

School of Planning & Architecture, Bhopal

BACHELOR OF ARCHITECTURE SCHEME OF EXAMINATION

Y E A R 1 (Semester I)

CODE	SUBJECT	CLASSES		END SEMESTER EVALUATION		MARKS	CREDITS	EXAM HRS
		L	T/ ST					
BARC-0101	DESIGN -I	2	6	WR	VV	100	3	6
BARC-0102	BUILDING MATERIALS & CONSTRUCTION -I	2	4	WR	VV	100	2	3
BARC-0103	GRAPHICS-I	2	4	WR	VV	100	1.5	3
BARC-0104	STRUCTRE-I (APPLIED MECHANICS)	2	2	WR	-	100	1	3
BARC-0105	SURVEYING & LEVELLING	1	2	WR	-	100	1	3
BARC-0106	MATHEMATICS	2	-	WR	-	100	1	3
BARC-0107	COMPUTER APPLICATION-I	-	3	-	VV	100	0.5	-
TOTAL		11	21				10	

Y E A R 1 (Semester II)

CODE	SUBJECT	CLASSES		END SEMESTER EVALUATION		MARKS	CREDITS	EXAM HRS
		L	T/ ST					
BARC-0201	DESIGN -II	2	6	WR	VV	100	3	6
BARC-0202	BUILDING MATERIALS & CONSTRUCTION -II	2	4	WR	VV	100	2	3
BARC-0203	GRAPHICS-II	2	4	WR	VV	100	1	3
BARC-0204	STRUCTURE- II	2	2	WR	-	100	1	3
BARC-0205	THEORY OF DESIGN-I	2	-	WR	-	100	1	3
BARC-0206	CLIMATOLOGY	2	-	WR	-	100	1	3
BARC-0207	WORKSHOP PRACTICES	-	2	-	VV	100	0.5	-
BARC-0208	COMPUTER APPLICATIONS-II	1	2	-	VV	100	0.5	-
TOTAL		13	20				10	-

SCHOOL OF PLANNING AND ARCHITECTURE, BHOPAL
SYLLABUS: BACHELORS OF ARCHITECTURE

YEAR ONE SEMESTER ONE

BARC-0101: ARCHITECTURAL DESIGN – I

INTENT:

- Architectural Design is the core subject in architecture thus the main objective of this subject is to make the students familiar with design & the architectural design process.
- To familiarize the students with the basic design elements & principles.
- Sensitizing students to be more observant to their surroundings and promoting it as a basic creative instinct in the students.

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METHODOLOGY:

- Orientation about the profession with the help of Audio/Video presentations.
- Studio lectures.
- Individual/ Group studio exercises.

CONTENTS:

Introduction to Design

Principles of design and elements of design.
Functionality of space and sequential function.
Exploration of patterns with 2 D compositions.
Exploration of form through 3 D compositions.

Study of Anthropometrics:

Exercises to increase perception and sensitivity of the students about space. This can be best understood through one or two short exercises in anthropometrics. Presentations should be made through simple sketches and drawings.
Short exercises in design and layout of personal space, rooms etc.

BARC-0102: BUILDING CONSTRUCTION & MATERIALS -I

INTENT:

Introduction to elementary building construction methods and their applications.

METHODOLOGY:

- Introduction to materials and construction through lectures and studio exercises.
- Site visits to gain knowledge about construction details.
- Introduction to some basic construction methods and elements.

CONTENTS:

Construction

- Basic Tools: Introduction to Basic tools used by masons and carpenters.
- Elementary Carpentry: Different types of common joints.
- Brick Work: Terminology: Bricks, bats and closures

- Bonding: Types of bonds: English, Single and double Flemish
- Offset functions and quoins: right angled and angular quoins, tee and cross-junctions for various thickness, attach and other piers, coping.
- Corbelling, String courses and decorative brickwork.
- Stonework: Stone masonry, dressing, Random Rubble, Coursed Rubble, Ashlar.

Materials

Introduction

Basic building materials like lime, sand, brick, cement, grit, steel, stone etc.

Importance of climate in architecture:

Factors affecting climate. Measurement and recording of elements of climate like solar radiation, temperature, wind, humidity, and precipitation.

Different types of climatic zones and their characteristics.

Macro and microclimate. Application of climatic principles for design of buildings in hot and dry, warm, humid, composite and tropical climates.

Thermal behavior of buildings and materials:

Study of body's heat production and heat loss.

Time lag of different materials for heat transfer.

Thermal comfort, effective temperature, bio-climatic analysis, Isoleths,

Direct and indirect insulation, Reflectivity and emissivity.

BARC-0103: GRAPHICS -I

INTENT:

- Introduction and familiarization with drafting tools and accessories.
- To give basic knowledge of good drafting and lettering techniques.
- To develop comprehension and Visualization of geometric forms.

METHODOLOGY: Studio assignments and lectures. Demonstration of 3D Geometrical objects and their 2D representation on sheets

CONTENTS:

Introduction:

Drawing Instruments and their uses.

Sheet layout and sketching.

Lettering: - Exercises in drafted and freehand architectural lettering.

Lines: Concept and types of lines. Line thickness. Dimension lines.

Scales:

Scales: Engineers scale, Graphical scale and Representation factor (R.F.)

Scales on drawings. Types of scales: Plain scale and Diagonal scale.

Orthographic Projections:

Definition, Meaning & concept. Principles and Methods of projection.

Orthographic projection. Planes of projection.

Four Quadrants. First angle projection. Third angle projection.

Projection of points, lines & planes.

Projections of solids:

Axis perpendicular to the H.P. , Axis perpendicular to the V.P.

Axis parallel to both the H.P. & V.P.

Projection of solids- axis inclined to one reference plane and parallel to other.

Projections of solids with axis inclined to H.P. and V.P.

BARC-0104: STRUCTURE –I (APPLIED MECHANICS)

INTENT:

To understand the basic principles of structural mechanics that would be pertinent to simple design elements.
To also understand the structural behavior of building elements.

METHODOLOGY:

Lectures and computation exercises.

CONTENTS:

Simple stresses and Strains:

Elasticity. Stress. Strain, Types of stress, Elastic limit, Hook's Law, Modulus of Elasticity, Stresses in Composite Bars, Linear Strain, Poisson's ratio, Shear stress, principal stresses and strains.

Center of Gravity:

Calculating Center of Gravity of figures.
Center of Parallel Forces.

Moment of Inertia:

Section Modulus.
Calculation of Moment of inertia by first principle and its application.
Moment of Inertia of Composite sections.

Elements of Static:

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.

Shearing force and bending moments:

Beams.
Shearing force and bending moment.
Shear Force and Bending Moment diagrams of simple cases for concentrated and distributed loads.

BARC-0105: SURVEYING & LEVELLING

INTENT:

- To illustrate the role of Surveying and Leveling in Architecture
- Introduction to the Tools and equipment for Land Surveying.

METHODOLOGY:

Lectures and Practical exercises involving fieldwork and working with survey equipments.

CONTENTS:

Introduction

Introduction to surveying, understanding land topography and its relevance in Architecture.
Types of surveys in practice
Introduction to survey equipments.

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 declination, effects of local attraction. Compass traverse and balancing the closing error.

Leveling

Different types of levels, their temporary and permanent adjustment, leveling staff. Book of the readings and reduction of levels. Errors in leveling.

Curvature and refraction reciprocal leveling profile, leveling cross sections.

Plane Tabling

Equipment and methods. Two points and three points problems.

Contouring

Characteristics of contour lines, direct and indirect methods of contouring and interpolation of contours. Interpretation and preparation of contour maps. Site modeling with total station. Exercises in setting out of building works.

Theodolite Surveying

Theodolite, its temporary and permanent adjustment, measuring of magnetic bearings, horizontal and vertical angles. Theodolite traverse and balancing the closing error.

Tacheometric Surveying

General instruments, different systems of tacheometric measurements, stadia method, Subtense method.

BARC-0106: MATHEMATICS

INTENT: To revise the aspects of Mathematics learned earlier.

METHODOLOGY: Lectures and exercises.

CONTENTS:

a) Differential Calculus

Differentiation and methods of differentiation

Applications to rates of change and small errors

Successive differentiation

Tangents and Normals : Angle of intersection of curves

Radius of curvature in Cartesian coordinates.

Polar coordinates: Angle between radius-vector and tangent

Simple curves tracing and ideas of asymptotes.

Taylor's and Maclaurin'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.

b) Trigonometry:

Complex number: their representation: Argand's diagram addition, multiplication.

De Moivre's theorem and its application to finding nth roots.

Exponential, Logarithmic, circular and hyperbolic functions of a complex variable.

Separation of real and imaginary parts in simple cases.

BARC-0107: COMPUTER APPLICATION-I

INTENT: To familiarize the students with the basic computer use;

- General Historical background of computer development.
- Brief description of various Hardware and Software.
- Basic knowledge of different operating systems i.e. Windows, Unix, Linux etc.

METHODOLOGY:

Brief lectures followed by application in individual lab exercises.

CONTENTS:

Introduction of various software available for documentation, presentation & drawing purposes.

Familiarizing the use of scanners, printers plotters etc.

Introduction of Auto CAD as drafting tool.

Applications of M.S. Office in presentation:

- Microsoft Word
- Microsoft Power Point
- Microsoft Excel
- Adobe Page Maker

YEAR ONE SEMESTER TWO

BARC-0201: DESIGN – II

INTENT:

- Architectural Design is the core subject in architecture thus the main objective of this subject is to make the students familiar with design & the architectural design process.
- To familiarize the students with the basic design elements & principles.
- Sensitizing students to be more observant to their surroundings and promoting it as a basic creative instinct in the students.

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METHODOLOGY:

- Orientation about the profession with the help of Audio/Video presentations.
- Studio lectures.
- Individual/ Group studio exercises.

CONTENTS:

Small design exercises:

Short exercises in design of milk booth, tea stall, shelter in park, bus stop or designing of students own room etc.

Design exercises to be coupled with parallel drafting and drawing exercises to encourage use of the skills of isometric and axonometric, sciography, perspective drawing and rendering techniques for opaque and transparent mediums.

BARC-0202: BUILDING CONSTRUCTION & MATERIALS -II

INTENT:

Introduction to elementary building construction methods and their applications.

METHODOLOGY:

- Introduction to materials and construction through lectures and studio exercises.
- Site visits to gain knowledge about construction details.
- Introduction to some basic construction methods and elements.

CONTENTS:

Construction

- Foundations: Need for foundations, preliminary design criteria. Foundation brickwork and concrete.
- Detail of spread foundation for load bearing walls of various thicknesses.
- DPC: Laying of Horizontal D.P.C.
- Arches: Elementary principles of Arch construction. Definition of various technical terms and Types of Arches. Construction of Brick and Stone Arches.

Materials

- Timber- seasoning of wood, types of wood used in construction.
- Identification of basic woods like teak, sal, sheesham, mango, eucalyptus etc.

BARC-0203: GRAPHICS - II

INTENT:

- To give basic knowledge of good drafting and lettering techniques.
- To develop comprehension and Visualization of geometric forms.

METHODOLOGY: Studio assignments and lectures. Demonstration of 3D Geometrical objects and their 2D representation on sheets

CONTENTS:

Section of Solids:

Section plans, Sections, True shape of a section.
Section of solids (Prisms, Pyramids, Cylinders, Cones, Spheres.)

Development Of Surfaces:

Introduction and Methods of development of surfaces.
Development of lateral surfaces of right solids like Cubes, Prisms, Cylinders.
Method of drawing the development of the lateral surface of a pyramid & Cone.

Sciography:

Introduction/ Meaning of sciography
Projection of sciography in plan and elevations.

BARC-0204: STRUCTURES -II

INTENT:

To understand the basic principles of structural mechanics that would be pertinent to simple design elements.
To understand the structural behavior of buildings.

METHODOLOGY:

Lectures and computation exercises.

CONTENTS:

Stresses in Trusses:

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

Bending stresses:

- Bending equation
- Bending stresses in symmetrical and unsymmetrical sections

Shear Stress: Shear stress distribution in various sections.

Deflection of Beams:

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

Column and Struts:

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

BARC-0205: THEORY OF DESIGN-I

INTENT:

The courses in Design theory aims to evolve a conceptual framework for intelligent appreciation of Architecture and to develop a vocabulary for discussing design ideas.

METHODOLOGY:

The structure of courses consists of set of lecturers and prescribed reading followed by group discussions and seminars.

Introduction

The genesis of indigenous architecture:

The genesis of indigenous architecture, its geographical and cultural sign posts. Evolution of ideals and design principles in modern architecture. Influences governing the formation of attitudes as a prelude to the act of design. The translation of design ideas into architectural expression.

Architecture as socially useful discipline:

The concept of measuring, function, style, type, social purpose and ideology, the relationship of architecture to the sciences, arts, economics and politics. Study of selected writing and buildings in monumental and vernacular scales. Manmade design at all levels including objects of daily use.

BARC-0206: CLIMATOLOGY

INTENT: To familiarize the students with the climatological aspects associated with the Architectural Design.

METHODOLOGY: The concepts of the climatological aspects shall be taught with the help of lectures, practical examples lab exercises.

CONTENTS;

Human Comfort:

Human heat balance and comfort, thermal comfort, heat stress, effective temperature, bioclimatic analysis, individuals' variation.

Climatology:

Tropics, climatic zones, macro climate, elements of climate, sun, temperature, wind, precipitation, and climatological data needed for planning of buildings.

Solar Radiation:

Direct and indirect insolation, types of waves infrared, visible light, ultraviolet, reflectivity and emissivity. Methods of recording sun's position, Radiation gains on various walls and roofs in various seasons. Application of solar change in the design of sun control device. Sun machine and their uses.

Day light:

Glare, colour, amount of light, sky as a source of light, day light factor, effect of size and shape of opening in different planes with and without obstructions, Intensity of light spread, penetration, design and setting of buildings for day light.

Air temperatures:

Factors that influence temperatures, sun latitude, season, land, water, wind, altitude, atmospheric impurities, green open areas, trees and urban areas. Inversion of temperature. Insulation, resistance insulation, capacity Insulation thermal diffusivity, thermal conductivity, heat transmission through building components, time lag, i.e. value AIR heat transmittance co-efficient, scale, temperature.

Wind:

Study of diurnal and seasonal variations, heating and cooling effect, effect of topography, effect of wind on location of industrial areas, airport and other landuses and road patterns. Air patterns around buildings, within buildings, wind eddies, size and position of openings with and without overlays and other architectural elements. Effect of wind on design and siting of buildings

BARC-0207: WORKSHOP PRACTICES

IN TENT:

To equip students with the basic skills necessary to represent their ideas in a rudimentary model format using simple materials like paper, thermocol, hardwood, Metals, glass fiber etc.

METHODOLOGY:

Exercises in cutting, finishing and joinery etc. with simple blocks, composition of basic geometrical forms etc. Introduction to the various tools and equipment available for executing these exercises. The section on joinery details will be dealt with in an engineering lab.

CONTENTS:

Joinery

Simple joinery details in wood.

Pipes and sleeve joints.

Metal- welded joints, nut-bolt joints. Types of welded joints.

Architectural Modeling:

General information about various materials and tools to be used in model making. Development of the skill to use the tools with precision to obtain desired results in model making.

Introduction to types of model

Block models, detailed model, construction model and interior models etc.

Introduction to various materials

Experimentation with these materials for different geometries and scales of models.

BARC-0208: COMPUTER APPLICATION-II

INTENT: Introduction and the use of software available for architectural applications.

METHODOLOGY: Integration of practical exercises along with the design studio project.

CONTENTS:**Introduction**

Introduction of various software available for Architectural presentation such as Photoshop & Corel

Basic commands for 2-D Graphics

Learning of softwares like Photoshop & Corel.

Understanding the basic composition in 2D and prepare attractive compositions using software's.

<u>YEAR TWO SEMESTER THREE</u>

BARC- 0301: ARCHITECTURAL DESIGN – II**OBJECTIVES:**

- To foster understanding about land and landforms and the elements of built space. Experimentation with shapes and forms to evolve sensitivity to built volumes.
- Focus on studying patterns in horizontal circulation in built areas.
- Introduction to vernacular architecture, use of local materials and appreciation of the socio-economics of the users.

METHODOLOGY:

- Site analysis at the beginning of each design problem. This would develop sensitivity to existing site conditions and context and help students evolve design directives to guide the design process.
- Block models at every design stage for three-dimensional visualization.