	Credit	L	T	P/S
04	BARC-04005	Computer as Tool in Architecture - II	3	2	0	1

Course Overview :

The subject intends to introduce techniques for further refinement of computer generated graphics covered in the previous semester. In addition to that, this course also trains students for developing photorealistic modeling using popular software in the field of architecture. Advanced technologies and concepts using computers as an essential tool are also introduced such as Building Information Modeling. This course equips students with soft skills which increase their productivity and expression in design related subjects.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	To **recognize** the need to combine the use of CAD tools and techniques for architectural design communication
Cognitive	Applying	To **apply** the projected drawing method to exterior and interior perspectives
Cognitive	Application	To **produce** architectural drawings using CAD and illustration software programs
Psychomotor	Precision	To **demonstrate** an understanding of furniture, people and accessories, 3-dimensional renderings
Psychomotor	Precision	To **demonstrate** knowledge of relevant industry standards and their application in architectural drawings and documents
Psychomotor	Construct	To **construct** conceptual and presentation renderings as a design presentation tool for various purposes
Cognitive	synthesize	To **evaluate** which software or technique is most effective for a particular goal

Module 1: Image Editing Methods and Techniques

Module Contents

- To edit and develop images in a raster format through adjustments in image clarity, quality and layers.
- Image and photo montage and its various methods and techniques
- Image as a vector and editing of its vector properties and compatibility with line drawings
- Processing of architectural renderings using image outputs from other software.
- Adding entourage to images developed from 3-d modeling software.

Module 2: Photorealistic Modelling- I

Module Contents

- Concepts of modeling, understand computer modeling through various basic shapes and its composition
- To develop solid and surface models with architectural scale, proportion and elements
- To understand Camera, movement , shades and shadows , daylighting and lighting conditions, setting up a scene through modeling

Module 3: Photorealistic Modelling-II

Module Contents

- To edit and develop materials , surfaces and computer aided photo realistic rendering and understanding its adjustments
- Using predesigned materials/maps from various sources 3-D Models
- To develop animation and photo realistic animations and short movies

Module 4: Visual Composition

Module Contents

- Composition and presentation though different vector based and page setting tools
- Combining photo editing ,modelling and rendering and presentation methods to produce photo realistic brochures and documents

• Development of concepts to real proposed scenarios through computer aided softwares
Module 5: Contemporary Praxis
Module Contents • Introduction to contemporary practices such as Building Information Modelling, solar/aerodynamic simulations • Content for this module is to be developed as per availability of faculty/software resources available

Learning Resources / References
• Computer Graphics & Animation by M.C. Trivedi (Jaico Publishing House; First edition, 22 January 2009) • Representational Techniques for Architecture (Basics Architecture) by Lorraine Farrelly Nicola Crowson, (Bloombury; 2nd Revised edition edition,18 Dec. 2014)

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Architectural Theory

SEM	Course No.	Course Title	Credit	L	T	P/S
03	BARC- 04002	Site Planning & Landscape Architecture	3	2	0	1

Course Overview:

The course is designed to make the students understand the natural and man-made components that generate the decisions in the planning of any site, and the role of landscape architecture for the judicious co-existence of man with nature and its patterns and systems. This course shall have a direct application in the design studio of the same semester as well as subsequent semesters for site planning and landscape design of the respective design assignments.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	To **recogniz**e the various land forms, natural patterns and systems
Cognitive	Identifying	To **identify** the elements of landscape architecture
Cognitive	Identifying	To **identify** the various functions on and around the site
Affective	Valuing	To **value** how it has been done in the past along with present state of art
Cognitive	Analyzing	To **conduct** a Landscape **analysis** based on visual and physical criterion; and evaluate it with required functions
Affective	Valuing	To **develop** a site plan with landscape design

Module 1: Introduction to Land Forms

Learning Objectives

- To understand land and its forms through drawings and models
- To learn about the occurrences of various landforms

Module Contents

- Natural elements of landscape architecture
- Natural systems
- Man-made elements
- Modifications in natural systems with man-made elements
- A co-existence of natural and man-made elements (visual and physical elements only)

Module 2: Elements of Landscape Architecture

Learning Objectives

To develop an understanding of the natural and man-made landscape elements, their inter-relationships and co-existence (Visual and physical elements)

Module Contents

- Natural elements of landscape architecture
- Natural systems
- Man-made elements
- Modifications in natural systems with man-made elements
- A co-existence of natural and man-made elements (visual and physical elements only)

Module 3: Historical Overview of Site Planning and Landscape Architecture- Design and Techniques

Learning Objectives

- To see the style in which the above (module 1 and 2) has been done in the past by renowned landscape architects.
- To understand the modern and contemporary requirements in site planning and landscape design
- To learn to design with their incorporation

Learning Resources/References

- Site Planning by J.O. Simmonds
- Trees of Central India by Pradip Kishen
- Man and Nature by George Perkins Marsh and David Lowenthal
- Time Saver Standards for Landscape Architecture by Charles W Harris and Nicholas T. Dine (Mcgraw – Hill, International Edition, Arch. Series)
- Site Planning by Kevin Lynch and Gary Hack

Subgroup: Architecture Evolution

SEM	Course No.	Course Title	Credit	L	T	P/S
04	BARC-04004	Contemporary Architecture	3	2	0	1

Course Overview:

- This subject outlines the metamorphosis of the technology-based and program-based architecture of occidental world since late 18th century in Europe, America and the rest of the world.
- It analyses the design philosophies of individual 'master's of occidental architecture as well as that of groups or movements in the field of architecture and art in Europe and elsewhere.
- In the process of analysis and narration of the development of architecture as we find it now globally, this subject showcases and discusses salient buildings standing as landmarks of design intervention in the timeline of building activity.
- Design Connectivity – This lesson in the development of contemporary architecture is directly linked to the type of buildings the students are exposed to and they would be supposed to design in their future carrier. The materials of construction are also the commonplace ones. Hence, development of different contemporary styles of architecture would help students to use/apply them in their designs in all forthcoming semesters.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	To **identify** different styles and schools of contemporary architecture.
Cognitive	Analyzing	To **analyze** the contributing factors for the design development of different styles.
Cognitive	Analyzing	To **analyze** the works of the famous master architects introduced to the student.
Cognitive	Evaluating	To **evaluate** the works of modern architecture that the student is coming across in everyday's life.
Cognitive	Creating	To **design** buildings in the contemporary architectural styles.

Module 1: Introduction, Advent of Steel, Glass and Ferro-Concrete

Module Contents

- Late Renaissance and development of open spaces
- Advent of Steel and Henry Labrouste
- Great Exhibitions of 1851 and 1889 and their contributions
- Gustave Eiffel
- Development of Ferro concrete: Auguste Perret, Tony Garnier

Module 2: Development of 'New Art & Architecture'

Module **Contents**

- Art Nouveau movement and Victor Horta
- H.P. Berlage, H. H. Richardson and 'True Construction'
- Balloon Frame Structure and Plane Surfaces in America

Module 3: Chicago School & Organic Developments

Module **Contents**

- Chicago School: Louis Sullivan
- Organic Architecture: Frank Lloyd Wright

Module 4: Programmatic Functionalism

Module **Contents**

- Walter Gropius and Bauhaus
- Le Corbusier

Module 5: Development of International Style

Module Contents

- Mies van der Rohe
- Philip Johnson
- Louis I Kahn Thermal Insulation

Module 6: 20th Century World Architecture

Module Contents

Works of some master architects, like –

- Eero Saarinen
- Alvar Aalto
- Frank O. Gehry,
- M. Pei,
- Kenzo Tange
- Oscar Niemeyer
- Richard Neutra
- Norman Foster
- Antonio Gaudi

Module 7: Indian Architecture since Independence

Module Contents

- Transformation of Indian architecture during colonial period – influences and effect
- Works of some master architects from the post-independence period, like –
    - B. V. Doshi
    - Charles Correa
    - Raj Rewal
    - A. P. Kanvinde
    - Laurie Baker

Learning Resources/References

- Space, Time and Architecture by Siegfried Gideon
- The Puzzle of Architecture by Robin Boyd
- Modern Architecture by Kenneth Frampton
- The Story of Architecture by Patrick Nuttgens
- History of Architecture by Sir Bannister Fletcher
- Architecture and Independence by John T. Lang, Madhavi Desai, Miki Desai
- Library of Contemporary Architecture

Subgroup: Structures

Sem.	Course No.	Course Title	Credit	L	T	P/S
03	BARC-04006	Concrete Structures	3	2	1	0

Course Overview:

The course would enable students to design simple RCC structures and their basic components, viz, columns, beams, slabs and staircases.
This course helps students to understand RC structure and its application in consecutive design project.

Course Outcomes: After completion of this course, students will be able to draw and sketch 2- Dimensional and 3-Dimensional Architectural drawings using projections and freehand techniques.

Domain	Category	Outcome
Cognitive	Understanding	To **distinguish** and classify various types of RCC material depending upon the strength and durability parameter.
Cognitive	Apply	To **design** a beam for a given system of loading and structural geometry, for flexure and shear.
Cognitive	Evaluate	To **design** a slab for given building floor for different end support conditions.
Cognitive	Apply	To **design** a column for given axial load and moments.
Cognitive	Creating	To **design** a dogleg staircase for given stair well space in residential or public building.
Cognitive	Remembering	To **outline** the features of IS code provisions regarding limit state method for designing concrete structure
Cognitive	Understanding	To **summarize** the conceptual idea behind the development of pre-stressed structural component for general use

Module 1: Basic Material Properties & Design Concepts

Learning Objectives

Knowledge of importance of building services.

Module Contents

Introduction to Concrete Technology, Composition of Concrete and the properties, Strength and Durability, Modulus of Rupture, Creep and Shrinkage of Concrete, Reinforcing Bars, Types and grade, Stress-Strain Diagram of Steel and Concrete. Concrete Mix Design: Nominal Mix and Design Mix. Design Philosophies, Working Stress Method, Limit State Method, Various Limit States. Role of admixtures in concrete, honey combing, cold joint, high performance concrete.

Module 2: Design for Flexure

Module Contents

Introduction, assumption, flexure design of singly reinforced & doubly reinforced and T- beams by Limit State Methods. IS-Coded provisions, Numerical Problems.

Module 3: Design for Shear Bond

Module Contents

Shear failure of beams, Shear reinforcement, Curtailment of reinforcement, Bond, Anchorage and Development length, IS-Code provisions, Design of a beam with flexural and shear consideration, Reinforcement Detailing, Numerical Problems.

Module 4: Design of Compression Members

Module Contents

Short and Long Columns, IS-Code Provisions, Design of Short Columns under Axial compression, Design of long Columns, use of interaction diagram for design. Lateral ties. Reinforcement Detailing, Numerical Problems

Module 5: Design of Footing

Module Contents

Type of footing, theory -grid flooring and deep beam, isolated footings for rectangular and circular columns. Reinforcement Detailing, Numerical Problems.

Module 6: Design of Slabs & Stairs

Module Contents

- Effective span, one way and two way slabs. Design of simply supported Slabs Reinforcement Detailing, Numerical Problems.
- Types of stairs, Design single flight stairs. Reinforcement Detailing, Numerical Problems.
- Application of thumb rule for beam, column, slab for fixing sectional properties.

Module 7: Introduction to Pre-Stressed Concrete and Strength Testing

Module Contents

Introduction to Pre-stressed Concrete, difference in Pre and Post tensioning systems, Advantages (History: Structures those have been designed economically), Basic design concept of Pre-stressed concrete beam, Analysis of pre stress and bending stress, Resultant Stress, Thrust Line, Concept of Load balancing, Various losses of stresses, Stresses behavior at anchorage zone Simple Numerical Problems. testing equipments, destructive and non destructive testing, cube testing on UTM

Learning Resources / References

IS Codes:

- IS 465: 2000.
- SP-16
- SP-34

Recommended Books:

- Reinforced concrete structure (Vol - I) by B. C. Punmia;
- Reinforcement Concrete Design by S. Unnikrishna Pillai & Devdas Menon
- Structural Design and Drawing & Reinforced Concrete and Steel by N. Krishna Raju
- Reinforced Concrete by Mallick and Gupta
- Limit State Design of Reinforced Concrete Structures by P.C. Varghese
- Prestressed Concrete Design and Construction by James R. Libby
- Prestressed Concrete by N. Krishna Raju

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Building Services

Sem.	Course No.	Course Title	Credit	L	T	S/P
04	BARC-04008	Electrical & Lighting	3	2	0	1

Course Overview:

- Building services engineering, technical building services, architectural engineering, building engineering or facilities and services planning engineering refers to the implementation of engineering for the internal environment and environmental impact of a building.
- Building services engineers are responsible for the design, installation, operation and monitoring of the mechanical, electrical and public health systems required for the safe, comfortable and environmentally operation of modern buildings.
- This course is designed to enable students to understand various systems of Electrical services, Fire fighting, Illumination and Elevators/Escalator services; and its design application for a small and large building.

Course Outcomes:

Domain	Category	Outcome
Knowledge	Comprehension	To **discuss** the active and passive components of Electrical system and various principles.
Knowledge	Comprehension	To **develop** understanding for Electrical, Fire fighting, illumination and vertical transportation system for Small building
Knowledge	Comprehension	To **develop** skills to design Electrical, Fire fighting, illumination and vertical transportation system for domestic building
Knowledge	Comprehension	To **develop** skills to design water supply in domestic building
Knowledge	Analysis	To **apply** of learning to design of Electrical, Fire fighting, illumination and vertical transportation system in buildings (except detail design calculation)

Module 1: Importance of Building Services

Learning Objectives

To develop understanding of building services involved in the built environment.

Module Contents

1. Importance of water supply and sewerage.
2. Historical overview of development of water/ sewerage systems.
3. Importance of Electrical, Fire fighting, illumination and vertical transportation system
4. Historical overview of development of Electrical, Fire fighting, illumination and vertical transportation system.

Module 2: Electrical Services

Learning Objectives

Knowledge of electrical systems at site level and building level

Module Contents

- Basic principles of electricity
- Electricity demand calculations; norms and standards
- High side electrical system at site level - Transformers and switch gears – Layout of substations
- Electrical distribution system at site level overview
- Types of distribution networks at site level and building level.
- Planning electrical wiring for building – Main and distribution boards
- Types of wires, wiring systems and conduit
- Fixing of electrical fixtures and switches
- Materials, apparatus, joints, fixtures and breakers –Market survey
- Low voltage supply (data and telephone)

Module 3: Illumination

Learning Objectives

- To understand the Illumination systems involved at domestic level.
- To develop skills to prepare design of illumination system for a residential and commercial building.

Module **Contents**

- Visual tasks – Factors affecting visual tasks
- Modern theory of light and colour – Synthesis of light –
- Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor
- Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering.
- Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types

Module 4: Fire Fighting System

Learning Objectives

- Knowledge of essential component of Fire fighting system systems at domestic level.
- Skill to prepare design of Fire fighting system for buildings

Module Contents

- Causes and spread of fire, Combustibility of materials and safety norms.
- Passive Fire Protection Strategies.
- Active Fire Protection Systems.
    - Fire Detection Systems.
    - Alarm Systems.
    - Fire Extinguishing Systems.
    - Smoke Control.
- Designing Fire Escapes for Life Safety.
- Code Provisions

Module 5: Vertical Transportation System

Learning Objectives

- Knowledge of vertical transportation system.
- Skill to prepare design of vertical transportation system for buildings

Module Contents

- Types of Elevators, Escalators and Auto-walks and their suppliers.
- Factors guiding their placement and layout in a building envelope.
- Designing Elevators – no. of elevators, capacity, elevator bank, etc.
- Design and construction of pit, well and machine rooms for elevators and escalators.
- Elevator, escalator and auto-walks design applications.
- Exchange of Information.
- Installation and commissioning

Module 6: Co-Ordination of Building Services

Learning Objectives

- Knowledge of building services co-ordination system.
- Skill to prepare co-ordinated building services plan for entire buildings.

Module Contents

- Co-ordination of building services with other service layouts, architectural layouts and structural layouts.
- Preparation of Co-ordination drawings.

Learning Resources/ References

- Basic electrical engineering by D.P Kothari, I.J Nagrath
- Introduction to the design and analysis of building electrical system by John Mathew
- Electrical design guide for commercial buildings by William H. Clark
- Handbook of electrical design details by Neil Sclater
- Building construction illustrated by Dr. D.K. Ching
- Mechanical and electrical equipment for building by Walter T. Gondzik

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Architectural Theory

Sem.	Course No.	Course Title	Credit	L	T	S/P
04	BARC-04010	Theory of Design	2	2	0	0

Course Overview:

To identify, observe, document, analyze and form a critical body of knowledge in the theoretical domain of built environment. Align and discuss the body of knowledge within a broader generalized theoretical structure. Summarize/synthesize a theoretical framework thus developing an appreciation of the built environment enabling the students in developing a critical evaluation in different social, cultural and environmental contexts.

The course acts as an umbrella of knowledge that will be practically manifested in architectural design problems in current as well as subsequent semesters.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	To **comprehend** a theoretical framework in architectural thinking since antiquities thus developing sensitivity to link design and theory.
Cognitive	Understand, apply	The students will **understand** theoretical premises in architectural design thinking.
Cognitive	Learn	The students will **learn** Theoretical concepts and contextual variations of thoughts through historical eras.
Psychomotor	Apply	The students will be equipped to **apply** theoretical standpoints in architectural design.
Affective	Sensitization	The students will be **sensitized** to various theoretical positions.
Affective	Enable, develop	The students will be able to **synthesize** theoretical approaches in design processes.

Module 1: Theoretical Framework

Learning Objectives

- To identify established theoretical framework in architecture and aesthetics
- To categorize essential theoretical aspects in architectural studies

Module Contents

- Development of conceptual framework in architectural theory - a historic review
- Understanding an overview of evolution of theory in design

Module 2: Comprehension through Evidence

Learning Objectives

Discuss best examples of built forms and situate them in the theoretical framework

Module Contents

- Survey of buildings, built forms of the antiquities across cultures, design principles and design elements.
- Survey of renaissance and post renaissance architecture.
- Survey of contemporary architecture and situating in theoretical framework.

Module 3: Analysis of Form

Learning Objectives

Engage in debates of aesthetics through specific evidence in built environment – analytical study.

Module Contents

- Analysis of architectural forms/ typologies within theoretical framework. (The case of *villa citrohan etc.*)
- Analysis of form in context. (The case of Richard Meier's work in Ulm etc.)
- Analysis of form geometrically. (Geoffrey Baker's approach in *Design Strategies in Architecture*, etc.)

Module 4: Comparative Studies of Theories/ Theories in Practice
Learning Objectives Study of Theoretical works of architects and practices in a comparative mode
Module Contents • Comparative study of theoretical works and practices (e.g. Comparison of works of modern masters and Bernard Tschumi) • Comparative study of writings of architectural theorists (e.g. writings of Kenneth Frampton and Charles Jencks)
Module 5: Synthesis and Evaluation
Learning Objectives Critique of existing theoretical positions and Emerging ideas in the study of the built environment.
Module Contents • Study of contemporary theoretical premises. • Study of emerging concerns in built environments and role of theory – e.g sustainability etc.

Learning Resources / References
• Architecture and Disjunction by Bernard Tschumi • Complexity and Contradiction in Architecture by Robert Venturi: • The Ten Books on Architecture by Vitruvius • Architecture: Form, Space, & Order by Francis D. K. Ching • Experiencing Architecture by Steen Eiler Rasmussen • The Puzzle of Architecture by Robin Boyd • The language of Post Modern Architecture by Charles Jencks • Architectural Composition by Rob Krier • Design Strategies in Architecture by Geoffrey Baker • Architecture as Space by Bruno Zevi • Space Time and Architecture by Sigfried Giedion

SCHOOL OF PLANNING AND ARCHITECTURE BHOPAL

DEPARTMENT OF ARCHITECTURE

B.ARCH PROGRAMME CURRICULUM
JULY 2016

5th SEMESTER

SUBJECTS OFFERED

5th SEMESTER										
S.No.	SUBJECT CODE	SUBJECTS	L	T	P/S	CREDITS	MARKS	SEMESTER EVALUATON (WR/VV/TP)		
	SESSIONAL SUBJECTS									
1	BARC - 05001	Architectural Design - V	1	0	7	08	800	--	VV	TP
2	BARC - 05003	Building Materials & Construction -V	1	0	4	05	500	WR	VV	--
3	BARC - 05005	Working Drawing- I	1	0	4	05	500	--	VV	--
4	BARC - 05007	Flexible Elective- I	0	0	1	01	100	--	VV	--
	THEORY SUBJECTS									
1	BARC - 05002	Housing & Land Economics	2	1	2	05	500	WR	VV	--
2	BARC - 05004	Mechanical Services & Acoustics	2	1	0	03	300	WR	--	--
3	BARC - 05006	Structural Concepts in Architecture	2	1	0	03	300	WR	--	--
	TOTAL CREDITS		30							
	TOTAL CONTACT HOURS		30							

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Architectural-Design

Sem.	Sub Code	Course Title	Credit	L	T	P/S
05	BARC- 05001	Architectural Design - V	8	1	0	7

Course Overview :

- The studio emphasizes on site planning. Design-problem should focus (but not limited to) on a multi-functional large span public building in an urban setting. Emphasis of the problem would be on design parameters, graphical presentation of design details and architectural expression in functional and constructional elements rather than detailed structural analysis. Site restrictions (bye-laws) should be imposed in framing design problems.
- Design exercises could be sports complex, exhibition hall(s), interpretation centre, cultural centre, showrooms, auditorium, temporary canopy etc.
- There would be minimum one major and one minor exercise/project based on the module contents.
- The modules may be taken up by the faculty in order of preference. The order should be Common in both sections of same year. The faculty may achieve stated minimum outcomes using various strategies and approaches.
- This course shall be integrated with building construction studio and services (mechanical services & acoustics).
- Parallel subjects would give assignments connected with the current design exercise(s) as part of their course work.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Analyzing	**Value** various advanced structural systems and latest building materials. **(LO-1)**
Affective	Responding	**Questions** new technology, structural system and materials.**(LO-2)**
Psychomotor	Articulation	**Formulate** through drawings or models methods developed to meet various requirements. **(LO-3)**
Cognitive	Applying	**Apply** new techniques and systems in their design. **(LO-4)**
Cognitive	Applying	**Apply** services (studied in previous and present semester) at building level in their design. **(LO-5)**
Psychomotor	Manipulation	**Build** study models with precision (or Graphics) of chosen structure for designed space. **(LO-6)**
Affective	Responding	**Participating** in team activities. **(LO-7)**

Module 1:

- **Value** various advanced structural systems and latest building materials. **(LO-1)**
- **Questions** new technology, structural system and materials.**(LO-2)**
- **Participating** in team activities. **(LO-7)**

Module Contents

- Students are required to be well versed with all the building structural systems, so that they will be able to categorize and choose structural systems for a multi-storeyed (2-3 storeys) building. This could be done through literature study/ lectures/ discussions/ videos, study models, presentation etc.
- Students should explore various new building materials appropriate for the building typology – An exhaustive list of materials could be prepared through market survey/ case studies/ books/ papers/ reports, presentation, display etc.
- Students must practice various written and verbal skills developed in previous semesters during this module.
- To achieve LO-2 the concerned faculties may open a dialogue in the studio on latest technology/ material. Mapping of students' participation in the discussion may help in evaluating the learning progress of the student(s). (Like in focused group).

Module 2,3 :

- **Formulate** through drawings or models methods developed to meet various requirements. **(LO-3)**
- **Participating** in team activities. **(LO-7)**

Module Contents

Learning outcome for the modules could be achieved after completing the initial design process steps (in any preferred order/ or using any of design teaching model) stated below :-

- Introducing Design Problem
- Site Visit
- Site Analysis
- Designing the design Programme
- Collecting and analyzing Data for various spaces
- Area Programming
- Flow diagram (relation of various spaces)
- Bubble diagram (locating various zones on site)
- Try and Re-create (Analyzing spaces in all dimensions through Block Models)
- Single line Graphics and study models (Choosing the right option)

Students must practice various written and verbal skills developed in previous module.

Module 4,5:

- **Apply** new techniques and systems in their design. **(LO-4)**
- **Apply** services (studied in previous and present semester) at building level in their design. **(LO-5)**
- **Build** study models with precision (or Graphics) of chosen structure for designed space. **(LO-6)**
- **Participating** in team activities. **(LO-7)**

Module Contents

- Students may integrate the knowledge gained from previous theory based subjects (like building services mathematics for architecture, building materials and construction, structures etc.) and apply in their design during design development/ detail stage.
- It is preferable if the students communicate the application of all services in their design.
- Students must make enlarged drawings showing all working details for any part of the building.
- Formative assessment in the studio could be done through individual critique, group discussion formal and informal feedback etc.
- Summative assessment of the studio work could be achieved through Panel discussion, presentation, peer review, public review , criteria based evaluation etc.

Learning Resources / References

- National Building Code 2005
- Madhya Pradesh Bhumi Vikas Rules 2012
- Time Saver Standards for Architectural Design
- Architectural Standard- Ernst & Peter Neufert- Architect's Data

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Techniques

Sem.	Sub Code	Course Title	Credit	L	T	P/S
05	BARC-05003	Building Materials and Construction - V	5	1	0	4

Course Overview :

- In this semester the study of doors and windows is continued with metal as the main building material. The study is concerned with special doors and windows to steel doors, windows and partitions. The knowledge about RCC is also enhanced through comprehension of RCC framed structures and reinforcement details in building elements like columns, beams, slab and lintels.
- Students are familiarized with the types of metal shutters and partitions, doors and windows, their application and construction details in steel and aluminium sections.
- The subject should be integrated with ongoing subjects like Architectural Design and Building services.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**To comprehend** various types of door and windows used in different situations from day to day life.
Cognitive	Understanding	**To understand** the variety of available metal sections for varied uses. **To comprehend** the details/ arrangements of reinforcement.
Cognitive	Analyzing	**To compare** the various types of doors with different material used to analyze the construction details.
Cognitive	Evaluation	**To evaluate** the best suitable material and type of Door, Window and Partitions.
Cognitive	Understanding	**To gain knowledge of** properties of various special materials
Cognitive	Creating	**To compose** the various elements of steel truss to make replica (Scaled Model) or drawings of building components.

Module 1: Special Doors and Shutters

Learning Objectives

To make students aware of various types of special Metal Doors

Module Contents

Different types of doors; sliding, sliding and folding, revolving doors, collapsible shutters, rolling shutters, types of rolling shutters in conventional and contemporary materials. The installation, working and mechanism of such doors and shutters.

Module 2: Metal Doors, Windows and Partitions

Learning Objectives

To familiarize students with doors and windows in steel and aluminum sections. Also integration of openings with partitions in steel and aluminum used in interior of buildings.

Module Contents

- Doors and Windows in steel, aluminum along with technical terminology involved.
- Types and varieties of available sections in steel and aluminum in market and their application in providing doors, windows and partitions.
- Design considerations and construction details in congruence to IS codes and manuals provided by CPWD and other organizations.

Module 3: RCC Details of Framed Structures

Learning Objectives

- To develop understanding about framed structure in terms of reinforcement and construction details.
- To be acquainted with about special structures like retaining wall and buttresses.

Module Contents

- Reinforcement and design details of Footings
- Columns, beams, slab and lintels.
- Buttresses and Retaining Walls: Details of construction of Buttresses and retaining walls.

Module 4: Manufacturing Materials

Learning Objectives

- Learning of various ferrous and non ferrous metal sections used in manufacturing of metal doors and windows along with various fixtures involved.

Module Contents

- Metal Sections, fixtures and fastenings for metal doors, windows and partitions
- Adhesives: Market survey and study of various adhesives available for the binding of various types of materials used in building construction.

Learning Resources / References

Each module should include market survey and construction site visit compulsorily.

- Building Construction by W. B. Mckay
- Building Construction by Sushil Kumar
- Building Construction by Rangwala
- Engineering Materials by Rangwala
- Building Construction by B. C. Punmia
- IS Codes and CPWD Manuals
- Jindal, Hidalco and other similar manuals

Each module should include market surveys and construction site visits compulsorily.

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Techniques

Sem.	Sub Code	Course Title	Credit	L	T	P/S
05	BARC-05005	Working Drawing- I	5	1	0	4

Course Overview :

- The Design of a building prepared needs to be executed and constructed on the site. The building drawings so prepared become part of the contract documents with proper labelling and dimensioning, specifications, detailing.
- The drawings shall be based on building design prepared as design studio assignment in the previous semester. The learning of building material and construction will be implemented for preparing various drawings through the semester.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**Recalls** the various drawing techniques, building construction techniques and structural systems.
Cognitive	Understanding	**Interpretation and translation of** drawings based on the structural and other practical considerations
Psychomotor	Manipulation	**Re-create** the drawings based on the various construction details and structural considerations.
Psychomotor	Precision	**Demonstrate** the preparation of execution drawings in the process of realization of a designed building.
Psychomotor	Articulation	**Integrate** all the drawings prepare for the execution purpose

Module 1: Structural Layout Drawings

Learning Objectives

- Enable the students to illustrate and prepare the structural layout drawings good for construction of the designed building.
- Enable the student to identify and determine the type of structural system to be used.

Module Contents

- Preparing detail drawing for layout of the building with respect to the site.
- Illustrate and prepare drawings for layout of the foundations.
- Preparation of detail layout of the beam and columns, or structural member as per the design.

Module 2: Architectural Drawings at Building Level

Learning Objectives

- Enable the students to illustrate and prepare the drawings good for construction explaining the overall building design.
-

Module Contents

- Preparation of detail floor level plan/s and roof level plan required for the execution of work on the site.
- Preparation of drawing giving detail of Section/s and Elevation/s to depict building heights, projections and floor levels.

Module 3: Architectural Drawings of Opening

Learning Objectives

- Enable the students to illustrate and prepare the detail drawings of openings, their material and detail

specification required for the construction.

Module Contents

- Design and prepare detail drawings of doors, windows, openings with specifications of materials.
- Detail drawing for the grill, jail work etc. as required for the building.

Module 4: Architectural Drawings of Vertical Circulation as Staircase/ Lift etc.

Learning Objectives

- Enable the students to illustrate and prepare the drawing drawings of connection between the two floors as staircase/ lift etc.

Module Contents

- Preparation of drawing for the layout of staircase, its detail and specification for the execution on the site as per the design.
- Illustration drawing of the handrail, baluster, rail fitting etc. as per the design.

Module 5: Architectural Drawings for Landscape and Site Development

Learning Objectives

- Enable the students to illustrate and prepare the detail drawings for the development of site including the landscape scheme and details.

Module Contents

- Preparation of drawing for the landscape layouts at the building level and at site level as per the design.
- Detailing of the site for example different level on the site, as required for the site development.

Learning Strategy

- Preparation of drawings with illustrations
- Site visit and case studies to know the various details
- Data collection from the market survey regarding construction material and detailing

Learning Resources / References

- Architectural Graphics by Francis D. K. Ching
- Architectural Graphics Standard by Charles George Ramsey
- Architectural Graphics Standard for Residential Construction by Dennis J. Hall
- Drafting & Design: Basics for Interior Design by Travis Kelly Wilson

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Elective

Sem.	Course No.	Course Title	Credit	L	T	P/S
05	**BARC-05007**	**Flexible Electives-I**	**1**	**0**	**0**	**1**

Course Overview :

The objective of the flexible elective is to help students acquire knowledge by direct involvement in diverse form of outreach programs. This would enable students to explore possibility of taking courses not regularly offered in B.Arch. curriculum. The outreach programs can be in the form of demonstrative workshops, summer/winter schools, paper/poster presentation, short courses, certified online courses, GIAN workshops, faculty led workshops, student competitions (eg, NSDC), integral studios and practical training to acquire skills in various creative fields which contributes to the profession of architecture.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	To **comprehend** the knowledge/ allied and multidisciplinary skill.
Cognitive	Understanding	To **explain** the learnt skill/ knowledge and its link to architecture in a forum.
Psychomotor	Applying	To **demonstrate** the learnt skill/ knowledge
Affective	Receiving	To **identify** area for a study
Affective	Characterization	To **resolve** the domain of learning and internalize it.

Module 1: Exploration and Identification of Creative Fields

Module Contents

- To explore allied disciplines which will contribute to the profession of Architecture. The creative fields can be like any of the listed below:
    - Photography
    - Building construction Techniques
    - Graphic Design
    - Textile Design
    - Arts & Crafts (e.g. Stone art, Bamboo, Ceramic, Origami, Calligraphy ,etc)
    - Video/ Film making
    - Animation
    - Research Paper writing
    - Advanced Computer Application courses
    - GIS
    - Architectural Journalism

This is just a suggestive list. The students are free to explore other allied areas which should be approved by the faculty coordinator.

Module 2: Acquiring the Skill/ Knowledge

Module Contents

- To undergo the coursework/workshop
- To document the process of the course undergone
- To prepare a report/ portfolio of the work done

Module 3: Demonstration of the Acquired Skill/Knowledge

Module Contents

- To demonstrate the learning's of the course.
- To present the work in a forum.

Criteria for choosing the elective:

- For workshops- Minimum number of days should be 1 week
- Courses opted for should be certified by recognized universities
- For Architectural competitions, the work will be evaluated and credited by a team of experts .Maximum persons in a group should be 4. (or as decided by the subject coordinator)
- For paper presentations/ publication in journals, magazines etc, maximum number of students in a group would be 2. (or as decided by the subject coordinator)
- For all the above, prior discussion, selection and sanction of the type/ scale/mode of exercise to be adopted need to be done with the subject coordinator (s).
- It is required to establish connection to Architecture.

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Architecture -Theory

Sem.	Sub Code	Course Title	Credit	L	T	P/S
05	BARC-05002	Housing & Land Economics	5	2	1	2

Course Overview :

Historically, human settlement has been the manifestation of socio-cultural, economical and environmental understanding. Designs of Adobe and habitat has been characterised and practiced by people presents huge variety mainly responding to the contextual setting that strive to achieve comfort conditions within a prevailing challenges. Growing urbanization, scarcity of land and housing shortage for poor, has imposing challenges whereas, new technology, concepts and capacity of real estate sector for mass housing production providing opportunities. This is quite important that, Budding architects should understand challenges and opportunities of housing development. The course Housing acts as bridge between architecture and urban planning thus will require inter-linkages with planning aspects, housing policies, development regulations, site planning, urban design and infrastructural service designs at neighbourhood levels.

The subject will be taught in congruence with the Design studio and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**To define** basic elements of housing, neighbourhood, community, slums and real estate market.
Cognitive	Remembering	**To outline** various housing policies and programmes
Cognitive	Understanding	**To explain** inter-relationships between hierarchy of human needs and housing typologies or differentiate settlement design in terms of local context (Physical, economical, socio-cultural, ecological, environmental aspects)
Cognitive	Understanding	**To interpret** cause and effects housing demand and supply
Cognitive	Applying	**To Apply** zoning regulations and sub-division techniques and computation for density, FAR, built-up area, MOS, as per development norms.
Cognitive	Analysing	Site planning through **analysis** of physical, legal and environmental conditions and feasibility **analysis** of housing project through pre design **calculations**
Cognitive	Evaluating	Critical **appraisal** of existing housing scheme in terms of quality of life through case study
Cognitive	Creating	To **prepare** suitable design of a neighbourhood under given context includes specific physical, legal, socio-economic, cultural and environmental conditions.

Module 1: Introduction

Learning Objectives	Learning Strategy
To understand basic terminology and relationship between human need, context and housing typologies.	Lecture notes, literature based case examples of various types of settlements and impact of context on designs through books, e-resource.

Module Contents

- Definition, terminologies and importance.
- Ecological and environmental aspects of human habitat.
- Concept of Neighbourhood and community.
- Hierarchy of human needs and Housing typologies.

Module 2: Housing Scenario

Learning Objectives	Learning Strategy
To recognize housing issues at national context in terms of magnitude of problems, outcomes of initiatives and related factors.	Lecture notes, literature based case examples through books, journal e-resource

Module Contents

- Urbanization and housing statistics
- Housing policies and programmes
- Factors of housing demand and supply
- Housing delivery mechanism

Module 3: Slum and Housing for Poor

Learning Objectives	**Learning Strategy**
To recognize issues related to slums and affordable housing to poor.	Lecture notes, through books, journal e-resource, case studies, data analysis and conceptual design attempt for affordable housing.

Module Contents

- Definition , causes and characteristics OF SLUMS
- Slum statistics and initiatives for housing for poor
- Affordable housing design case studies
- Design of affordable housing for poor

Module 4: Development Norms and Standards

Learning Objectives	**Learning Strategy**
To interpret housing development norms and calculation.	Lecture notes, through books, development plans, norms data & regulation books

Module Contents

- Housing and its relationship with neighbourhood and city plan
- Zoning regulation, its impact on quality of life of neighbourhood
- Density; definitions, types of density, factors, FAR, FSI, etc.
- Development norms and standards for services, amenities and facilities
- Sub- division techniques.

Module 5: Land Economics and Real Estate Development

Learning Objectives	**Learning Strategy**
To analyse role of real estate market and development of mass and high rise housing with new concepts.	Lecture notes, through books, e-resource, case studies, analysis and prevailing concept in real estate housing design.

Module Contents

- Introduction to real estate market; potential and challenges
- Land economics; Concept of economics, Types of land holding and tenure systems
- Factor affecting demand and supply of housing
- Relationship between land use, location and land value (Theory of location and growth pole theory)
- Land use constraints, reservations and Land acquisition act, 2013
- Land economics and feasibility analysis for housing projects
- Models of land development in real estate market (Land pooling and sharing)

Module 6: Site Planning and Neighbourhood Design

Learning Objectives	**Learning Strategy**
To create Design of Neighbourhood under given context.	Lecture notes, presentations, design exercise limited to concept and calculations

Module Contents

- Factors and principles of site planning
- Analysis for physical, climatic, legal, financial, socio-cultural aspects
- Principles of Neighbourhood design
- Housing case studies (Successful real estate projects)
- Design of Neighbourhood (concept and calculations)

Learning Resources / References

- Beyond Gated Community by Sameer Bagaeen
- China housing reforms and outcomes Ed. By Joyce Yanyun Man
- Cities and Housing by C.S. Yadav
- City slums by J.A. Ingham
- Cost effective rural housing technology by Reddy
- Design quality in Housing- Leanings from Netherlands by Matthew Cousins
- Gated community by Sameer Bagaeen
- High density housing for mixed income group by Ranjana Ashish Mittal
- Neighbourhood planning and community based development by W. Peterman
- Planning and design for future informal settlements by David Gouverneur
- Row Housing by Gunter
- Shadow cities by Robert Neuwirth
- The economics of urban property market by Paschalis A. Arvanitidis
- The modern economics of Housing by Randall Johnston
- Town Planning by A. Bandhopadhayay
- Town Planning by Rangawala
- Urban development and Housing in India (1974-2007) Ed. By Rishimuni Dwivedi
- Urban economics and real estate market by Denise DiPasqualle
- Urban Housing and Slums by A.K. Jain
- Urban land economics by Jack Harvey and Ernie Jowsey
- Urban Planning Theory and Practice by M. Pratap Rao
- Urbanization and urban systems in India by R. Ramchandran
- Urbanization in India Ed. by R.S. Sandhu
- Journal of Housing and built environment
- Journals of Housing studies
- M. P. Town and country planning act 1973
- MP Bhoomi Vikas Niyam 2012
- Planning sustainable cities- UNHabitat

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Building Services

Sem.	Sub Code	Course Title	Credit	L	T	P/S
05	BARC-05004	Mechanical Services & Acoustics	3	2	1	0

Course Overview :

Building Services are what makes a building alive. These vital components vary in scale and complexity depending upon building profile and usage. Accordingly, an architect's role may range from designing services for a less complex structure to incorporating engineering solutions / designs provided by respective consultants in their design programme and to deliberate with them in order to provide best possible solution. Having already dealt with water supply & sanitation, lifts & escalators, electrical, illumination and fire fighting services in previous semesters, this semester deals with HVAC and acoustics.

- This course is designed to give architects an overview and introduction to heating, ventilation, and air conditioning focussing on different HVAC systems; their architectural considerations and their coordination with other services and architectural designs.
- In today's architectural environment, good acoustical design isn't a luxury – it's a necessity. This course deals with the science behind sound and its application to achieve desired acoustical performance in a specific building by using different building materials, systems and technologies.

The subject will be taught in congruence with the Design studio and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Knowledge	**Discuss** the active and passive components of HVAC and their underlying principles.
Cognitive	Comprehension	**Explain** different types of air conditioning systems. Also, identify the design / execution time considerations specific to each of them.
Cognitive	Comprehension	**Identify** the various interventions / innovations to make these systems energy-efficient.
Cognitive	Analysis	**Analyse** critically the air conditioning systems used in their case study buildings.
Cognitive	Application	**Apply** the knowledge of air conditioning systems in their current design exercise.
Cognitive	Comprehension	**Explain** different phenomenon and principles related to sound propagation and their implications on building design.
Cognitive	Comprehension	**Summarize** the common acoustical defects in an auditorium and the ways to avoid / correct them.
Cognitive	Knowledge	**Describe** the different types of noise, their transmission and the measures to isolate / control them.

Module 1: Fundamentals of Heating, Ventilation and Air Conditioning

Module Contents

- Basic principles, laws and terminologies related to HVAC.
- Psychometric chart and comfort zone.
- Evaporative cooling systems of air conditioning.
- Refrigerant Cycle (Vapour Compression System) and its reversal.
- Components of Mechanical Vapour Compression Refrigeration Systems.
- Natural and artificial ventilation.

Module 2: Types of Air Conditioning Systems

Module Contents

- Window Air Conditioners.

- Split Air Conditioners.
- Packaged Air Conditioners.
- Direct Expansion Air Conditioning Systems.
- Central or All-water Air Conditioning Systems.
- Selection criteria, design / structural considerations and energy requirements for above mentioned air conditioning systems.

Module 3: Emerging Trends in HVAC and other Miscellaneous Topics

Module Contents

- Passive Heating and Cooling Systems.
- Energy Saving through Design, Operation and Maintenance.
- Emerging Technologies – VRV, VRF, Heat Recovery Systems, etc.
- Developing Air Conditioning layouts for their current design exercise.
- Coordination with other services, architectural and structural designs.
- Case Studies and their critical appraisal.

Module 4: Introduction to Basics of Acoustics

Module Contents

- Basic laws and terminologies related to Acoustics.
- Sound Intensity and Sound Intensity Level. (Classroom exercise)
- Sound Absorption, Transmission, Reflection, Diffusion and Diffraction.
- Free field conditions and Inverse Square Law for noise reduction with distance.
- Sound Absorbing Materials – descriptions and characteristics.

Module 5: Acoustics for an Enclosure / Building Design

Module Contents

- Reverberation Time and its importance for acoustical performance of an enclosure.
- Sabin's Equation and its application for designing new auditoriums and correcting RT of existing ones. (Classroom exercise)
- Acoustical defects in an auditorium and their remedies.
- Acoustical design of auditorium and other acoustically sensitive enclosures meant for speech, music, lecture, etc.
- Properties of materials and their application for acoustical treatment, shape analysis for different enclosures.
- Designing enclosures for variable RT's.
- Sound Amplification Systems.

Module 6: Noise Isolation and Control

Module Contents

- Noise and its effects.
- Types of noise and its transmission.
- Sound Insulation and Transmission Loss.
- Speech privacy and noise control in specific situations.
- Methods of Sound Insulation - control of mechanical noise and vibrations.
- Codal Provisions

Learning Resources / References

- National Building Code 2005
- Mechanical and Electrical Equipment for Buildings by Walter T. Grondzik, Alison G. Kwok, Benjamin Stein.
- Basic Refrigeration and Air Conditioning by A. Ananthanarayana.
- Building Construction by Rangwala.
- Architectural Acoustics by M. David Egan.

Drawings from various case study projects may be presented and discussed for better understanding of the subjects.

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DEPARTMENT OF ARCHITECTURE

Subgroup: Structures

Sem.	Sub Code	Course Title	Credit	L	T	P/S
05	BARC-05006	Structural Concepts in Architecture	3	2	1	0

Course Overview

The course outlines the metamorphosis of various structural concepts and systems during the development of architecture at various times. It also discusses the role of non-conventional innovative structural systems in the contemporary practice of architecture. It also highlights the impact of new materials and structural solutions on the innovative forms of architecture.

The course thus aims at enabling students to design innovative non-conventional forms in their architectural design in a feasible manner, with a better understanding of the structural behaviour of these forms.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**Identify** the concept of various structural elements and system
Cognitive	Analyzing	**Illustrate** the use of different structural systems in building industry.
Cognitive	Analyzing	**Analyze** the structural geometry based on strength and stability criteria.
Cognitive	Remembering	**Outline** the development of structural forms during the passage of architectural time line
Cognitive	Creating	**Design** the effective use of structural systems for complex architectural need
Cognitive	Applying	**Apply** the fundamentals of temporary systems to design the shelters for disaster mitigation
Cognitive	Creating	**Create** an integrated systems based on structural models and new material for modern sky scrapers
Cognitive	Evaluating	**Appraise** the built environment based on specific structural system

Module 1: Classification of Structures

Module Contents

- Classification of structures on basis of their force transmission media.
- Discussion of Vector Active, Surface Active and Force Active structures

Module 2: Arches, Shells and Domes

Module Contents

- Arch Action,
- Classification and Advantages of Arch, barrel shells hyperbolic paraboloid.
- Shell, Vaults and Domes: Structural Concept and Classification and Application in Architecture

Module 3: Plate Structures

Module Contents

- Plate Structures: Definition, Classification and Application,
- Concept and Application of Folded plates,
- Flat slab and Coffered Slab

Module 4: Tensile Structures

Module Contents

- Concept of Tensile Structures,
- Formation, Classification of Tensile structures
- Use and Examples of various cable structures.

- Application of Cable Structures in Contemporary Architecture.
- Materials and Construction Methods of Membrane Structures.

Module 5: Trusses and Space Frames

Module Contents

Truss Components, Classification and application in Architecture, Long Span Trusses: Advantages and Use, Space Frame: its Formation and Applications in Buildings, Laminated timber construction

Module 6: Pneumatic Structures and Kinetic Structures

Module Contents

- Concept, Classification and Application of Pneumatic Structures,
- Kinetic Structures and Mobile Structures: Definition, and Application
- Module - failure of structures, type, cause, evaluation of damage, techniques, repaired structures.
- Module - theory and principals for structural design of tall building, advance intelligent structure, introduction to matrix stiffness and finite element method.

Module 7: Structural Systems for Modern Sky Scrapers

Module Contents

- High Rise Buildings: Structural Systems and Application,
- Sky Scrapers: Structural Concept and Modern Methods of Construction Application,
- Case Studies on Structural Systems of Sky Scrapers

Learning Resources / References

- Building Structures Illustrated: Patterns, Systems, and Design by Francis D. K. Ching; Wiley Publication
- Prestressed Concrete Structures by P.Dayaratnam;Oxford and IBM Publishing Co.; New Delhi, 1982
- High Rise Building Structures by Wolfgang Schuller; John Wiley & Sons; New York, 1976
- Tensile Structures ; Vol-II, Pneumatic Structures, Cable Structures by Frei Otto;The MIT Press London
- Principles of Space Structures by N.Subramaniam; Wheeler& Co.; Allahabad, 1983

SCHOOL OF PLANNING AND ARCHITECTURE BHOPAL

DEPARTMENT OF ARCHITECTURE

B.ARCH PROGRAMME CURRICULUM
JULY 2016

6th SEMESTER

SUBJECTS OFFERED

6th SEMESTER										
S.No.	**SUBJECT CODE**	**SUBJECTS**	**L**	**T**	**P/S**	**CREDITS**	**MARKS**	**SEMESTER EVALUATON (WR/VV/TP)**		
	SESSIONAL SUBJECTS									
1	BARC - 06001	Architectural Design - VI	**1**	**0**	**7**	**08**	**800**	--	VV	TP
2	BARC - 06003	Building Materials & Construction- VI	**1**	**0**	**4**	**05**	**500**	WR	VV	--
3	BARC - 06005	Working Drawing- II	**1**	**0**	**4**	**05**	**500**	--	VV	--
4	BARC - 06007	Flexible Elective- II	**0**	**0**	**1**	**01**	**100**	--	VV	--
5	BARC - 06009	Seminar- I	**1**	**1**	**1**	**03**	**300**	--	VV	--
	THEORY SUBJECTS									
1	BARC - 06002	Settlement Pattern & Town Planning	**2**	**1**	**2**	**05**	**500**	WR	VV	--
2	BARC - 06004	Estimation Costing & Valuation	**2**	**1**	**0**	**03**	**300**	WR	--	--
	TOTAL CREDITS		**30**							
	TOTAL CONTACT HOURS		**30**							

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

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Subgroup: Architectural-Design

Sem.	Course No.	Course Title	Credit	L	T	P/S
06	BARC-06001	Architectural Design - VI	8	1	0	7

Course Overview :

The studio emphasis shall be on creative and rational skills for problem solving, preferably on a contoured site. Design-problem may focus but not limited to a multi-functional, service (advanced services) oriented building like housing, convention hall, shopping complex, resort, habitat centre, office building, mixed use occupancy buildings etc. in an urban setting including application of urban development, controls, codes and bye-laws.

Emphasis may also be laid on site planning as well as on advanced services at building and at site level. The focus would be on understanding how to design for an urban setting.

There would be minimum one major and one minor exercise/project based on the module contents. The modules may be taken up by the faculty in order of preference. The order should be common in both sections of same year. The faculty may achieve stated minimum outcomes using various strategies and approaches.

There may be integration of design with structural and construction details, for this, the project should be integrated with the structures and building construction classes. One set of detailed working drawings must also be generated at the end of the design process.

Parallel subjects would give assignments connected with the current design exercise(s) as part of their course work.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Analyzing	**Value** various indigenous and latest building materials **(LO-1)**
Psychomotor	Precision	**Demonstrates** architectural and structural vocabulary through verbal and written communication **(LO-2)**
Affective	Responding	**Questions** conventional technology, structural system and materials(**LO-3)**
Affective	Valuing	**Develop** sensitivity towards building bye-laws.(**LO-4)**
Cognitive	Applying	**Apply** services learnt in previous semester to design project at building and site level. (LO-5).
Psychomotor	Manipulation	**Build** with precision block models**,** study models, site models **(LO-6)**
Affective	Responding	**Participating** in team activities **(LO-7)**
Affective	Valuing	**Forms** correlation between design and other subjects studied in previous semesters and till present **(LO-8)**
Psychomotor	Articulation	**Communicate** through drawings or models methods developed to meet various requirements **(LO-9)**

Module 1:

- **Value** various indigenous and latest building materials. **(LO-1)**
- **Demonstrates** architectural and structural vocabulary through verbal and written communication **(LO-2)**
- **Questions** conventional technology, structural system and materials**.(LO-3)**

Module Contents

- This module can be started with a warm-up exercise/ literature review (group or individual). Students could be sensitized (social-cultural sensitization) through documentary/ movies/ photos etc.
- Students may visit site for collecting context specific data for getting better understanding of real- life project details. The collected data may be analyzed and presented for evaluation.
- The above mentioned module teaching methods are suggestive. Faculty may choose other pedagogical approaches for design thinking process.

Module 2,3:

- **Develop** sensitivity towards building bye laws**.(LO-4)**
- **Apply** services learnt in previous semester to design project at building and site level. **(LO-5)**
- **Build** with precision block models**,** study models, site models **(LO-6)**

Module Contents

- Design Problem may be introduced by the faculty using linear design approach or hidden-curriculum or other design teaching models can be adopted for defining the design problem.
- Readings/ short movies/ Discussion on designers' philosophies could be initiated for idea generation. Further approaches for design iterations may involve more common techniques like Flow diagram to explore relation of various spaces, bubble diagram for locating various zones on site, try and re-create for analysing spaces in all dimensions through Block Models and single line graphics and study models for choosing the right option.

Module 4,5

- **Apply** services learnt in previous semester to design project at building and site level. **(LO-5)**
- **Build** with precision block models, study models, site models (LO-6)
- **Participating** in team activities **(LO-7)**
- **Forms** correlation between design and other subjects studied in previous semesters and till present **(LO-8)**
- **Communicate** through drawings or models methods developed to meet various requirements **(LO-9)**

Module Contents

- Students may integrate the knowledge gained from previous theory based subjects (like building services mathematics for architecture, building materials and construction, structures etc.) and apply in their design during design development/ detail stage.
- It is preferable if the students communicate the application of all services in their design.
- Students must make enlarged drawings showing all working details for superstructure.
- Formative assessment in the studio could be done through individual critique, group discussion formal and informal feedback etc.
- Summative assessment of the studio work could be achieved through panel discussion, presentation, peer review, public review , criteria based evaluation etc.

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Learning Resources / References

- National Building Code 2005
- Madhya Pradesh Bhumi Vikas Rules 2012
- Time Saver Standards for Architectural Design
- Architectural Standard- Ernst & Peter Neufert- Architect's Data

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

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Subgroup: Techniques

Sem	Course No.	Course Title	Credit	L	T	P/S
06	BARC-06003	Building Materials and Construction - VI	5	1	0	4

Course Overview :

In this semester, the domain knowledge about steel is added with advanced study of steel structures.

- The semester aims to familiarize students with steel structures for the construction of steel columns, beams, trusses etc. It also aims to make students aware of the construction fundamentals to construct steel framed structures.
- The studies proceed with sensitizing students about the construction details of the contemporary / modern methods of constructing factory sheds/ large span structures, etc with modern materials and technologies.
- The semester should be integrated with previous or ongoing design studio exercises for better understanding and practical implementation of the learning developed out of this semester.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	To **comprehend** various types of roofing structures used in different purposes from day to day life. To **explain** the alternatives of Long span structures in Steel.
Cognitive	Understanding	To **understand** the variety of available MS sections (Hot and Cold Rolled) for varied uses. To **comprehend** the details/ arrangements of combinations for various uses. To **make** students **aware** of the process of Pre-fabrication in advanced building construction processes
Cognitive	Analyzing	**To compare** the various types of steel roofing with different material used to analyze the construction details. **To Analyze** the components of roof structure
Cognitive	Analyze	**To organize** various elements of steel truss to make replica (Scaled Model) of real truss or steel structures

Module 1: Steel Structures

Learning Objectives

- To know the comparison between conventional RCC structure over Steel Structure
- To understand different types of spanning systems in Steel
- To understand the details of trusses providing natural light
- To acquaint students about rain water disposal from roof and water proofing

Module Contents

- Construction of steel structures (Factory shed/ large span)
- Details of Roof and roof trusses
- Water proofing and rain water disposal from roofs
- Steel columns, portal frames, etc.
- North light truss, tubular monitor roof truss

Module 2: Multi Storied Steel Framed Structures

Learning Objectives

- To understand the structural requirements of multi storied steel structures
- To know the concept and need of space frames

Module Contents

- Multi- storied steel frame structures connections and their components
- Steel Monitor Trusses
- Space Frames

Module 3: Modern Factory Shed/ Large Span Construction

Learning Objectives

- To know about the modern materials for roof covering, supporting structures
- How to minimize loading and structure light weight for large span areas

Module Contents

Introduction to a wide range of modern building construction systems incorporating the use of metals like steel, aluminum and composite materials.

Module 4: Modular, Pre-Fabricated Construction

Learning Objectives

- To know the concept and advantages of Pre Fabrication of Building Components
- To understand the process of Pre-Stressing

Module Contents

- Prefabricated construction of building components.
- Precast, pre stressed
- Pre Tensioning and Post Tensioning of concrete members.
- Advantages of Pre-stressing over RCC

Module 5: Materials

Learning Objectives

- To understand various methods of joining of steel members
- To know about various modern materials/ Patented material used for false ceiling and roof covering

Module Contents

- Steel Structures: Study of steel structures, construction, joining, welding riveting etc. Hot rolled sections, cold forming of sheets into sections.
- Materials of Suspended Ceilings: Study variety of false ceiling types and materials available in the market.
- Modern Factory Shed Construction: Study of modern building construction materials.
- Study of various patent materials of construction available under different trade names with their specifications, properties and uses like Vineertex, Marblex, Fixopan, Anchor Boards, Novapan, composite aluminium bond, etc.

Learning Resources /

Each module should include market survey and construction site visit compulsorily.

- Building Construction Illustrated by Francis D. K. Ching
- Building Construction by W. B. Mckay (Vol. 4)
- Barry's Advanced Construction of Building Construction by Stephen Emmitt
- Barry's Introduction to Construction of Buildings by Robin Barry
- Building Construction Handbook, R. Chudely

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

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Subgroup: Techniques

Sem	Course No.	Course Title	Credit	L	T	P/S
06	BARC-06005	Working Drawing- II	5	1	0	4

Course Overview :

The Architectural Drawings needs to be detailed out on the basis of services layouts and other important features to be used in the designed building to be executed and constructed. The building drawings so prepared become part of the contract documents with proper labelling and dimensioning, specifications, detailing.

The drawings shall be based on Architectural Drawings prepared in Working Drawing- I in the previous semester. The learning of building Materials & construction will be implemented for preparing various drawings.

The knowledge gained through WD-I and WD-II will help the students in better understanding the project management aspects.

The subject will be taught in congruence with the design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

It will be helpful in detailing out the drawings for the subject working drawing-I and understand the various stages of construction for estimation and costing.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**Select** the appropriate construction details as per the various services
Cognitive	Understanding	**Illustrate** drawings based on the traditional and new materials
Cognitive	Applying	**Prepare** various details
Psychomotor	Precision	**Demonstrate** the preparation of execution drawings in the process of realization of a designed building and services
Psychomotor	Articulation	**Integrate** all the drawings prepare for the execution purpose

Module 1: Building Services Drawings (External)

Learning Objectives

Enable the students to illustrate and prepare the drawings good for construction explaining the building services scheme outside the building envelop but within the site

Module Contents

- Water supply source and connections
- Electric supply source and connections
- Sewage disposal and storm water disposal system
- Rain water harvesting system
- Landscaping details if required

Module 2 : Building Services Drawings (Internal)

Learning Objectives

Enable the students to illustrate and prepare the drawings good for construction explaining the building services scheme within the building envelope.

Module Contents

- Layouts of kitchen, toilets and other utility spaces along with the specifications of fixtures.
- Plumbing layouts of kitchen, toilets etc.

Module 3 : Specifications of Finishes

Learning Objectives

Enable the student to illustrate and describe the specifications for the various internal and external finishes.

Module Contents

Internal Finishes

- Flooring Pattern and its specifications
- White washing/ Wall finishes etc. and its specifications
- Wood Finishes and Fixtures
- Fabrication and its specifications
- Electrical fitting and fixtures and their specifications

External Finishes

- Site development which will include the Paving, Roads, Driveways, Pathways etc and their specifications
- Fabrication like Gate, railings, fencing etc. and their specifications
- White washing/ Wall finishes etc. and its specifications
- Electrical fitting and fixtures and their specifications
- Boundary wall design, fixtures and their specifications.

Module 4 : Details of Fabrications

Learning Objective

Enable the student to illustrate and prepare drawings good for construction of the various fabrications which shall be required for the successful completion of the project

Module Contents

Different Fabrication like Gate, railings, fencing etc.

Module 5: Graphics and Signage

Learning Objectives

Enable the student to illustrate and prepare drawings good for construction of the various kinds of signage and graphics which shall be required for the successful completion of the project.

Module Contents

Various types of signage and graphics as and where required.

Learning Strategy

- Preparation of drawings with illustrations
- Site visit and case studies to know the various details
- Data collection from the market survey regarding construction material and detailing

Learning Resources / References

- Architectural Graphics by Francis D. K. Ching
- Architectural Graphics Standard by Charles George Ramsey
- Architectural Graphics Standard for Residential Construction by Dennis J. Hall
- Drafting & Design: Basics for Interior Design by Travis Kelly Wilson

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

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Subgroup: Elective

Sem.	Course No.	Course Title	Credit	L	T	P/S
06	**BARC-06007**	**Flexible Electives-II**	**1**	**0**	**0**	**1**

Course Overview :

The objective of the flexible elective is to help students acquire knowledge by direct involvement in diverse form of outreach programs. This would enable students to explore possibility of taking courses not regularly offered in B.Arch. curriculum. The outreach programs can be in the form of demonstrative workshops, summer/winter schools, paper/poster presentation, short courses, certified online courses, GIAN workshops, faculty led workshops, student competitions (eg, NSDC), integral studios and practical training to acquire skills in various creative fields which contributes to the profession of architecture.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	To **comprehend** the knowledge/ allied and multidisciplinary skill.
Cognitive	Understanding	To **explain** the learnt skill/ knowledge and its link to architecture in a forum.
Psychomotor	Applying	To **demonstrate** the learnt skill/ knowledge
Affective	Receiving	To **identify** area for a study
Affective	Characterization	To **resolve** the domain of learning and internalize it.

Module 1: Exploration and Identification of Creative Fields

Module Contents

- To explore allied disciplines which will contribute to the profession of Architecture. The creative fields can be like any of the listed below:
    - Photography
    - Building construction Techniques
    - Graphic Design
    - Textile Design
    - Arts & Crafts (eg. Stone art, Bamboo, Ceramic, Origami, Calligraphy ,etc)
    - Video/ Film making
    - Animation
    - Research Paper writing
    - Advanced Computer Application courses
    - GIS
    - Architectural Journalism

This is just a suggestive list. The students are free to explore other allied areas which should be approved by the faculty co-ordinator.

Module 2: Acquiring the Skill/ Knowledge

Module Contents

- To undergo the coursework/workshop
- To document the process of the course undergone
- To prepare a report/ portfolio of the work done

Module 3: Demonstration of the Acquired Skill/Knowledge

Module Contents

- To demonstrate the learning's of the course.
- To present the work in a forum.

Criteria for choosing the elective:

- For workshops- Minimum number of days should be 1 week
- Courses opted for should be certified by recognized universities
- For Architectural competitions, the work will be evaluated and credited by a team of experts .Maximum persons in a group should be 4. (or as decided by the subject coordinator)
- For paper presentations/ publication in journals, magazines etc, maximum number of students in a group would be 2. (or as decided by the subject coordinator)
- For all the above, prior discussion, selection and sanction of the type/ scale/mode of exercise to be adopted need to be done with the subject coordinator (s)
- It is required to establish connection to Architecture

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

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Subgroup: Elective

Sem	Course No.	Course Title	Credit	L	T	P/S
06	**BARC-06009**	**SEMINAR- I**	**3**	**1**	**0**	**2**

Course Overview :

To prepare students for writing a paper based on secondary research and literature review and its oral and visual presentation.

Students would be able to identify and go in depth into specific and appropriate aspects relating to the discipline of architecture and discuss how it is reflected in the realm of design.

Students learn how to research a subject area through readings; learn description, analysis and synthesis of readings; citation of authors in their writing.

The importance of the course is also in understanding what constitutes plagiarism research writing and in imbibing the ethics of publication.

Literature review is seen as the first step in preparation of understanding research methods.

This level there will be group work and presentation that will also develop team building and leadership skills between the students.

At the next level, in seminar II, students will learn how to plan a focused study which includes case studies employing small surveys.

Course Outcomes:

Domain	Category	Outcome
Affective	Receiving	**Knows and Recalls** the process of construction stage. Identify research papers published in Journals for a study.
Cognitive	Understanding	**Paraphrase reading/s**
Psychomotor	Precision	Precise **comprehension** of paper studied (Format & application of research methods)
Psychomotor	Articulation	**Present** the paraphrased reading/s
Affective	Organization	**Organize** a study based on literature survey
CAP		**Write** a paper, based on a study
Psychomotor	Articulation	**Present** paper in a seminar
Affective	Valuing	**Practice** Citation
Affective	Valuing	**Develop** ethics of publication

Module 1: Introduction to Research Study Methods and Resources

Module Contents

- Differentiate between referenced sources /websites and non-referenced sources
- Identify a research paper, newspaper article, report and book chapter
- Categorise papers within a subject area
- Identifying key authors in a subject area

Module 2 : Paraphrase and Present a Paper Selected & Studied

Module Contents

- Understand the structure of a research paper
- Descriptive writing about a paper demonstrating comprehension of subject matter, academic format, research methods & vocabulary- involving paraphrasing.
- Presentation of the paper read.

Module 3 : Analysis and Collation of Papers- Techniques of Writing

Module Contents

- Analytical writing based on readings
- Framing a focussed topic for study based on readings

Module 4 : Preparation of the Structure of the Study

- Formulate aims and objectives of study
- Prepare a methodology based on literature study
- Present study proposal

Module 5 : Paper-writing Based on the Study

Module Contents

- Compare and analyse readings
- Discuss with subject teacher
- Group Discussions
- Prepare & Submit Draft Paper

Module 6 : Present the Paper using a Visual Presentation Technique

Module Contents

- Prepare a visual presentation based on written paper
- Present Paper in a Seminar
- Submit Final Paper

Learning Resources / References

- Smith, Korydon; 2012; Introducing Architectural Theory: Debating a Discipline; Routledge-Taylor and Francis Group, New York, London.
- Walliman Nicholas; 2008; A step by step guide for the first time researcher; Vistaar Publications; New Delhi.

Learning Strategy

The topic selection and literature work will be undertaken by the students in small groups. The work has to be judicially distributed to involve all but at the same time work together as a team. This strengthens the team bonding and also develops the leadership skills within the students.

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Architectural-Theory

Sem	Course No.	Course Title	Credit	L	T	P/S
06	BARC-06002	Settlement Pattern & Town Planning	5	2	1	2

Course Overview :

The subject is designed to have an overview on the vocabulary of Human settlements. To understand the various elements, classifications and typology of Human Settlements. To familiarize the students with Planning concepts and process in Urban and Regional Planning. To familiarize the students with the process of evolution of cities, concepts related to humanitarian planning processes and skill development to identify planning issues in existing areas and develop solutions at basic levels.

The subject will be taught in congruence with the Design studio and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**Define** types of settlements based on different criteria
Cognitive	Remembering	**Identify** the elements of a settlement
Cognitive	Remembering	**Describe** the principle of a settlement pattern.
Cognitive	Understand	**Classify** constituents of town/city
Cognitive	Analyze	**Distinguish** between different settlements, concepts of planning and techniques of survey
Cognitive	Evaluate	**Review** the condition of development/status of urbanization
Psychomotor	Manipulation	**Re-create** thematic settlement patterns/ origin and growth patterns of city.
Psychomotor	Articulation	**Develop** local area plans

Module 1: Introduction to Settlement Planning

Module Contents

- Evolution of human settlements- man, environment and built structure. Community and settlement patterns. Characteristics of settlements. Growth patterns
- Ancient rural and urban settlements
- Settlement patterns and birth of early and medieval cities.
- Renaissance and High Baroque cities
- Factory and Company towns.

Module 2 : Settlement Planning and Design of Cities in Ancient and Medieval India

Module Contents

- Town planning as per Vastu-shashtra.
- Landscaping and measurement practises as per Manasara.
- India during Medieval period.

Module 3 : Introduction to Town Planning and Design of Cities

Module Contents

- Definitions related to Planning, levels of planning, scope and components.
- Types of planning, elements and scope.
- Characters of a town, census definition of urban area, densities of town.
- Constituents of town/city.

Module 4 : Town and Urban Planning Concepts

Module Contents

- Evolution of Planning concepts : City beautiful movement, Garden cities, Radburn city and neighbourhood concept
- Theories related to growth and decay of settlements- Luis Mumford, Geddesian triad, Ekistics.
- Utopian Planning theories-Linear city- Tony Garnier, Soriya Y Mata. Planning concepts by Le Corbusier and FLW.

Module 5: Planning Framework and Process for Various Development Plans

Module Contents

- Planning process, components and techniques- survey techniques and data collection methods
- Concept of master plan, its elements, preparation and implementation
- Perspective plans, structure plans, advocacy plans, zonal plans
- Participatory and inclusive planning

Module 6: Problems and Issues of Towns and Settlements

Module Contents

- Identification of planning problems of land use distribution and change, communication system, overcrowding.
- Informal growth- slums, blighted areas.
- Sporadic growth and conurbation, primacy, traffic.
- UDPFRI Guidelines, MoUD laws, Zoning and developmental controls.

Module 7: Case Study of Existing Settlement

Module Contents

- Case studies of planned cities of the world-New Delhi, Chandigarh, Jaipur, Bhubaneshwar, Bhilai, Bokaro, port town, Brasilia, Islamabad
- Hands-on Exercise on local area planning. (Survey, Documentation , Interpretation, Proposal development)

Learning Resources / References

- An Introduction to the Science of Human Settlements by C.L.Doxiadis; Ekistics Hutchinson, London, 1968.
- Housing and Urban Renewal by Andrew D.Thomas, George Allen and Unwin; Sydney, 1986.
- Ministry of Urban Affairs and Employment; Government of India, New Delhi,1999
- Urban Development Plans: Formulation & Implementation; Guidelines, 1996.
- Master Plan for Madras Metropolitan Area; Madras Metropolitan Development Authority, Second Master Plan, 2007.
- Report of the National Commission on Urbanisation; Government of India 1988.
- Regional Policy and Regional Integration by N. Hansen; Edward Elgar, UK, 1996.
- Sustainable Human Settlements by R. S. Sandhu; Asian Experience, Rawat publications, 2001.
- Living Plans: New concepts for advanced housing by P. Gastek; Brikhauser publications, 2005
- URDPFI Guidelines Vol I-2014 (http://moud.gov.in/URDPFI)
- URDPFI Guidelines II A-II B-2014(http://moud.gov.in/URDPFI)

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Building Management

Sem	Course No.	Course Title	Credit	L	T	P/S
06	BARC-06004	Estimating Costing & Valuation	3	2	1	0

Course Overview :

The building designed by an architect needs to be executed and it is essential for an architect to tell his client regarding the tentative expenditure and the quantities of various materials required at various stages of the construction which become part of the tender document. The architect should also be aware of the various ways through which the contractors, materials and other related things with the construction can be hired or engaged. These estimates and tendering process are essential part of an Architects practice.

The students will be introduced and familiarised with the various techniques and processes of preparing an estimate, tender documents and the process of tendering. The exercises taken shall be based on the design exercise done by them in the previous semester.

Another important role an Architect plays is of a Valuer for immovable properties. The students will be introduced and made aware of the various methods and techniques for doing the valuation of a property.

The subject will be taught in congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**Knows and Recalls** the process of Construction stage wise and the type of Construction and materials used.
Cognitive	Understanding	**Comprehend** and **understand** the various processes of Estimating, Valuation, and tendering
Psychomotor	Manipulation	**Execute and Implement** the appropriate methods for preparing the estimates and valuation reports
Psychomotor	Precision	**Demonstrate** the acquired knowledge to **complete** a building Estimate/ Valuation report.
Cognitive	Evaluating	**Compares, evaluates, interprets** the building typologies for preparing an estimate or doing the valuation , Justify with the help of documents and analysis

Module 1: Classification of Areas & Types of Estimates

Learning Objectives

To know the various types of estimates and the techniques for preparing them

Module Contents

- Introduction to the basic terms used in Estimation
- Important considerations while preparing an Estimate
- Introduction to various types of Estimates
- Various Techniques of Preparing the Estimates and BOQ's

Module 2 : Specifications

Learning Objectives

To know the importance and uses of specifications and how to write them

Module Contents

- Introduction to Specifications
- Important considerations while Writing the Specifications
- Specifications as per CPWD, PWD etc., and how to read them
- Writing Specifications for Building work
- Writing Specifications for Interior finishing and Furnishing Works

Module 3 : Analysis of Rates

Learning Objectives

To know how to calculate the rates for a unit of work to be executed

Module Contents

- Introduction to Schedule of Rates
- Importance of Rate Analysis
- Considerations done while doing the Rate Analysis
- Calculations for basic building materials like RCC, Brick work
- Calculating the various quantities of materials required per unit

Module 4 : Introduction to Tendering

Learning Objectives

To know the various types of tenders and the process of tendering.

Module Contents

- Introduction to various types of tenders and the tendering process.
- Introduction to contract and its various components.

Module 5: Valuation of Properties

Learning Objectives

To know the process of valuation of properties and how to prepare a valuation report

Module Contents

- Introduction to the concepts of Valuation
- Various considerations taken while doing valuation
- Process of Valuation
- Preparing valuation report

Learning Strategy

Lectures and assignments

Learning Resources / References

-
- Estimating, costing and valuation: professional practice and quantity surveying by S. C. Rangwala and K. S. Rangwala
- Estimating and costing in civil engineering : theory and practice by B.N. Dutta
- Estimating costing and building economics for architects by Harbhajan Singh
- Estimating, costing, specification and valuation in civil engineering : principles and applications by Manojit Chakraborti
- CPWD Specifications by Central Public Works Department
- Delhi Schedule of Rates by CPWD
- Valuation of real properties by S. C. Rangwala, K. S. Rangawala and P. S. Rangawala

SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

BACHELOR OF ARCHITECTURE
PROGRAMME CURRICULUM
JULY 2016

7th SEMESTER

SUBJECTS OFFERED

7th SEMESTER										
S.No.	**SUBJECT CODE**	**SUBJECTS**	**L**	**T**	**P/S**	**CREDITS**	**MARKS**	**SEMESTER EVALUATON (WR/VV/TP)**		
	SESSIONAL SUBJECTS									
1	BARC - 07001	Architectural Design - VII	**1**	**0**	**9**	**10**	**1000**	----	VV	TP
2	BARC - 07003	Non-conventional materials & techniques	**2**	**1**	**0**	**3**	**300**	WR	VV	----
3	BARC - 07005	Seminar- II	**1**	**1**	**1**	**3**	**300**	----	VV	----
4	*BARC – 07007 (A)	Interior design	**1**	**0**	**4**	**5**	**500**	----	VV	TP
5	*BARC – 07007 (B)	Product design	**1**	**0**	**4**	**5**	**500**	----	VV	TP
*Any one of the subjects with code BARC07007 will be registered.										
	THEORY SUBJECTS									
1	BARC - 07002	Urban Design	**2**	**1**	**0**	**3**	**300**	WR	----	----
2	BARC - 07004	Energy Efficient Architecture	**2**	**1**	**0**	**3**	**300**	WR	----	----
3	BARC - 07006	Steel Structure	**2**	**1**	**0**	**3**	**300**	WR	----	----
	TOTAL CREDITS		**30**							
	TOTAL CONTACT HOURS		**30**							

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Subgroup: Architectural Design

Sem.	Course No.	Course Title	Credit	L	T	P/S
07	BARC-07001	Architectural Design -VII	10	1	0	9

Course Overview:

- The studio emphasis shall be on creative and rational skills for problem solving in architectural buildings on real site. Design-problem may focus on multifunctional, multi storied structure and services with application at site and building level like multi star hotels, multi specialist hospitals, high rise mall etc. in an urban setting including application of urban development controls, codes and bye-laws. The design proposal will be taken up with byelaws, master plan or any other restriction on large site.
- There should be integration of design proposal, structural system, energy efficient approaches and construction detail. One set of detailed working drawings of any one of services must also be generated at the end of the design process. Emphasis may also be laid on site planning as is learnt in previous semester. The focus would be on understanding of designing a complex building with all aspect of site planning and services in urban setting.
- There would be minimum one major and one minor exercise/project based on the module contents. The modules may be taken up by the faculty in order of preference. The order should be common in both sections of same year. The faculty may achieve stated minimum outcomes using various strategies and approaches
- Parallel subjects would give assignments connected with the current design exercise(s) as part of their course work.

Course Outcomes:

Domain	Category	Outcome
Psychomotor	Precision	**Demonstrates** architectural and composite structural system and services through their design
Affective	Valuing	**Value** appropriate technology, structural system and materials
Affective	Valuing	**Develop** sensitivity towards non conventional technologies, energy efficiency and interior design.
Cognitive	Applying	**Apply** services learnt in previous semester to design project at building and site level
Psychomotor	Precision	**Build** with precision block models**,** study models, site models
Affective	Responding	**Participating** in team activities
Affective	Valuing	**Forms** correlation between design and other subjects studied in previous semesters and till present.
Psychomotor	Articulation	**Communicate** through drawings or models, methods developed to meet various stages.

Module 1: I**ntroductio**n

Learning Strategy

- **Demonstrates** architectural and composite structural system and services through their design.
- **Value** appropriate technology, structural system and materials.
- **Develop** sensitivity towards non conventional technologies, energy efficiency and interior design.

Module Contents

- This module can be started with a warm-up Exercise/ Literature review (Group or Individual). Students could be sensitized (complex users, high rise issues and services) through Documentary/ movies/ Photos/

Presentation etc.

- Design Problem may be introduced by the faculty using linear design approach or hidden-curriculum or other design teaching models can be adopted for defining the design problem.
- Students may visit site for collecting context specific data for getting better understanding of real- life project details. The collected data may be analysed and presented for evaluation.
- The above mentioned module teaching methods are suggestive. Faculty may choose other pedagogical approaches for design thinking process.

Module 2 : Development Of Concept

Module Contents

- Readings/ short movies/ Discussion on designers' philosophies could be initiated for idea generation.
- Further approaches for design iterations may involve more common techniques like
- Flow diagram to explore relation of various spaces, bubble diagram for locating various zones on site, try and re-create for analysing spaces in all dimensions through Block Models and single line graphics and study models for choosing the right option.

Module 3,4: Design Development

Learning Strategy

- **Apply** services learnt in previous semester to design project at building and site level.
- **Build** with precision block models**,** study models, site models.

Module Contents

- Students may integrate the knowledge gained from previous theory based subjects (like building services, building materials and construction, structures etc.) and apply to detail out their design proposal.
- The theories of urban design may be applied for co relating the urban setting during the design development stage.

Module 5: Final Design Proposal

Learning Strategy

- **Participating** in team activities.
- **Forms** correlation between design and other subjects studied in previous semesters and till present.
  Communicate through drawings or models methods developed to meet various requirements.

Module Contents

- The final design proposal is prepared after conducting various informal and formal reviews at individual and at group level. The drawings and detail physical model explaining the approach and consideration of urban setting to achieve the requirements with various other restrictions may be the submittals. It is preferable if the students communicate the application of all services in their design and must prepare a set of working drawings of one of the services showing all details for execution.
- Formative assessment in the studio could be done through individual critique, group discussion formal and informal feedback etc.
- Summative assessment of the studio work could be achieved through Panel discussion, presentation, peer review, public review , Criteria based evaluation etc.

Learning Resources/References

- Madhya Pradesh Bhumi Vikas Rules 1984/ relevant Building Bye-laws as per site chosen
- Time saver standards for building types by DeChiara and Callender- Mc Graw hill company
- Neufert Architect's data by Bousmaha Baiche & Nicholas Walliman,-Blackwell science ltd.
- National Building Code – ISI
- Time saver standards for landscape architecture by Charles W Harris – Mc Graw Hill
- New Metric Handbook by Patricia Tutt and David Adler – The Architectural Press

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Subgroup: Techniques

Sem.	Course No.	Course Title	Credit	L	T	P/S
07	BARC-07003	Non-Conventional Materials & Techniques	3	1	0	2

Course Overview:

- The subject Non-Conventional Materials and Techniques will refer to those materials and techniques which are relevant to social needs and are easily accessible.
- It incorporates the use of locally available materials with relatively less labour charges making it easily affordable to individual families.
- The study will involve non-conventional materials and techniques which are adaptable, flexible and include local communities in the innovation and implementation stages. These techniques should also not have any adverse environmental impact.
- The subject - Non Conventional Materials and Techniques should have an in-depth study of rural appropriate technology which shall form the base of understanding and simultaneously for appreciating the ethics and philosophy of technology with its uses in a rural, cost effective, maintenance free and relatively eco-friendly substitute to the conventional techniques.
- The subject will be taught in congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	To **develop** the understanding of non conventional energies and the various technologies involved
Cognitive	Remember	To **identify** the different non-conventional energy resources, materials and construction techniques
Cognitive	Understand	To **differentiate** between non- conventional and conventional energy sources
Affective	Valuing	To **appreciate** different techniques used to construct building elements.
Affective	Organization	To **justify** various alternative roofing materials and its construction techniques.
Affective	Characterization	To **display** the sensitivity to different non-conventional energy resources, materials and construction techniques

Module 1: Introduction To Non-Conventional Materials and Technologies in the Architectural Field.

Learning Resources / References

- A. K. Jain: “Extension Strategies for Innovative Housing Technologies under Scheme of Community Development through Polytechnics” Presented at the conference on Extension Strategy for Innovative Housing Technologies, Roorkee, India, 2010.
- Lynne Elizabeth and Cassandra Adams; Alternative Construction: Contemporary Natural Building Methods
- Victor Papanek; The Green Imperative; Thames and Hudson; 1995
- Steven Harris and Deborah Berke; Architecture of the Everyday; Princeton Architectural Press; 1997
- Pilar Echavarria; Portable Architecture- and unpredictable surroundings; Page One Publishing Pvt. Ltd.
- Site visits, case studies, exercises/ tutorials

Module Contents

- Renewable Energy Resources: Solar Energy, Biomass Energy, Hydro Power Energy, Wind Energy, Tidal Energy, Bio Fuel
- Appropriate technology and rural development: with respect to government policies and initiatives
- Participatory Planning, Education, Development Controversies

Module 2: Appropriate Walling Materials and Technologies

Learning Resources / References

- K. Lal, “Development and adoption of New Low Cost Construction Techniques and Building Materials,” Presented at the Seminar on Low Cost Building Materials and Housing, Vidisha, India, 2009.
- J. Sengupta, “Cost Effective Building Materials from Industrial and Agricultural Wastes”, Proceedings of

Winter School on Alternative Building Materials, Vidisha, India, 2005.

Learning Strategy:

- Site visits, case studies, exercises/ tutorials

Module Contents

- Types of non-conventional walling techniques: mud walls: adobe, wattle and daub, rammed earth, cob walls, compressed earth blocks, etc.
- Sun dried bricks, stabilized soil blocks, hollow concrete blocks, etc.
- Ferro-cement and similar materials
- Use of precast aesthetical materials: Bricks jaalis, cement jaalis, mouldings etc.

Module 3: Appropriate roofing materials and technologies

Learning Resources / References

- Ministry of Housing & Urban Poverty Alleviation, Government of India, "National Housing Policy 2007", http://mhupa.gov.in/policies/duepa/HousingPolicy2007.pdf, New Delhi, India, 2008.

Learning Strategy

- Site visits, case studies, exercises/ tutorials

Module Contents

- Alternative non-conventional materials and techniques used for roofing: Bamboo roofing, Composite material, Mangalore tiles, etc
- Types of other Roofs: Jack arch roof, Thatch roofing, Filler slab roofing with various filler material, Clay/micro-concrete tiled roofing, etc.

Module 4: Use of Bio- Mass as a Non Conventional Source of Energy Leading to Various Non-Conventional Techniques

Module Contents

- Various uses of bio mass and techniques involved in the same.

Module 5: Use Of Bamboo as a Renewable Building Material

Module Contents

- Importance and Potential of Bamboo
- Uses of bamboo as a building material including the techniques involved.

Module 6: Region Specific Non – Conventional techniques

Module Contents

- Non - Conventional techniques in general but conventional for a specific region developed in response to the locally available materials and construction techniques in response to the climate of a region in an urban or rural set up may be taken for study.
- Students can integrate the same exercise to various allied subjects like climate responsive architecture, BMC, Building Services, etc. Students may also study works of other architects.

Learning Strategy:

- Small exercises and projects, study may be in groups.

Learning Resources / References

- Green Architecture: Design for a sustainable future by Brenda and Robert Vale-Thames and Hudsson;1996

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Subgroup: Elective

Sem.	Course No.	Course Title	Credit	L	T	P/S
07	BARC-07005	Seminar- II	3	1	0	2

Course Overview:

- To prepare students for writing a research paper based on literature review and case study, and its oral and visual presentation.
- Students have learned in Seminar 1 to research a subject area through readings; learn description, analysis and synthesis of readings; citation of authors in their writing; and plan a study and write a paper based on literature review.
- This level will expedite the student's individual capacity to work and hone their research ability.
- Through Seminar 2, students extend the study to include case studies, small surveys and interviews and qualitative research methods.

Course Outcomes:

Domain	Category	Outcome
Affective	Receiving	**Identify** research papers published in Journals for a study
Affective	Organization	**Organize** a study based on literature survey
Affective	Organization	**Identify** research methods for study
Affective	Organization	**Apply** research methods in case study
Psychomotor	Articulation	**Present** paper in a seminar
Affective	Valuing	**Practice** Citation
Affective	Valuing	**Develop** ethics of publication

Module 1: Introduction to the Seminar-II objectives and discussion on identifying the study area.

Module Contents

- Recapitulate the differences between referenced sources /websites and non-referenced sources with exercises
- Discussion on differences between a research paper, newspaper article, report and book chapter
- Categorise papers within a subject area, identify the broad area of study.
- Identifying key authors and resources in a subject area

Module 2: Study Based On Literature Survey

Module Contents

- Formulate aims and objectives of study
- Prepare a methodology based on literature study
- Present study proposal

Module 3: Introduce Research Methods – Survey & Interviews

Module Contents

- Introduction to Scientific Research
- How to do a survey
- How to conduct interviews

Module 4: Introduce Research Methods – Qualitative Research Methods In Architecture

Module Contents

- Introduction to Qualitative Research methods in architecture
- Selecting a research method for case study

- How to document, analyse and present findings

Module 5: Plan And Conduct a Case Study

Module Contents

- Plan a field study/Survey, case study
- Conduct a case study
- Document findings
- Analyse

Module 5: Research-Paper Based on the Study conducted

Module Contents

- Write a draft paper
- Discuss with subject teacher
- Group Discussions
- Prepare & Submit Draft Paper

Learning Resources

References: Books on Qualitative Research Methods

- A step by step guide for the first time researcher by Walliman Nicholas; 2008; Vistaar Publications; New Delhi.
- Qualitative Research Methods by Hennink, Monique, Hutter, Inge and Bailey, Ajay- 2011; Sage, New Delhi

Learning Strategies

- The subject will develop the research skills of individuals along with learning about different methods of architectural research.
- There will be intermediate visual presentation to validate the progressive learning.
- The culmination will be writing a paper based on the research work.

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Subgroup: Techniques

Sem.	Course No.	Course Title	Credit	L	T	P/S
07	BARC-07007(A)	Interior Design	5	1	0	4

Course Overview:

- The subject Interior Design is a specialized course offered in architecture which deals with functionality, safety and provides an aesthetically pleasing space for users. This semester will deal with minute details and construction techniques involved in interior design.
- The subject may have product design aspects related to interior design. The subject is integrated to subjects like Design, Graphics, Art Appreciation, BMC and CAD.
- The subject will also be integrated with a small component of design exercise with the current or any of the previous semester design works.
- The course will include one or several exercises in relation to site visits, market surveys, presentations, reports, etc.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understand	The students will **understand** the application of design principles in interiors.
Cognitive	Learn	Students will **identify** the construction methods and techniques in interior design
Affective	Apply	Students will **apply** aspects from building services like acoustics, illumination, electrical in interiors.
Affective	Sensitization	Students are **sensitized** towards environmental control in interiors
Psychomotor	Articulation	To enable the students to **develop** entrepreneurial skills as well as soft skills

Module 1: Principles Of Interior Design

Learning Objectives	Learning Resources / References & Learning Strategy
• To understand the elements and principles of design. • To learn its application in interior design • To identify the design principles in case studies	• Inside Today's Home, by Faulkner, S.and Faulkne, R,(1987), Rinehart publishing company, New York. • The complete Home Decorator by Caroline Clifton et. al., - Portland House New York. • Warm up exercises in sheets, group discussion, comparison of case studies

Module Contents

- Development of interior design concepts - a historic review.
- Design –Definition, meaning, purpose, Types - Structural and decorative characteristics,
- classification of decorative design - Naturalistic, conventional, geometric, abstract, historic,
- biomorphic
- Elements of design - Line and direction, form and shape, size, colour, light, pattern, texture
- and space - application of elements to form designs.

Module 2: Ergonomics

Learning Objectives	Learning Resources / References & Learning Strategy
• To enable the students to gain knowledge on importance of ergonomics in work • Effectiveness. • Design work areas using ergonomic principles.	• Motion and Time Study, Design and Measurement of work by R.M Barnes- John Wiley (1980), New York. • Housecraft – Principles and Practices by Borgert, E. (1982), Issac Pitman, London. • Occupational Biomechanics by Chaffin, D.B. and Anderson, G.B.J. (1984), John Wiley, New York. • Biomedical Instrumentation and Measurements by Cromwell, L. Weibell, F.J. and Pfeirffer, E.A. (1991), Prentice Hall, New Delhi.

	• Project work
Module 3: Materials and Construction Techniques	
Learning Objectives • Know the various materials used in construction. • Understand the methods of interior construction techniques.	**Learning Resources / References & Learning Strategy** • Water supply and sanitary Engineering by S.C Rangawala - Charter publishing house, Roorkee. • Interior Design Principles and practice by Pratap R.M (1988)- Standard publishers distribution, Delhi. • Market survey, presentations, site visits, reports
Module Contents • Building materials and finishes • An introduction to various construction techniques in interiors • Details of doors, windows, cupboards, partitions and joineries • Soft furnishings – Meaning, Importance – relationship of furnishings with space, selection and use of furnishings – functional and decorative.	
Module 3: Colour and lighting	
Learning Objectives • To enable the students to • Learn the concepts of color • Learn the concept of lighting.	**Learning Resources / References & Learning Strategy** • Inside Today 's Home by LuAnn Nissen, Ray Faulkner, Sarah Faulkner(1987),- Rine hart publishing company, New York. • Colour:How to see, how to paint it by Judy,M.,(1994 • Lighting for a beautiful Home by Jan Orcharchd (1993)- Dunestyle publishing Ltd.,U.S.A. • Interior Design and Decoration by Seetharam, P and Pannu, P- CBS publishers and distributors, NewDelhi. • The Complete Home Decorator by Stewart and Sally .W., (1997)- Annes publishers Ltd. ,New York. • Specific case studies in restaurants, shopping malls, museums, cultural centres and theatres
Module Contents • Concept of colour - significance of colour in the interiors and exteriors-Dimensions of colour • Hue, value, intensity, Effects of Hue, value and Intensity. • Application of colour harmonies in the interiors and exteriors –Effects of light on colour, • Illusion of colour, psychology of colour, effect of colour on each other. • Importance of lighting – Lighting in interiors – importance, classification based on sources, uses, illumination, factors to be considered in lighting for different areas of house. Artificial lighting - light sources, types and uses of light, specific factors in lighting – measurements of lighting and economy in lighting, Psychological aspects of light, Avoidance of glare – Glare its types and prevention. • Lighting accessories – Selection of lamps and lighting fixtures, lighting for various areas and specific activities, modern features in lighting design.	
Module 4: Services in Interiors	
Learning Objectives • To enable the students to • Understand the importance of environment control in interiors. • To acquire knowledge on heating and cooling system.	**Learning Resources / References & Learning Strategy** • Building construction by S.C. Rangawala- Charter publishing house, Anand 1963. • Interior design principles and practice by R.M Pratap - Standard publisher's distribution, Delhi.1988 • Theory, site visits, application in exercises
Module Contents • Mechanical and sanitary services – Mechanical systems - Lifts and Escalators. Sanitary services - Water supply within buildings, drainage system for residence, sanitary apparatus. • Acoustics- Definition, requirements of good acoustics, Sound absorption- sound absorbent materials, qualities of acoustic materials, guidelines for good acoustical design. • Air conditioning - Principles of air conditioning system, types of air Conditioning, application in building like apartments and guest rooms, libraries, museums and hospitals, estimation of air conditioning	

- Electrical services – Electrical system, symbols used, three phase and single phase system, simple electrical layouts, how electrical fixtures are used to enhance interiors
- Ventilation- definition, importance, types of ventilation-natural and mechanical, guidelines for natural ventilation.
- Ducting and Panelling, False ceiling
- Estimating – Definition of estimates, types, unit and mode of measurement, quantity surveying –systems adopted, analysis of rates, schedule of items, schedule of rates, schedule of quantities.

Module 5: Furniture in interiors

Learning Objectives	**Learning Resources / References & Learning Strategy**
• Sketch using freehand techniques • Draw views demonstrating the play of light and shadows. • Demonstrate use of various presentation mediums	• Introduction to Home furnishings, Stepat, D.D, (1971)- The Mac Millan Co, New York. • Contemporary decorating by Wilhide, E and Cope stick, I. (2000)- Conran Octopus Ltd. London. • Living rooms by Levine M (1998)- Rockport publishers, USA. • Inside Today 's Home by LuAnn Nissen, Ray Faulkner, Sarah Faulkner(1987),- Rine hart publishing company, New York. • Textbook of Home science, by Mullick.P, (2000) - Kalyani publishers, New Delhi. • Theory, site visits, application in exercises

Module Contents

- Techniques Colouring of architectural presentation drawings in various medium
- Monochromatic shades, Shades and shadows in multi-coloured drawings

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Techniques

Sem.	Course No.	Course Title	Credit	L	T	P/S
07	BARC-07007 (B)	Product Design	5	1	0	4

Course Overview:

- The subject Product Design is a specialized course offered in architecture which deals with functionality, safety and provides an aesthetically pleasing product for users.
- The subject is integrated to subjects like Design, Graphics, Art Appreciation and CAD.
- The subject will also be integrated with a small component of design exercise with the current or any of the previous semester design works.
- The course will include one or several exercises in relation to context of use study, market surveys, presentations, reports, etc.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understand	The students will **understand** the application of design principles in product segment.
Cognitive	Learn	Students will **identify** the design methods and techniques in product design
Affective	Apply	Students will **apply** knowledge of functionality, ergonomic and aesthetics in product design.
Affective	Sensitization	Students are **sensitized** towards environmental issues of products
Psychomotor	Articulation	To enable the students to **develop** entrepreneurial skills as well as soft skills

Module 1: Introduction to Product Design

Learning Objectives	Learning Resources / References & Learning Strategy
• To study history of design (introduction level) • To understand the elements and principles of design. • To study form of product	• Elements of Design by Anderson, Donald M., Holt-Rinehart and Winston, New York (1961)

Module Contents

- Development of product design concepts - a historic review.
- Elements of design – visual grammar and principles of design
- Different techniques for form studies.

Module 2: Ergonomics

Learning Objectives	Learning Resources / References & Learning Strategy
• To study the application of ergonomics in human-product interaction • To apply knowledge of ergonomics in Usability design	• Ergonomic for beginners by Jan Dul, B. A. Weerdmeester, - CRC (1993)

Module Contents

- Application of ergonomics in human-product interaction
- Design of ergonomic model for specific user-problem
- Usability study of product form

Module 3: Problem identification and context study

Learning Objectives	Learning Resources / References & Learning Strategy
• To learn user study	• Kathy Baxter and Catherine Courage, Understanding your users: A practical guide to user requirements methods, tools,

• To understand the problems of user	and techniques • Karen O'Reilly, Ethnographic Methods

Module Contents

- Different techniques to study different user group
- Understand the user problems through various methods
- Understand the context of use
- Analysis of problems

Module 3: Product Design

Learning Objectives	**Learning Resources / References & Learning Strategy**
• To Form design requirement • To Analyse & standardise product requirement • To learn Product Design methods	• John Chris Jones, Design Methods,

Module Contents

- Quality function deployment,
- Formation of design requirements
- SWOT Analysis,
- Learning of different product design methods

Module 4: Application of materials in Product design

Learning Objectives	**Learning Resources / References & Learning Strategy**
• To Study properties of different material • To Apply knowledge of different materials in product design.	• Chris Lefteri, Materials for Design • Andrew H. Dent and Leslie Sherr, Material Innovation: Product Design

Module Contents

- Study of properties of various types of materials
- Application of material for various aspects of product

Module 5: Prototyping of Product Concept

Learning Objectives	**Learning Resources / References & Learning Strategy**
• To Learn different techniques of model making	• Martha Sutherland, Model Making: A basic guide • Norman Trudeau, Professional Modelmaking: A handbook of techniques and materials for architects and designers

Module Contents

- Different types of model making techniques and their application at different stages of product design
- Different presentation techniques of final concept of product

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Architectural Theory

Sem.	Course No.	Course Title	Credit	L	T	P/S
07	BARC-07002	Urban Design	3	2	1	0

Course Overview:

- Introducing Urban Design is important to understand the city as a context to architecture.
- Any building impacts the street and public space and is, in turn, constrained by the framework of urban building regulations.
- Designing the transition of the private space into the public realm and its articulation, determining the overall volume of built space and its form require an understanding of the complex urban fabric.
- The course is designed to explain the complex urban fabric through different dimensions.
- The subject will be taught in congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understand	To **Interpret** relationship between the building and city
Psychomotor	Articulation	To **map** the dimensions of urban space
Affective	Organization	To **synthesize** complex urban issues
Affective	Value	To **resolve** the interface between the building and urban space
Affective	Value	To **respond** to urban design of built form context in the

Module 1: Introduction To Urban Design

Module Contents

- Importance of Urban Design
- Elements of Urban Design
- The Dimensions of Urban Design

Module 2: The Morphological Dimension

Module Contents

- Key Concepts – Land use , Building Structures, Plot Pattern, The Street Pattern
- The Public Space Network
- Buildings *In* Space and Buildings *Defining* Space
- Traditional Urban Space
- Urban block Patterns and Road Networks
- Pod Development
- The return to streets

Module 3: The Perceptual Dimension

Module Contents

- Human sensory perception of environment
- Meaning and symbolism in urban form
- Sense of Place and Placeless-nests
- Territoriality and personalization
- Place Identity
- Key Attributes of Successful places
- Invented places and Superficiality

Module 4: The Social Dimension

Module Contents

- Relationship between people (Society) and (Urban) space

- Necessary, Optional and Social activities
- The function of the Public Realm and its Decline
- The Physical and Socio Cultural Public Realm
- Neighbourhood Unit- Size , Boundaries, Social relevance and Meaning, Social mixed and Balanced Communities
- Safety and Security
- Accessibility and Exclusion
- Equitable Environments

Module 5: The Visual Dimension

Module Contents

- Aesthetics Preferences
- Patterns and Aesthetic Order
- The Kinethestics Experience
- Positive and Negative Space
- Streets and Squares
- Townscape and Urban Architecture
- Criteria for Harmonious Integration
- Hard and soft Landscaping
- Street Furniture

Module 6: The Functional Dimension

Module Contents

- Public Private Interface – Comfort, Relaxation, Passive & Active Engagement, Discovery
- Social use of Space
- Movement
- Privacy- Visual and Oral
- Land use, Density and Urban Form
- Environmental Design- Microclimate, Wind shading, Designing for Sun and Shade, Natural Lighting,Parking, Servicing and Infrastructure
- Growth of Car free Streets and Squares

Learning Resources / References:

- Public Places-Urban Spaces: The Dimensions of Urban Design by Carmona, Matthew; Heath, Tim; Oc, Taner; Tiesdell, Steven; 2003; Architectural Press, Amsterdam, Boston, Heidelberg, London, New York, Oxford, Paris, San Diego, San Francisco, Singapore, Sydney, Tokyo
- Place and Placelessness by Relph, Edward; 1976;; Pion Ltd. , Brondesbury Park, London, NW2 5JN

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Building Science

Sem.	Course No.	Course Title	Credit	L	T	P/S
07	BARC-07004	Energy Efficient Architecture	3	2	1	0

Course Overview:

- The objectives include creating awareness and understanding of the concept of energy efficiency in buildings that respond to the climate, material and natural resources. Developing analytical skills to understand the energy consumption and hence cater to reduction. To create awareness about tools and practices to calculate energy consumption
- The subject will be taught in congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same

Course Outcomes:

Domain	Category	Outcome
Cognitive	Discuss	To be **able** to discuss the concept of energy in buildings
Cognitive	Demonstrate	**Demonstrate** his/her capacity to understand the building as a whole with its integrated systems
Cognitive	Critically And Systematically Integrate	**Demonstrate** the capacity to critically and systematically integrate his/her knowledge about energy-efficient buildings as well as analyze and assess complex systems and built environment
Cognitive	Evaluate And Analyze	**Demonstrate** the capacity to evaluate and analyze energy consumption in buildings and suggest measures to modify it
Cognitive	Creating: Illustrate	To be able to **illustrate** methods to reduce energy consumption of buildings
Cognitive	Analyze	To be able to **understand** and apply current energy rating systems of built environment
Affective	Organization	To **justify** various alternative roofing materials and its construction techniques in congruence with energy concerns.
Affective	Characterization	To **display** the sensitivity to different non-conventional energy resources, materials and construction techniques.

Module 1: Introduction of Energy In Buildings and Parameters Affecting Energy Consumption in Buildings

Learning Objectives

- To be able to discuss the concept of energy in buildings
- Enumerate the manner by which energy is consumed in building materials, building construction and building energy use

Module Contents

- Energy in building construction
- Building energy use
- Embodied energy and operational energy, Life cycle assessment
- Parameters affecting energy consumption in buildings, Demonstrate his/her capacity to understand the building as a whole with its integrated systems

Module 2: The concept of Energy audit

Learning Objectives

- To analyse the energy consumption in buildings
- Demonstrate the capacity to critically and systematically integrate his/her knowledge about energy-efficient buildings and sustainable development as well as analyze and assess complex systems and design processes

Module Contents

- Phases of energy audit
- Energy conserving opportunities
- Energy audit instruments and measurements

- Energy audit checklist
- ECBC manual application

Module 3: Building Integrated Renewable and alternate energy systems

Learning Objectives

- To be able to illustrate methods to reduce energy consumption of buildings
- To be able to understand embodied energy of various materials of construction

Module Contents

- Passive building design concepts
- Solar thermal option, energy efficient lighting, HVAC design
- An introduction to various construction materials used in common (and uncommon) structures.
- After receiving an introduction into fundamental principles of structural, physical and long-term performance, students learn about material and product manufacturing techniques and how they relate to mechanical and non mechanical properties of the various materials

Module 4: Building automation and control and Best management practices

Learning Objectives

- To understand application of building automation for energy reduction in buildings
- To be able to appraise the case studies or examples of energy efficient architecture

Module Contents

- Fundamentals of control systems
- Types of control systems
- The impact of automation
- Application and components of building automation systems
- Methods to reduce energy consumption of buildings
- Case studies from various climatic zones of energy efficient architecture.

Module 5: Rating systems

Learning Objectives

- To be able to understand and apply present day rating systems in a context

Module Contents

- Introduction to rating systems
- Application of a rating system into a design studio project

Module 6: Energy efficient design

Module Contents

- Site planning and design methods to reduce energy consumption
- Energy management in vernacular building
- Techniques to manage energy post occupancy
- Case studies of best management practices

Learning Resources / References

- Practical handbook on Energy conservation in buildings Edited by: Indian Buildings congress
- ECBC Manual

Subgroup: Structures

Sem.	Sub Code	Course Title	Credit	L	T	P/S
07	BARC-07006	Steel Structures	3	2	1	0

Course Overview :

- The course would enable students to design simple steel structures and their basic components. The fundamental aspects of analysis and design and also discusses the practical requirements such as safety, feasibility and economy of steel structures.
- The subject will be taught in congruence with the Design studio, and assignments for the subject will be linked to the design exercises to achieve higher level of learning and understanding the practical application of the same

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	**Discusses** loads on structures, stresses, the concept of factor of safety, methods of design and gives an introduction of type of rolled steel sections.
Cognitive	Creating	**Design** of simple connections, rivets, welds, bolts and pins.
Cognitive	Creating	**Design** of welded connections.
Cognitive	Creating	**Design** of compression members.
Cognitive	Creating	**Design** of column base and footing.
Cognitive	Creating	**Design** of Tension members
Cognitive	Creating	**Design** beams and Gantry Girders

Module 1: General Considerations

Module Contents

- Introduction to steel as a structural material.
- Advantages and disadvantages of steel.
- Structural Steel Stress strain curve for mild steel. Rolled steel sections. Loads. Permissible stresses.
- Working stresses. Factor of safety. Minimum thickness of structural members. Design Methods.

Module 2: Simple Connections-Riveted, Bolted and Pinned Connections

Module Contents

- Introduction, Riveted connections, Bolted connections, Pin connections. Type of joints and numerical on finding strength in various connections

Module 3: Simple Connections- Welded connections

Module Contents

- Introduction. Types. Symbols. Welding process. Weld defects.
- Permissible stresses. Design of butt welds. Design of fillet welds.
- Design of intermittent fillet welds. Fillet weld for truss members. Plug and slot welds.Distortion of welded parts. Inspection of welds. Fillet weld Vs butt weld. Welded joints Vs Riveted joints.

Module 4: Design of Compression Members

Module Contents

- Introduction. Effective length. Slenderness ratio. Column design formula.
- Types of sections. Assumptions. Design of axially loaded compression members.
- Built up columns (latticed columns) Lacing. Batten.
- Compression members composed of two components back to back.
- Encased column. Eccentrically loaded columns. Splices.

Module 5: Column bases and Footings

Module Contents

- Introduction. Types of column bases.
- Slab base. Gusset base. Welded column bases.
- Design of hold down angles and base plates.
- Grillage footing.

Module 6: Tension members

Module Contents

- Introduction. Types of tension members. Permissible stresses. Slenderness ratio. Net sectional area.
- Design of tension member. Lug Angles. Splices. Gusset plate.
- Use of Steel Table for selection of desired section.

Module 7: Beams and Gantry Girders

Module Contents

- Introduction. Types of sections.
- Lateral stability of beams. Bending stress. Bearing stress. Shear stress.
- Deflection.
- Web Buckling.
- Web Crippling.
- Diagonal buckling.
- Design of laterally supported beams.
- Design of laterally unsupported beams. Lintels. Purlins.
- Encased beams. Beam bearing plates. Castellated beams.
- Effect of holes in beams. Shear connectors.
- Introduction to Gantry girders.

Learning Resources / References :

IS Codes:

- IS 465: 2000.
- SP-16
- SP-34

Recommended Books:

- Steel Structures Volume I &II by B. C. Punmia;.
- Reinforcement Concrete Design, Tata McGraw Hill, New Delhi. By S. Unnikrishna Pillai & Devdas Menon
- Structural Design and Drawing, Reinforced Concrete and Steel, University Press (India) by N.Krishna Raju
- Design of steel structures by S.K. Duggal.
- Design of Steel Structures by P.C.Varghese.
- Prestressed Concrete Design and Construction by James R. Libby- The Ronald Press Company.
- Prestressed Concrete by N.Krishna Raju - Tata McGraw Hill, New Delhi.

SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

BACHELOR OF ARCHITECTURE
PROGRAMME CURRICULUM
JULY 2016

8th SEMESTER

SUBJECTS OFFERED

8th SEMESTER										
S.No.	SUBJECT CODE	SUBJECTS	L	T	P/S	CREDITS	MARKS	SEMESTER EVALUATON (WR/VV/TP)		
	SESSIONAL SUBJECTS									
1	BARC - 08001	Professional Training	-	-	-	30	3000	WR	VV	--
	TOTAL CREDITS		30							
	TOTAL CONTACT HOURS		-							

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Professional Training

SEM	Course No.	Course Title	Credit	L	T	P/S
08	BARC-08001	Professional Training	30			

Course Overview:

- The aim of the 'Professional Training' is to enable the students to gain the kind and range of practical experience which will prepare them for their likely responsibilities, immediately after qualifying B. Arch. Course.
- The trainee student has the responsibility to use his/her own initiative in making the best use of the opportunities which he gets during training period and prepare himself/herself for profession. The core of the professional training is architectural one. Student is expected to get well worse with the realm of architectural discipline ranging from generation of idea, preparation of drawings to the final execution of design on site.
- A Training Manual shall provide the details of the expected outline of work and other procedures.
- **Mandatory Requirements:** Student shall have to undergo Professional Training for a period of at least 24 Weeks in an establishment approved by the Training & Placement Cell to become eligible to appear for final viva-voce.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understand, Apply	To **understand** and **apply** the professional aspects of an architecture office/company and the multiple issues in conception, preparation and execution of project on a site.
Affective	Receiving	To be aware of or **sensitive** to the existence of certain ideas, material, or phenomena and being willing to tolerate them.
Affective	Organization	To be able to **formulate** and theorize the principles into practices.
Affective	Characterization	To be able to set practises to act consistently in **accordance with the values** he or she has internalized.
Psychomotor	Adaptation	To develop skills that helps to **adapt** to fit special requirements.
Psychomotor	Origination	To be able to **design** for situation specific problems.

Module 1: Nature of works expected to be done during training

Module Contents

The architect may expose the trainee to difference aspects of professional practice. The task may include the following but not necessarily containing all-

- Preparation of:
  - Sketch designs, presentation drawings etc.
  - Municipal drawings according to the byelaws.
  - Workings drawings and details.
  - Estimates, bill of quantities & specifications.
- Discussions with:
  - Clients
  - Structural Consultants
  - Services Consultants
- Inspection and management of site:
  - Preparation of Models, perspectives and photographs
  - Preparation of Reports, progress charts etc
- Other administrative works

Module 2: Content of the training report

Module Contents

Following contents will be followed for both intermediate and final submissions:

After completion of practical training, the trainee is required to submit the following in a hard copy. Training report should contain:

- Office profile
- Listing of current project being undertaken
- Project wise details of work undertaken by student
- Trainee's own assessment and experience about office, working, projects etc.

All projects listed in the report should compulsorily correspond with the list of projects mentioned in the monthly log. Copies of drawing shall be attached as annex to support the content of the report. The drawing prints shall be obtained with the permission of the office and stamped/sealed by the 'Supervisor'/Head of the firm/office.

Module 3: Critical Appraisal of a building of national/International importance -1

The trainee is required to write a report choosing any building that has been designed/ executed by the company/ firm, she / he is working for internship. This can be done through secondary research/data collection.

The report should contain:

- Explanation/ Justification for the choice of the project.
- Fact file of the project- discussion on location, client profile, context (physical, cultural) and legal bindings.
- Remarkable features that make the building / complex noteworthy.
- Trainee's own assessment and experience about the same.
- References used in preparation of the appraisal.

Module 4: Critical Appraisal of a building of national/International importance-2

The trainee is required to write a report choosing any building that is present in the city/ town where she / he is working for internship. This needs to be done with primary study and user experience study. This allows the student to choose structure of heritage values.

The report should contain:

- Explanation/ Justification for the choice of the project/ built structure
- Fact file of the project- discussion on location, client profile, context (physical, cultural) and legal bindings.
- Remarkable features that make the building / complex noteworthy/ award winning/ popular.
- User experience and the design comparison.
- Trainee's own assessment and experience about the same.
- References used in preparation of the appraisal.

ASSESSMENT

- Students are required to submit 2 intermediate reports supported by an intermediate weekly log.
  - 30 marks of mid-term evaluation are based on all these.
- The performance of the student in the viva- voce examination will be conducted by a panel of internal and external examiners and a written test- 40 marks of End Semester Examination
- The qualitative assessment grading done by the office in the 'Evaluation Sheet of Trainee' would be quantified for an assessment of 15 marks of internal assessment.
- The Final report compiled during the entire training period would account for internal assessment and would be required to be submitted one week prior to the conduct of End Semester viva-voce Examination. Also final log sheet and confidential training report to be submitted at the same time. This will be considered as Continuous progression evaluation.

SCHEME OF ASSESMENT				Evaluation type
Midterm-total (30% marks)	**10% marks**	**15% marks**	**5 %marks**	
	Critical appraisal of a building of architectural importance designed by the firm/ company that the student is undergoing training. (secondary data)	Critical appraisal of a building of architectural importance in the city/district of the place of training.(Primary study)	Intermediate report of the Log sheet	Internal
End term-(40% marks)	**20% marks**	**20% marks**		
	Grand viva on training port folio.	Written exam- based on knowledge of professional training.		external
Continuous progression (30 %marks)	**5% marks**	**10% marks**	**15% marks**	
	Log sheet	Confidential Training report from training org.	Training portfolio+ Site visit report	internal

TYPE OF OFFICE/ ORGANIZATION

While choosing office for training, students shall keep the note of following:

- In case of proprietorship firm, THE PROPRIETOR SHALL BE AN CoA REGISTERED ARCHITECT.
- In case of 'Partnership'/'Private Limited firms, at least one of the partner/ director shall be an architect, and the firm shall have at least one or more architects as Partner/ director/employee/ associate.
- In case of a 'Public-sector'/State or Central Government office/academic institute or a multi- national organization, there shall be a separate wing for architectural consultancy works.
- The said firm/office/organization should be at least 3 years old.
- Apart from the list of architects/firm, suggested list of organisations may include Government colleges/Institutions, State Town and Country Planning Boards, Urban Development Authorities, State Housing Boards, Municipalities, Municipal Council and Municipal Corporation where a separate wing for architectural consultancy works exist.

Learning Resources / References & Learning Strategy

- Training manual

SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

BACHELOR OF ARCHITECTURE
PROGRAMME CURRICULUM
JULY 2016

9th SEMESTER

SUBJECTS OFFERED

9th SEMESTER										
S.No.	SUBJECT CODE	SUBJECTS	L	T	P/S	CREDITS	MARKS	SEMESTER EVALUATON (WR/VV/TP)		
	SESSIONAL SUBJECTS									
1	BARC - 09001	Architectural Design - IX	2	0	10	12	1200	--	VV	TP
2	BARC - 09003	Advanced Building Techniques	1	1	1	3	300	WR	VV	--
2	BARC - 09005	Seminar Leading to Thesis	1	0	2	3	300	--	VV	--
3	BARC - 09007	Flexible Elective-III	0	0	1	1	100	--	VV	--
	THEORY SUBJECTS									
1	BARC - 09002	Landscape Architecture	2	0	1	3	300	WR	VV	--
2	BARC - 09004	Conservation	2	0	1	3	300	WR	VV	--
3	BARC - 09006	Inclusive Design	2	0	1	3	300	WR	VV	--
4	BARC - 09008	Common Pool Elective	2	0	0	2	200	WR	--	--
	TOTAL CREDITS		30							
	TOTAL CONTACT HOURS		30							

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Architectural Design

Sem.	Course No.	Course Title	Credit	L	T	P/S
09	BARC-09001	Architectural Design - IX	12	2	0	10

Course Overview:

- The objective of the design studio is to expose the students to Urban scale problems and to enable them to visualize the contextual part of a built form. They need to understand, as to what goes beyond the premise of a single building or an area and where its boundaries merge into surrounding built form with different land uses and activities.
- The studio problem therefore will focus on study and intervention within areas that have the context of design issues like, pedestrian and traffic movement, mixed activities etc. and have the scope of redevelopment.
- The design problem of Urban design scale is to be introduced, example; Redesigning of existing Urban area by studying and identifying the problems associated with it. The project would be a medium sized urban design intervention.
- The design solution would address issues like demography, market value, land use patterns etc. Other design issues are the detailing of open and built areas after studying human and movement patterns.
- The project should be substantiated by detailed site surveys and reading about urban design principles.
- Parallel subjects would give assignments connected with the current design exercise(s) as part of their course work

Course Outcomes:

Domain	Category	Outcome
Cognitive	Applying	**Apply** the experience gained during the training semester in current design projects
Cognitive	Analyzing	To **compare** the built and un-built environment around.
Affective	Responding	**Organize** to work in a team.
Cognitive	Analyzing	**Plot** an appropriate program for a project.
Affective	Responding	**Formulate** and **Highlight** the issues. .
Affective	Valuing	**Justifies** the environment for sensitivity.

Module 1: identify an Area with the Given Objectives

Module Contents

- Pilot survey of an area to identify the project.
- Survey the existing urban environment.
- Visualize with objectives

Module 2: Carving the study area

Learning Resources / References & Learning Strategy

- Local Master Plans or Development Plans.
- Development control regulations.

Module Contents

- Delineate the study area.
- Collect initial data.
- Prepare brief questions for responses.
- Reading the area for commonalities.
- Take response from the users.

Module 3: Presenting the collected data

Module Contents

- Mapping of collected data using techniques and methods.
- Explain images relevant to the objectives.
- Use of both qualitative and quantitative data.
- Filter data for relevance and use.

Module 4: Analysing the collected information

Module Contents

- Co-relating the various data for interrelationship.
- Analyzing interrelationships of various identified factors.
- Examining the data for overall understanding of the information.
- Using different methods for analyses.
- Micro-level assessment of the study areas.
- Prepare activity wise layers.

Module 5: Drawing inferences for interventions

Module Contents

- Picking up issues for addressing.
- Thinking about developing sensitive responses to the identified issues.
- Take case examples for better understanding (Readings through books or studying similar projects undertaken elsewhere)
- Prepare models for spatial analysis.
- Prepare quantitative data for existing and future proposals.

Module 7: Formulation of the design programme and strategies for intervention

Module Contents

- Prepare the vision statement.
- Phasing of the project.
- Before and after images.
- Public private participation.
- Implementation of the design solutions.

Learning Resources / References & Learning Strategy

- Graphics in Urban design by Ballly Meeda, Neil Parkyn and David Stuart Walton.
- Responsive Environments by Ian Bentley.
- Local Master Plans or Development Plans.
- Development Control Regulations- as per requirements.
- Relevant case examples of Designed or executed projects.

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Subgroup: Techniques

Sem.	Course No.	Course Title	Credit	L	T	P/S
09	BARC-09003	Advanced Building Techniques	3	1	0	2

Course Overview:

Construction industry is very dynamic with new technologies constantly replacing the older ones and the same techniques being adapted for newer applications. The wide range of magnificent structures / buildings designed by architects and their team of consultants are physically realized through these construction systems only. There are specific requirements / implications on design & construction process associated with each of these technologies. Knowledge of these systems will help these to-be architects to consider appropriate construction technologies while designing and also in dealing with other professionals in the field.

- This course is designed to familiarize the students with latest construction technologies and their integration with architectural designs as they have already completed all their lessons in conventional construction systems.
- Construction equipment has revolutionized our execution speeds so it is pertinent to discuss the different types of construction equipment being used currently in the construction industry and the various issues associated with them.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Comprehension	**Explain** different types of formwork systems available in the market and their implication on design / construction process.
Cognitive	Application	**Apply** their knowledge of formwork systems to choose the appropriate system for a given situation.
Cognitive	Knowledge	**Discuss** the current trends in concrete technology.
Cognitive	Comprehension	**Explain** different types of structural systems available for the construction of large span structures & high-rise buildings and their integration with architectural designs.
Cognitive	Comprehension	**Discuss** the importance of mechanization in construction industry and the associated issues.
Cognitive	Comprehension	**Summarize** the application of modularization and mass production in construction industry.
Cognitive	Comprehension	**Understand** the nuances of timber as a construction material for contemporary buildings.

Module 1: Formwork Systems

Module Contents

- Concrete Formwork: An Introduction
- Integrated Concrete / Formwork Life Cycle
- Horizontal Formwork Systems
- Vertical Formwork Systems
- Selection Criteria for Formwork System

Module 2: Concrete Technology

Module Contents

- Concrete: Past, Present and Future.
- Concrete Admixtures.
- Concreting under extreme conditions.
- Ready Mix Concrete.
- Application specific varieties of concrete.

- Quality Control in Concrete Construction.
- Defects and repairs in concrete.

Module 3: Long Span Structures

Module Contents

- Introduction to Long Span Structures.
- Structural Systems for Long Span: their application in buildings and associated issues.
- Pre and post Tensioning.
- Segmental Construction.
- Composite Construction.
- Pre-engineered Construction.

Module 4: High Rise Buildings

Module Contents

- Introduction.
- Evolution of High Rise Buildings.
- Structural Systems and their integration with architectural designs.
- Service Installations in High-rise buildings.
- Construction related issues.

Module 5: Construction Equipment

Module Contents

- Evolution of Heavy Construction Equipment.
- Different types of Construction Equipment.
- Estimating Productivity.
- Introduction to Replacement Models.
- The Buy, Lease or Rent Decision.
- Construction Equipment Site Safety.

Module 6: Miscellaneous Topics

Module Contents

- A suggestive list of miscellaneous topics can include:
  - Constructability / Build-ability issues.
  - Modular Coordination and its application in construction.
  - Factory Line Production.
  - Reinforced Earthwork.
  - Advanced Timber Construction.
- Future Trends in Construction Technology.

Learning Resources / References & Learning Strategy

- Concrete Technology by Neville.
- Concrete Technology by A.R. Santhakumar.
- Concrete Formwork Systems by Awad S. Hanna.
- Building Structures Illustrated: Patterns, Systems, and Design by Francis D. K. Ching.
- Construction technology for tall buildings by M. Y. L. Chew, Michael Chew Yit Lin.
- Construction Equipment Management for Engineers, Estimators and Owners by Douglas D. Gransberg, Calin Popescu, Richard C. Ryan.
- Construction Planning, Equipment and Methods by Robert Peurifoy, Clifford J. Schexnayder, Aviad Shapira.

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Elective

Sem.	Course No.	Course Title	Credit	L	T	P/S
09	BARC-09005	Seminar Leading to Thesis	3	1	0	2

Course Overview:

The studio emphasizes on the integrated approach. The students are required to integrate the learning of the previous two Seminars to establish the research component that leads to thesis.

Emphasis of the studio is to enable students to;-

- Raise clear and precise questions, Use abstract ideas to interpret information gathered. Able to conclude with good justification. Test the conclusions against relevant criteria and standards.
- Gather, assess, record and apply relevant information and incorporate relevant study in to document form as a report.
- Make precise power point presentation of the study and conclusions and gain the ability to criticize and analyze the case studies to reach conclusion.
- Students will apply the learning from the previous semesters to research a subject area through readings; learn description, analysis and synthesis of readings; citation of authors in their writing; and plan a study and write a paper based on literature review.
- Through the course, the students will be capable of identifying the research area that will enable them to undertake a Thesis project in the forthcoming semester.

Course Outcomes:

Domain	Category	Outcome
Affective	Receiving	**Identify** research papers published in Journals for a study
Affective	Organization	**Organize** a study based on literature survey
Affective	Organization	**Identify** research methods for study
Affective	Organization	**Identify** area of research for thesis
Affective	Organization	**Apply** research methods in case study
Psychomotor	Articulation	**Present** paper in a seminar
Affective	Valuing	**Practice** Citation
Affective	Valuing	**Develop** ethics of publication

Module 1: Introduction to the course and discussion on the objectives.

Module Contents

- Recapitulation and discussion of methods of research :Discussion of research methods, understanding the applicability of various techniques of architectural research
- Learning from examples and group Presentation.

Module 2: IDENTIFICATION OF RESEARCH AREA AND GAP

Module Contents

- Identify the broad study area for thesis based on literature review and case study, and its oral and visual presentation.
- Interpretation drawings, visual presentation techniques with info-graphics.
- Literature review and identification of research area and stating the research question.
- Time-work schedule
- Presentation on-Selection of topic, reason for selection, justification, synopsis

Module 3: DEVELOPING A STRUCTURAL FRAMEWORK FOR THE SEMINAR

Module Contents

- Discussion on the methodology-The types of data collection- primary and secondary
- Site/ case studies to be conducted
- Literature Case study and documentation, review of case study; usefulness of case study to the selected topic; conclusion from case study.
- Probable study/ research outcome
- Draft chapterization

Module 4: CONTENT DEVELOPMENT

Module Contents

- Detailed study and finalization of research parameters.
- Conduction of research- comparative study/ field study/qualitative data collection/ questionnaire survey.
- Live case study/survey/ direct observation etc; and documentation, review of case study, usefulness of case study to the selected topic; conclusion from case study
- Discussion on the raw data and final chapterization
- Report writing.
- Identifying Live/ hypothetical architectural Thesis scopes within the study area.
- Exercise on synopsis writing based on the same research area.

Module 5: DATA PROCESSING AND OUTCOME OF RESEARCH

Module Contents

- Results and discussion – completion of the report writing with proper citation and referencing.
- Discussion on IPR.
- Power point presentation on the actual topic based on conclusions from case studies and research; preparation of report based on research conducted under various heads
- Preparation and presentation of Synopsis for Architectural thesis to be taken in the next semester.

Learning Strategies

- Warm-up exercise/ literature review (group or individual)
- Discussion on reading material- hardcopy/ online materials, articles, papers, journals and writing individual review.
- Group discussion and debates
- Visual and oral presentation.

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Elective

Sem.	Course No.	Course Title	Credit	L	T	P/S
09	BARC-09007	Flexible Electives -III	01	0	0	1

Course Overview :

The objective of the flexible elective is to help students acquire knowledge by direct involvement in diverse form of outreach programs. This would enable students to explore possibility of taking courses not regularly offered in B.Arch curriculum. The outreach programs can be in the form of Demonstrative workshops, Summer/Winter Schools, Paper/poster Presentation, Short courses, Certified Online courses, GIAN workshops, Faculty led workshops, Student competitions (eg, NSDC), Integral studios and Practical training to acquire skills in various creative fields which contributes to the profession of architecture.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	To **comprehend** the knowledge/ allied and multidisciplinary skill.
Cognitive	Understanding	To **explain** the learnt skill/ knowledge and its link to architecture in a forum.
Psychomotor	Applying	To **demonstrate** the learnt skill/ knowledge
Affective	Receiving	To **identify** area for a study
Affective	Characterization	To **resolve** the domain of learning and internalize it.

Module 1: Exploration and identification of Creative Fields

Module Contents

- To explore allied disciplines, this will contribute to the profession of Architecture. The creative fields can be like any of the listed below:

o Product Design
o Photography
o Building construction Techniques
o Graphic Design
o Textile Design
o Arts & Crafts (eg. Stone art, Bamboo, Ceramic, Origami, Calligraphy ,etc)
o Video/ Film making
o Animation
o Research Paper writing
o Advanced Computer Application courses
o GIS
o Architectural Journalism

- This is just a suggestive list. The students are free to explore other allied areas which should be approved by the faculty co-coordinator.

Module 2: Acquiring the skill/ knowledge

Module Contents

- To undergo the coursework/workshop
- To document the process of the course undergone
- To prepare a report/ portfolio of the work done

Module 3: Demonstration of the acquired skill/knowledge

Module Contents

- To demonstrate the learning's of the course.
- To present the work in a forum

Criteria for choosing the elective:

- For workshops- Minimum number of days should be 1 week
- Courses opted for should be certified by recognized universities
- For Architectural competitions, the work will be evaluated and credited by a team of experts .Maximum persons in a group should be 4. (or as decided by the subject coordinator)
- For paper presentations/ publication in journals, magazines etc, maximum number of students in a group would be 2. (or as decided by the subject coordinator)
- For all the above, prior discussion, selection and sanction of the type/ scale/mode of exercise to be adopted need to be done with the subject coordinator (s).
- It is required to establish connection to Architecture.

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Architectural Theory

Sem.	Course No.	Course Title	Credit	L	T	P/S
09	BARC-09002	Landscape Architecture	3	2	0	1

Course Overview:

The course is designed to make the students understand the role of landscape architecture in the creation of better environments. This course shall have a direct application in the design studio of the same semester as well as in the Thesis.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	**Recognize** the various methods of a scientific landscape analysis with due integration of the MEP
Cognitive	Remembering	**Identify** the historic landscape patterns
Cognitive	Remembering	**Identify** the development processes and cycles in the urban landscapes
Cognitive	Remembering	**Recognizes** how it has been done in the past along with present state of art
Cognitive	Apply	**Understand** the role of urban biodiversity
Cognitive	Apply	**Conduct** a Landscape analysis and evaluate it with required functions
Cognitive	Apply	A **knowledge** base to deal with complex urban and human induced landscape design issues.
Affective	Valuing	**Develop** a site plan with landscape design and relate with environment and ecology

Module 1: OVERVIEW OF THE LAND DEVELOPMENT PROCESS

Learning Objectives

To learn to design landscapes with due understanding and integration of the modern and contemporary services and functions along with the scientific functions of the land

Module Contents

- The different layers of scientific landscape information: geology, geomorphology, hydrology and geo hydrology
- Role of modern and contemporary functions, transportation and services (MEP)
- Analysis and synthesis of the layers
- Arriving at inferences and the base map
- Application of inferences through various examples, comprehensive planning and zoning

Module 2: THE HISTORIC LANDSCAPE PATTERNS

Learning Objectives

To learn to read the land through the imprints left by history

Module Contents

- A comparative study of the major traditions of landscape design in the east and the west; Historical landscape garden styles of India and the world; Chinese, Buddhist, Islamic, European etc.

- Reading the historic landscape patterns
- Self-organizational landscape patterns
- Complex landscape patterns/ human induced
- The fragmented landscapes
- Developing an understanding with Examples, Historic and archaeological assessments
- Landscape heritage and conservation
- Historical Landscape assessment techniques

Module 3: Landscape Ecology and Processes

Learning Objectives

- To understand landscape ecology and process
- To understand the need for urban bio-diversity for better environments.
- To learn how to generate and sustain urban biodiversity.

Module Contents

- Landscape ecology, concept of ecosystem, eco regions, bio geographic zones, landscape structure, Patch, corridors and matrix
- Ecological urbanism; Recent research and the historical overview
- Ecological planning and design
- Urban biodiversity, Examples of urban biodiversity and its role in arriving at better urban environments.
- Landscape analysis as a tool for the scientific management of urban biodiversity

Module 4: INFRASTRUCTURE ENHANCEMENTS AND THE GREEN LANDSCAPE RATING SYSTEMS

Learning Objectives

To learn to develop and plan large sites with minimum or no negative impacts on the environment

Module Contents

- Infrastructure enhancements, environmental regulations, environmental site assessments
- Storm water management, floodplain studies, grading and earthwork, wastewater collection, treatment, erosion and sediment control
- An overview of the landscape rating systems, green landscape rating system

Module 5: DESIGNING WITH PLANTS

Learning Objectives

- Identification of plants
- To understand plant ecology
- Ability to design with plant

Module Contents

- Plant ecology and processes: aquatic plants, terrestrial plants
- Climatic adaptation in plants
- Classifications in plant kingdom
- Ecological sensitive plantation
- Spatial principles of planting design
- Planting techniques and maintenance

Module 6: LANDSCAPE ARCHITECTURE AS A PROFESSION

Learning Objectives

To understand the role of a landscape architect in the profession

Module Contents

- Landscape architecture profession
- Scale and Types of projects

- Types of drawings used in land development, samples of landscape architecture drawings, Contract document and specifications
- Site visits with landscape architects
- Recording of the site experiences

Learning Resources / References & Learning Strategy

The learning strategy used shall be live site studies through observation and measured documentation, recording of observations through drawings; the students shall be exposed to real site conditions for understand the scale, vehicular/ machinery movements, vegetation, microclimate, MEP incorporation, etc; along with class lecture cum demonstrations and reading relevant literature.

Learning Resources / References & Learning Strategy

- Landscape architecture in India A reader by Prof Shaheer, Geeta Wahi Dua
- Time saver standards for landscape architects
- Trees of Delhi/ Central India by Pradip Kishen
- Ornamental Plants and Garden Design in Tropics and Subtropics (2 vols) by T.K. Bose

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Architectural Evolution

Sem.	Course No.	Course Title	Credit	L	T	P/S
09	BARC-09004	Conservation	3	2	0	1

Course Overview:

This course gives a brief introduction to the subject of Architectural Conservation. It discusses the history, theory and best practices in Architectural conservation. Moving from basic theories, the course touches upon the technical aspects and ethics of conservation. The course culminates with a module on sensitising the students of architecture towards designing in historic environments.

Course Objectives:

- Explore the history, philosophy and science of architectural conservation through lectures and seminar discussions.
- Encourage appropriate methodologies and tools for recording, documentation and inventorying of heritage structures.
- Develop sensitivity to design in heritage environment.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remembering	To **understand** the philosophy and science of architectural conservation
Cognitive	Remembering	To **learn** the appropriate methodologies and tools for recording, documentation and inventorying of heritage structures,
Cognitive	Remembering	To **acquire** skills for documentation photography, surveys, research etc
Cognitive	Analyzing	To **apply** suitable methodology with reference to given context
Cognitive	Analyzing	To **critically evaluate** and make assessment of heritage components
Cognitive	Creating	To **design** in a heritage context
Affective	Valuing	To **demonstrate** respect for built and cultural heritage

Module 1: INTRODUCTION TO ARCHITECTURAL CONSERVATION

Module Contents

- Definition of Conservation and its socially accepted Meanings.
- Why Conservation? Justification for conservation.
- Development of Theory of conservation and various charters of International importance like Venice charter, Burra charter, Bombay Heritage Act, etc.
- Concepts of Values, Significance, Authenticity and Integrity.
- Ethics in Conservation.

Module 2: RESEARCH IN CONSERVATION

Module Contents

- Importance of Research in conservation.
- Sources of information like books, archival photographs and maps, folklores, mythology, oral tradition and memories.
- Structuring and interpretation of collected information.

Module 3: CRITICAL ANALYSIS OF HERITAGE COMPONENTS

Module Contents

- Understanding the concepts of Stylistic Analysis
- Understanding the Scales of various heritage components: Buildings, Areas, Towns, Region (Local, National, International)

Module 4: DOCUMENTATION

Module Contents

- Introduction to Heritage Database and Surveys for conservation
- Listing and Inventories
- Measured Drawing: Techniques of Measurement, Drawing and Presentation
- Photographic Documentation

Module 5: DEGREES OF INTERVENTION IN HISTORIC BUILDINGS AND MONUMENTS

Module Contents

- Prevention of deterioration
- Preservation of the existing state
- Consolidation of the fabric
- Restoration
- Rehabilitation
- Reproduction
- Reconstruction

Module 6: DECAY AND REMEDIES

Module Contents

- Introduction to Decay in Cultural property, Materials and Structural failures
- Internal and External environment of historic buildings
- Climatic causes of decay
- Botanical, biological and microbiological causes of decay
- Insects and other pests as causes of decay
- Man-made causes of decay

Module 6: DESIGNING IN HISTORIC CONTEXT

Module Contents

Concepts of :-Imitation,Inspiration,Innovation,Influence,Evolution,New Design.

Learning Resources / References & Learning Strategy

- Conservation of Historic Buildings by Fielden,Bernard, 2003, Architectural Press.
- Guidelines for Conservation by Fielden,Bernard,1989, INTACH, New Delhi.
- Historic England, Practical Building Conservation: Conservation Basics, 2013, Routledge.
- Contemporary Theory of Conservation by Salvador Munoz-Vinas, 2005, Elsevier.
- Recording, Documentation, and Information Management for the Conservation of Heritage Places- Guiding Principles by Letellier, Robin, , 2007, Getty Conservation Institute. Los Angeles.

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Ethics

Sem.	Course No.	Course Title	Credit	L	T	P/S
09	BARC-09006	Inclusive Design	3	2	0	1

Course Overview:

Inclusive design is an introduction to the concepts of accessibility and universal design with a particular focus on the implications of ability and dis-ability on usability of the built environment; spaces, buildings, infrastructure and interfaces. The student will learn how to apply this knowledge in architecture, landscape architecture, interior design and planning. The interdisciplinary collaboration with disability studies, rehabilitation studies and social science research will provide students with an opportunity to learn and develop wider understanding about the subject.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Remember	**Define** inclusive design with a particular focus on the implications of ability and dis-ability on usability of the built environment; spaces, buildings, infrastructure and interfaces.
Cognitive	Remember	**Describe** the standards, theories, legislation and principles of accessibility and universal design.
Cognitive	Understand	**Critiques** interdisciplinary connect with disability studies, rehabilitation studies and social science research.
Cognitive	Analyze	**Distinguish** between different concepts of accessibility and universal design.
Psychomotor	Evaluate/ manipulate	**Review** the condition of existing environment for universal access and suggest measures to address those.
Affective	Articulation	**Apply** this knowledge in architecture, landscape architecture, interior design and planning.

Module 1: BASIC CONCEPTS

Module Contents

Knowledge of human ability relevant to design problems in home, workplace, infrastructure and community environments.

Module 2: EVOLUTION OF CONCEPTS OF ACCESSIBILITY AND UNIVERSAL DESIGN

Module Contents

An understanding of the evolution and limitations of Accessible Design, and differences between Accessible and Universal Design.

Module 3: ACCESSIBILITY STANDARDS IN EXTERNAL AND INTERNAL ENVIRONMENTS

Module Contents

Types of disability, Devices and Controls, Defining Architectural design requirements, Classification of Buildings and Access provisions. Design Elements within the buildings; Site planning, parking, approach to plinth levels, corridors, entrance and exit, windows, ramps, stairways, lifts, toilets, signage, guiding and warning systems, floor finishes and materials. Design Elements Outside the building; kerb at footpath, road crossing, public toilet, bus stop, telephone booth, signage.

Module 4: INTERNATIONAL THEORIES OF UNIVERSAL DESIGN
Module Contents Understanding Principles of Universal Design that enable usability and inclusion across the spectrum of age, size, gender, ability and conditions, and contextual derivation of Universal Design Principles in India.
Module 5: ACCESSIBILITY CONSIDERATIONS IN BUILDING TYPOLOGY
Module Contents Provisions in residential buildings, auditorium, parks, restaurants, railway stations etc. Best examples and case studies in Universal Design practice.
Module 6: ACCESS AUDIT
Module Contents Access Audit; definition, purpose and method, retrofitting techniques for barrier free environment.
Module 7: ACCESSIBILITY LEGISLATION
Module Contents Understanding legislative framework for practice in India; Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act 1995, Amendments and United Nations Convention for Rights of Persons with Disabilities (UNCRPD).
Module 7: CASE STUDY AND HANDS-ON
Module Contents Hands-on practicum in assessing needs and developing design solutions; a project based on, field research and design to learn how to design for all individuals, regardless of ability.

Learning Resources / References & Learning Strategy

- Mullick, A.,Ostroff, E., Sanford, J., Steinfeld, E., Story, M. And Vanderheiden, G., Center for Universal Design. North Carolina State University,Raleigh, NC. Available at https://www.ncsu.edu/ncsu/design/cud/about_ud/udprinciples.htm
- Universal Design by Goldsmith, S. -(2000) Architectural Press.
- Guidelines and Space Standards for Barrier Free Built Environment for Disabled and Elderly (1998), CPWD, Ministry of Urban Affairs and Employment, India.
- Persons with Disabilities Act. (1995). Government of India. Available at disabilityaffairs.gov.in/upload/uploadfiles/files/PWD_Act.pdf.
- Universal Design Handbook by Preiser, Wolfgang, Editor in Chief; Elaine Ostroff, Senior Editor –McGraw Hill, 2000.
- Enabling Environments by Steinfeld, E., Danford, G. Scott. (1999). Plenum Press, New York.
- Creating Universal Environment by Steinfeld, E., Maisel, J. (2012).. John Wiley and Sons INC, Hoboken, New Jersey.
- The universal design file: Designing for people of all ages and abilities by Story, M. F. (1998).. Available at http://design-dev.ncsu.edu/openjournal/index.php/redlab/article/viewFile/102/56.
- UDIP. (2011). The Universal Design Principles, Abir Mullick, Anjlee Agarwal, Balaram S., Debkumar Chakrabarti, Gaurav Raheja, Haimanti Banerjee, Rachna Khare, Ravi Shankar and Shivani Gupta, National Institute of Design, Ahmedabad, India. Available at http://www.humancentereddesign.org/resources/universal-design-india-principles
- UNCRPD. (2006). Convention on the Rights of Persons with Disabilities at the United Nations and the Optional Protocol. Available at http://www.un.org/disabilities/documents/convention/convoptprot-e.pdf.
- UN-ENABLE. (1982). UN's World Program of Action concerning Disabled persons in 1982, Available at http://www.un.org/disabilities/default.asp?id=23.

- UNESCAP. (2003). Biwako Millennium Framework for Action by the United Nations Economic and Social Council. Available at http://www.un.org/esa/socdev/enable/rights/uncontrib-escap.htm.
- UN-ESD. (1995). World Summit for Social Development held at the Copenhagen in 1995. Available at (http://www.un.org/esa/socdev/wssd/text-version/).
- WHO. (1980). International Classification of Impairments, Disabilities, and Handicaps: ICIDH World Health Organization, Geneva.
- WHO. (2001). Towards a Common Language for Functioning, Disability and Health: ICF The International Classification of Functioning, Disability and Health. World Health Organization, Geneva.
- Inquiry by Design by Ziesel, J. (2006). W. W. Norton and Company, New York.

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Elective

Sem.	Course No.	Course Title	Credit	L	T	P/S
09	BARC-09008	Common Pool Elective	2	2	0	0

Course Overview:

This course gives an opportunity to students to explore allied disciplines and courses for higher studies. The intent is to introduce the students to some specialized aspects of the higher level Architecture/ Planning courses. This would be a vertical grouping of the B.Arch IXth Semester and Masters (III semester) students.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	To **explore** allied disciplines and courses for higher studies.
Psychomotor	Applying	To **demonstrate** special interest skills as per the course taken.
Affective	Organization	To **synthesize** the higher aspects of learning.

Course Description:

The students need to choose any one out of the thirteen electives offered by the common pool of Masters Programme:

Conservation

- Museum Design
- Disaster Management of Cultural Resources

Landscape

- Landscape and City design
- The future cities
- Movement Corridors

Urban Design

- Urban design politics
- Architectural criticism
- City and the arts

Environment Planning

- Water Resource Management
- Energy Auditing and Accounting

Urban Regional Planning

- Urban redevelopment
- Planning for tourism
- Quantitative methods and systems analysis

SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

BACHELOR OF ARCHITECTURE
PROGRAMME CURRICULUM
JULY 2016

10th SEMESTER

SUBJECTS OFFERED

10th SEMESTER										
S.No.	SUBJECT CODE	SUBJECTS	L	T	P/S	CREDITS	MARKS	SEMESTER EVALUATON (WR/VV/TP)		
	SESSIONAL SUBJECTS									
1	BARC10001	Architectural Thesis	4	0	18	22	2200	--	VV	--
2	BARC 10003	Thesis Elective	0	0	2	2	200	--	VV	--
	THEORY SUBJECTS									
1	BARC 10002	Professional Practice	2	1	0	3	300	WR	--	--
2	BARC 10004	Project Management	2	1	0	3	300	WR	--	--
	TOTAL CREDITS		30							
	TOTAL CONTACT HOURS		30							

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

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Subgroup: Architectural Design

Sem.	Course No.	Course Title	Credit	L	T	P/S
10	BARC-10001	Architectural Thesis	22	4	0	18

Course Overview:

Bachelor of Architecture Thesis is the final stage of learning Architectural Design. With the help of a thesis project, students are expected to demonstrate the understanding of a systematic design process which includes identification of project requirements, site study and analysis, case studies, programming, schematic design and Design Development.

It provides the students with an opportunity to culminate the nine semesters of architectural education by demonstrating the body of knowledge and skills gained during their education and the professional training.

The main objective of this exercise is to provide an opportunity to the students to handle a complete design project of their own choice in a practicable manner using their creative ability. This will prepare them for the challenges of the practical world once they graduate.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Creating	**Designs** a Thesis project responsive to the contextual and program requirements.
Affective	Organization	**Combines** the systematic/methodological learning from various stages of study and analysis in design process towards culmination of an informed design.
Affective	Respond	**Communicates** the ideas clearly using writing, verbal and visual presentation.
Affective	characterization	**Demonstrates** self-reliance when working independently
Cognitive	Creating	Integrates ideas with design requirements
Cognitive	Analyzing	**Compares** data and information gathered from Pre-design research
Cognitive	Evaluating	**Evaluates** data and information gathered from Pre-design research and summarizes the information to used for design
Cognitive	Applying	**Applies** various codes, standards and regulations governing the project.
Cognitive	Applying	**Demonstrates** synthesis of creativity and technical knowledge
Cognitive	Applying	**Demonstrate** the ability for decision making required to progress the understanding already developed.
Psychomotor	Precision	**Demonstrate** the ideas clearly using detailed physical Model.

Module 1: SYNOPSIS

Module Contents

The synopsis will be a brief introduction of the proposed thesis / project and has to be submitted by the student at the end of the previous semester.

Module 2: CASE STUDY, SITE ANALYSIS AND AREA PROGRAMMING

Module Contents

- **Case Study**

The students have to conduct literature study and case studies – live & literature, to form a basis for their own design.

- o Literature Review: It includes gathering the relevant standards and other information from all the available sources related to their thesis topics that will help them during the later stages of their thesis programme.

- o Case Studies: The students have to conduct live and literature studies of similar projects. Instead of mere documentation of these projects, information must be collected about the requirements; salient design features clearly stating the positive and negative aspects of the design. Idea of the case study is to form a base for candidates own design.

- **Site Analysis**

The purpose of the site analysis is to record and evaluate information on the site and its surroundings, and to use this evaluation in the design response. The site analysis should identify issues that will influence the design of a development in order to make a considered response to both site opportunities and constraints, to provide a good quality living environment, and respect, acknowledge and improve the character of the area.

- **Area Analysis and Programme**

The students are required to prepare a comparative statement of the various available design standards, areas provided in the various case studies and the area requirements stated in the project brief, so that the area requirements for the various functions / spaces for the proposed building can be finalized. This area programme should be an exhaustive list and will form the basis of the design process to be undertaken in upcoming stages.

Module 3: SCHEMATIC DESIGN

Module Contents

- The students have to express their ideas generated on the basis of the studies (case studies / literature studies / area analysis) conducted so far in the form of conceptual drawings, sketches and models.
- The emphasis during this stage should be on the basic concept explaining the principal ideas / thought process / dream of the student for the project in terms of planning / built form / massing of different components, leading to the design, through sketches / 3D images / block models etc.

Module 4: DESIGN FINALIZATION

Module Contents

- The schematic drawings presented in the previous module needs to be detailed out as per the comments/ suggestions received from the guides and the reviewers.
- The detailed drawings as per the final area programme with due consideration to structural and service requirements of the building needs to be presented at this stage.

Module 5: PRE-FINAL DESIGN

Module Contents

- The students are required to submit the final drawings, views, models, etc. incorporating the comments received in the previous reviews, to be presented before a panel of internal / external reviewers.
- All the submittals should be complete in all respects except their final renderings.

Module 7: FINAL THESIS SUBMISSION

Module Contents

The students are supposed to present all the submittals (drawings, model, report, etc.) complete in all respects as per the comments and suggestions received from thesis guide and various review members before the final review panel for B. Arch. Thesis.

Learning Resources / References & Learning Strategy

- Bachelor of Architecture Thesis Manual
- Lectures on various related topics such as Site study and Analysis, Case Studies, Building bylaws and standards, Area Programming, structure design, Building services, Drafting conventions and Drawing Coordination.
- Tutorial on one-to-one basis
- Supervision by assigned Guide
- Supervision by assigned Guide
- Presentation to External and Internal Examiners
- Supervision by assigned Guide

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Elective

Sem.	Course No.	Course Title	Credit	L	T	P/S
10	BARC-10003	Thesis Elective	2	0	0	2

Course Overview:

This elective is a researchable component with design connection which would help the students to acquire a depth of knowledge about the required design details of their thesis. The students would reflect the learning of this elective through its application in the Thesis Project. The outcome would be predominantly value based and may be evaluated based on the application in design.
The exploration may include a report/ additional sheets on interior design/ landscape design/ service details/ structural details/ cost efficiency of building and other relevant links with the design project.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Understanding	**Summarize** relevant research areas to thesis project
Cognitive	Synthesis	**Formulate** research synopsis and methodology
Psychomotor	Applying	**Demonstrating** various secondary and primary case studies.
Cognitive	Evaluating	**Evaluation** of case studies to infer conclusions.
Cognitive	Evaluating	**Demonstrate** comprehensively the link between the research and the thesis project
Affective	Responding	**Resolve** problems based on acquired knowledge
Affective	Valuing	**Forms** correlation of theories with real life issues

Module 1: INTRODUCTION TO RESEARCH AREAS

Module Contents

- To identify and outline research threads that could be explored in the thesis
- To comprehend and interpret the research component of the thesis.
- To select the most relevant research component.

Module 2: RESEARCH SYNOPSIS AND METHODOLOGY

Module Contents

- To define and outline aims, objectives and limitations of the research area.
- To illustrate appropriate methodology for conducting the research
- To identify and outline appropriate tools and methods for conducting the research.

Module 3: SECONDARY/ PRIMARY STUDIES

Module Contents

- To select and outline relevant literature sources.
- To comprehend and infer best practices available through secondary sources.
- To conduct primary studies relevant to research area.

Module 4: APPLICATION TO THESIS- I

Module Contents

- To outline various parameters for analysis relevant to thesis project.
- To compare and contrast different secondary and primary cases.
- To infer conclusions from analysis.

Module 5: APPLICATION TO THESIS- II

Module Contents

- To recognise and link conclusions to the thesis project.
- To demonstrate comprehensively the application of research area to the thesis project (through report/ additional sheets for electives)
- To evaluate the impact of the research area in the students' specific research project.

Learning Resources / References & Learning Strategy

- Research methods: the key concepts by Hammond, Michael-2013,Routledge, Oxon

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Ethics

Sem.	Course No.	Course Title	Credit	L	T	P/S
10	BARC-10002	Professional Practice	3	2	1	0

Course Overview:

The professional practice in post independent India took a shift primarily because of The Architects Act 1972. This course is to locate architecture profession in the larger milieu of socio-cultural and economic-political world of India. The course will develop attitude towards highest standards of professionalism, integrity, and competence. The larger goal is to appraise the future architects/designers/planners for social responsibility works for peace, environmental protection, ecological building, social justice, and the development of healthy communities.

Course Outcomes:

Domain	Category	Outcome
Affective	Receiving	**Develop the** practice and office management
Cognitive	Remembering	**Identify** and **define** the legal provisions for architectural practice
Cognitive	Analyzing	**Appraise** the morals and ethics in architectural profession
Affective	Receiving	**Acknowledge** the social responsibilities and duties of an architect
Affective	Responding	**Comply** with social norms and responsibilities.
Affective	Valuing	**Defend** and practice professional ethics.

Module 1: LEGALITIES OF PROFESSION

Learning Objectives	Learning Resources / References & Learning Strategy
• To understand the legal system and an architect's role in this system • Assessment of the law and legal principles in a variety of subject areas as well as understand legal procedures and practices.	• Analysis judicial case studies • Study of Bare Acts

Module Contents

- Architectural profession and legalities
- Identify and discuss the provisions of architectural practice in various acts namely, The Architects Act 1972, Labour Laws in India, The Companies Act 2013, The Arbitration and Conciliation Act 1996, Indian Copyright act 1957.
- Conventions and Charters
- Role of Professional Bodies
- History of Architecture Profession in India

Module 2: MORALS AND ETHICS OF PRACTICE

Learning Objectives	Learning Resources / References & Learning Strategy
• Recognize the ethical rules and	• Case studies of various case examples from professional

standards of conduct involved in the architectural practice	bodies

Module Contents

- Code of ethics for architectural practice
- Moral duties of an architect
- Standards of professionalism, integrity, and competence, discussions on provisions of Competition Commission of India
- Intellectual Property Rights
- Ancient Indian texts on duties of architect and architecture profession

Module 3: SOCIAL RESPONSIBILITIES AND DUTIES

Learning Objectives	Learning Resources / References & Learning Strategy
• To make architect respond and an attitude that emphasizes the needs and experiences of people over concerns of form or aesthetics. • To seek alternatives for more just, accessible, and equitable.	• Case studies of various case examples on social issues relating to architectural profession • Book: Professional Practice by Roshan Namawati

Module Contents

- Social responsibilities of profession
- Contributions to non-profit organizations
- Public awareness of important architectural issues
- Inclusive design
- Architecture as an agent of change- socio-economic perspective

Module 4: ARCHITECTURAL PRACTICE AND MANAGEMENT OF OFFICE

Learning Objectives	Learning Resources / References & Learning Strategy
• To equip the students for handling future architectural practice	• Students may choose case offices and present an analytical report on offices structure, managements. • Case studies from various offices in the city as well as across India • Book: Architectural Practice In India by Prof. Madhav Deobhakta and Meera Deobhakta

Module Contents

- Architectural practice and office
- Work Structure of office
- Client management, Human Resource management, Financial management
- Contracts and tenders and Fee Structure
- Architectural practice and building byelaws & national building code

SCHOOL OF PLANNING & ARCHITECTURE, BHOPAL

DEPARTMENT OF ARCHITECTURE

Subgroup: Building Management

Sem.	Course No.	Course Title	Credit	L	T	P/S
10	BARC-10004	Project Management	3	2	1	0

Course Overview:

Construction is a complex activity and the scale and complexity of contemporary construction projects make CPM a prerequisite in every sphere of construction industry. Cost overruns, missed deadlines, quality / safety issues and lack of planning by construction firms leading to loss of returns and customers' / shareholders' trust is widely prevalent in Indian Construction Industry. The situation can only be met by employing effective project management solutions. The role of Project Management in an Architect's professional life can be multifarious depending upon type of consultancy, ownership of firm etc. The most common ones are as follows:

- Office Management: Managing his / her own office and field staff; staffing, allocating space, funds, equipments, etc. and establishing, managing and promoting ones business.
- Design Management: Coordinating with all the stakeholders, consultants and others having a say in design process in order to arrive at a final programme in a timely and efficient manner.
- Project Management: The scope of activities will depend upon the Project Delivery Method deployed but broadly deals with all the activities concerned with the implementation process subsequent to the preparation of design and construction drawings.

Course Outcomes:

Domain	Category	Outcome
Cognitive	Knowledge	**Enumerate** the attributes of a project, phases in project cycle, stakeholders involved and their management.
Cognitive	Knowledge	**Describe** the time, cost, quality, safety and contract management processes involved in a construction project.
Cognitive	Application	**Prepare** project schedule through identification of critical tasks and path in a project.
Affective	Response	**Generalize** the entrepreneurship issues commonly faced by architectural firms in Indian Construction Industry.
Cognitive	Comprehension	**Discuss** the tools and skill-sets required for managing office set-ups.

Module 1: INTRODUCTION TO CONSTRUCTION PROJECT MANAGEMENT

Learning Resources / References & Learning Strategy

- IS 15883: Construction Project Management – Guidelines.
- A Guide to the Project Management Body of Knowledge by Project Management Institute, USA.
- Construction project management: a practical guide to field Construction Management by S. Keoki Sears, Richard Hudson Clough, Glenn A. Sears.
- Construction Project Management: Planning, Scheduling and Controlling by K. K. Chitkara.
- Operations Research by H. A. Taha.

Module Contents

- What is a Project?
- Phases involved in Project life cycle i.e. from inception phase to the Post-construction phase.
- Project Appraisal.

- Project Delivery Methods.
- Various stakeholders in construction industry and their roles and responsibilities.
- Introduction to Project Management Knowledge Areas.

Module 2: PROJECT SCHEDULING

Module Contents

- Preparation of Work Break Down Structures and Sequencing of Activities.
- Resource and Duration Estimating.
- Preparation of Schedules (using CPM, PERT, Gantt charts, precedence diagrams, etc)
- Monitoring and controlling the schedules.
- Computer Applications for preparing and managing Schedules.
- Preparation of schedule for completion / submission of deliverables related to their current design exercise.

Module 3: FINANCIAL MANAGEMENT

Learning Resources / References & Learning Strategy

- Financial Management by Prasanna Chandra

Module Contents

- Functions of Financial Management.
- The Concept of Time Value of Money.
- Techniques of Capital Budgeting.
- Cash Flow Statement: Preparation of cost baselines and their analysis.
- Earned Value Management.

Module 4: MANAGING QUALITY AND SAFETY IN CONSTRUCTION

Module Contents

- Evolution of Quality Management, quality assurance & control and ISO requirements.
- Introduction to concept of quality in building design, construction and project management.
- Tools for Quality Management.
- Introduction to construction site conditions in India.
- Impact of safe working environment on HR performance and their productivity.
- Legal, contractual and other guidelines for construction safety.

Module 5: CONTRACTS AND THEIR ADMINISTRATION

Learning Resources / References & Learning Strategy

- CPWD, MES, FIDIC, JCT, ADB, World bank, etc.: General & Special conditions of contract and standard operating procedures.
- Contracts and their Management by B. S. Ramaswamy.

Module Contents

- Types of contracts.
- Pre-qualification of contractors, Preparation of contract documents, Evaluation of contract bids and Award.
- Alternative Dispute resolution mechanisms.
- Study of CPWD General Conditions of Contract.

Module 6: HR MANAGEMENT

Module Contents

- Organizing work, staffing, delegation and decentralization.
- Human resource managementD managing work groups.
- IT application in office management and procedure: ERP.
- Customer Relationship Management (CRM).
- Entrepreneurship Issues in Indian Construction Industry.

Learning Resources / References & Learning Strategy

- IS 15883: Construction Project Management – Guidelines.
- A Guide to the Project Management Body of Knowledge by Project Management Institute, USA.
- Construction project management: a practical guide to field Construction Management by S. Keoki Sears. Richard Hudson Clough, Glenn A. Sears.
- Construction Project Management: Planning, Scheduling and Controlling by K. K. Chitkara.
- Operations Research by H. A. Taha.
- Financial Management by Prasanna Chandra
- CPWD, MES, FIDIC, JCT, ADB, World bank, etc.: General & Special conditions of contract and standard operating procedures.
- Contracts and their Management by B. S. Ramaswamy.