

Architecture Assistantship

4.1 CLIMATOLOGY

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RATIONALE

Understanding of the basic principles of climatology and environment are very important for diploma holders in Architectural Assistantship. The knowledge of this subject will be very useful in the design of buildings.

DETAILED CONTENTS

1. General Introduction (06 hrs)
 - Introduction to Climatology
 - Movement of earth around sun.
 - Different elements of climate like: Wind, temperature, humidity, precipitation and pressure.
 - Different climatic zones
 - Orientation of building with respect to above mentioned elements of climate
 - Effect of climate on man and shelter.
2. Relation of Climate and comfort (04 hrs)
 - Macro-micro climatic effects
 - Concept of comfort zone and bio-climatic chart
 - Climatic evaluation by season
3. Sun Control and shading devices (without calculations) (08 hrs)
 - Solar Chart (sun path diagram)
 - Orientation for sun
 - Internal and external sun protection devices
 - Natural lighting
 - Introduction and objectives of Solar Passive Design
 - Passive solar heating and cooling
4. Wind control (02 hrs)
 - Orientation with respect to wind
 - Wind protection devices
5. Use of building materials with respect to climate (02 hrs)
 - Concrete
 - Brick
 - Glass
 - Plastics
 - Stone
 - Insulating material

6. Criteria for site selection (02 hrs)
7. Environment and Ecology (08 hrs)
 - Basic elements of ecology
 - Concepts of natural cycles in Eco-system
 - Source of noise and air pollution, their effects and controls
 - Use of landscape elements for micro and macro climate control
 - Introduction to climate change, principle causes and effects- methods of mitigating climate change.

STUDY REPORT AS AN ASSIGNMENT

A study report on the effect of climate and environment on ancient and modern buildings should be prepared by the students. The study should emphasize on orientation of courtyards, windows, jallies, chajjas, landscape and various other sun and wind control devices.

INSTRUCTIONAL STRATEGY

Audio-video should be used for explaining various components of climatology and environment. Teachers are expected to impart instructions of the above course keeping in view the effect of above course in the design of buildings. The course contents should be taught with reference to tropical climates.

RECOMMENDED BOOKS

1. Environmental Engineering and Management
2. Tropical Architecture by Koeingsberger.
3. Tropical Architecture by C.P. Kukreja
4. Ecology by EP Odem
5. Design with Climate by Arvind Krishna and others

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	6	20
2	4	15
3	8	20
4	2	10
5	2	5
6	2	10
7	8	20
Total	32	100

4.2 BUILDING CONSTRUCTION – II

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RATIONALE

Students of Architectural Assistantship at diploma level are supposed to prepare structural drawings, working drawings and detailed drawings to various components of buildings. Also students are expected to design small residential buildings, for this purpose, it is essential that students are taught various components of building construction comprising foundations, super structure, openings, roofs, staircases, floorings and finishing and other allied building components.

Therefore, the subject of building construction is very important for students undergoing diploma course in Architectural Assistantship.

Teachers while imparting instructions are expected to show various components to buildings under construction. Make use of models or other audio-visual media to clarify the concepts. While preparing drawings, teachers should lay considerable stress on proper toning. Dimensioning, specification writing and printing and composition of drawing work. Students should be asked to maintain a sketch book for recording the observations form site visit. While conducting viva, teachers should ask specific questions on various topics.

DETAILED CONTENTS

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|--|--|
| 1. Roof and roof coverings <ul style="list-style-type: none">➤ Pitched roof and terms related to roof➤ Types of timber roofs➤ Lean to roof➤ Double collar roof➤ King post and queen post trusses | 1. Drawing details of fixing and layout of AC, GI sheets, slates, tiles and locally available materials. |
| 2. Staircases and ramps <ul style="list-style-type: none">➤ Definition and types of staircases as per nomenclature➤ Staircases of different materials➤ Relation between different components➤ Definitions, purpose, slopes, types of ramps and moving walks | 2. Drawing of king post and queen post trusses along with their constructional details |
| 3. Interiors of Buildings <ul style="list-style-type: none">➤ False ceiling and partitions➤ Different counters as per usage | 3. Drawing a dog leg wooden staircase |
| | 4. Steel spiral staircase |
| | 5. RCC staircase cast-in-situ and also precast |
| | 6. Drawing of false ceiling details |
| | 7. Drawing of counter |

4. Expansion joints
 - Viva-voce based upon theory syllabus
 - Preparation of drawing file
5. Form work and steel work
 - Definitions of form work, shuttering and centring
 - Form work for different structural members
 - Bending of bars, formation of hooks and cranks
8. Expansion joint in walls and roof

Total Number of Drawings: 8

INSTRUCTIONAL STRATEGY

This subject is of practical in nature. While imparting instruction for preparation of various drawings of different types of buildings and their components, the teacher should organize demonstration and field/site visits to show various stages, sizes and scales of operations involved in building construction. The teacher should involve the theoretical aspects of the instructions to the students before drawings are attempted by the students. Students may prepare the port-folio of the work done by them throughout the session. Teacher may also organize viva-voce after each drawing assignment so as to test the level of understanding of the students about unlying concepts, principles, and procedures.

RECOMMENDED BOOKS

1. Building Construction by WB Mackay
2. Building Construction by SP Bindra and SP Arora
3. Building Construction by BC Punmia
4. Building Construction by Sushil Kumar
5. Construction of Buildings (Vol I and II) by Barry
6. Building Construction by VB Sikka
7. Building Construction by Rangwala

4.3 COMPUTER APPLICATIONS IN ARCHITECTURE - I

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RATIONALE

In the present times an architectural assistant should be capable of drafting drawings on the computer. Due to increasing need for computerized drawings by most architects for their ease of drafting, editing, managing and presentation at the end of the course the students should be able to make 2-D architectural drawings for presentation and construction purposes. The student should get familiar with the latest AutoCAD versions.

DETAILED CONTENTS

Note: Relevant theory may be taught along with practical exercises in each topic.

1. Introduction to AutoCAD (02 hrs)

- Input devices
- Graphics
- Starting AutoCAD
- Inside the drawing editor
- Commands in the menus (Tool bars)
- Accessing Commands
- Entity selection
- Entering coordinates
- Folders for organizing drawings and files

Exercise: Creating folders and sub folders

2. Creating and Saving a new Drawing (02 hrs)

- Commands and options to create new drawings
- Units
- Limits
- Snap
- Grid
- Ortho
- Layer
- Application of layers
- Open a new, existing drawing
- Save, save as, quit, close, exit
- Customization of tool bars

Exercise: Setting up a new drawing with units, limits etc

3. Drawing Commands (12 hrs)

- Line
- Poly line/Double line.
- Arc
- Ellipse
- Polygon
- Rectangle
- SP line
- Circle
- Sketch.
- Hatch
- Donuts

Exercise: Making a composition of different geometrical shapes using various drawing commands

4. Viewing an Existing Drawing (04 hrs)

- Zoom
- Pan
- Redraw and Regen all
- Regen Auto
- View

Exercise: Viewing, zooming of existing drawing made in section 3.

5. Modifying an Existing Drawing (16 hrs)

- Undo Redo/Oops
- Trim
- Move
- Offset
- Rotate
- Array
- Stretch
- Divide
- Champher
- Erase
- Break
- Copy, multiple copy
- Mirror (Mirror test)
- Change (change properties)
- Extend
- Explode
- Blip mode

- Scale
- Fillet

Exercise: a) Modifying composition made in section 3
 b) Making plan, elevation and section of simple building

6 Making and Inserting Blocks (12 hrs)

- Blocks
- Insert block
- Base
- Using library for blocks
- W-block
- X-ref
- Explode

Exercise: Inserting furniture, fixtures, trees etc. in the plans, sections and elevations made in section 5.

7. Dimensioning and Text (08 hrs)

- Dimension type, style, units
- Dimension utilities
- Dimension variables
- Dimensioning of different elements like (Horizontal, vertical, inclined). Arc. Circle Radius, diameter), continuous dimensioning etc.
- Editing dimension text and updating (adding new text and editing existing text)
- Text style – font types, height, width factor etc.

Exercise: Dimensioning and editing text in composition made in Sections 5 and 6.

8. Plotting Drawings (08 hrs)

- Plot command
- Selecting area for plotting
- Scale of plot, scale to fit
- Selecting plotting device
- Selecting paper size and type
- Selecting black and white or colored plots
- Selecting appropriate print speed, quality
- Print preview
- Working in Paper space and plotting

INSTRUCTIONAL STRATEGY

This is a highly practical oriented subject. Efforts should be made by the teachers to procure relevant softwares and give practical exercises to individual students, so that they develop proficiency in operating computer softwares as applied to the profession of architecture. The theoretical instructions should be dovetailed with practical work. Towards the end of the session each student should be given independent computer based project assignment. Experts from practicing architectural field may be invited to deliver talks and for presentation of live case studies on computers to motivate the students and increase their level of awareness. Special efforts should be made by the teachers to develop well defined small tutorial exercises on each topic and supervise the exercises being performed by the student throughout the session. If need be some basic operational fundamental exercises may be repeated in the beginning of the session. Special emphasis may be laid on training the students through availing help from the user friendly architectural softwares so that they develop confidence and are able to work independently.

Note :- The Board will set the Question Paper for exercises for external examination

4.4. STRUCTURE SYSTEMS AND DESIGN

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RATIONALE

Students of architectural assistantship diploma are expected to understand the behavior of structures under load. They should understand the theory and design of simple RCC and steel structures and should be able to sketch the structural details of RCC and steel structures.

DETAILED CONTENTS

Part-I

Brief introduction and use of following structure systems (15 hrs)

1. Bulk Active Structures
 - 1.1 Post and beam
 - 1.2 Fixed and continuous beams
 - 1.3 Portal Frame
2. Vector Active Structure
 - 2.1 Roof Truss
 - 2.2 Space Truss
3. Form Active Structures
 - 3.1 Cable
 - 3.2 Arches
4. Surface Active Structure
 - 4.1 Slabs and Folded plates
 - 4.2 Spherical shells, domes and vaults
5. Pneumatic Structure
 - 5.1 Membrane Action
 - 5.2 Air supported and air inflated structures
6. High Rise Structures

Part –II: RCC STRUCTURES

(45 hrs)

1. Concept of reinforced concrete, suitability of different types of reinforcing materials. Introduction to IS:456-2000
2. Theory and design of singly reinforced rectangular sections-definitions, concept of neutral axis, balanced, under reinforced and over reinforced sections.
3. Calculation of Moment of Resistance of Simply Supported Singly reinforced Rectangular beams.
4. Shear and Bond stresses in beams
5. Theory of doubly reinforced beams, descriptive only (No design)

6. Theory of one way and two way slabs as per IS: 456-2000 and drawings showing reinforcement details.
7. Theory of long and short square, rectangular and Circular Columns subjected to axial loading (with Circular ties) as per IS: 456-2000 and drawings showing reinforcement details. Design of Square/Rectangular/Circular Column.
8. Detailing of reinforcements: Slabs, Beams, Columns and Column footings (02 sheet)

Part – III: STEEL STRUCTURES

(36 hrs)

1. Introduction to IS:800, Types of structural steel, Types of Indian Standard Steel Sections
2. Stress Strain Curve of mild steel
3. (a) Riveted Connections- Type of rivets, Types of riveted joints, Failure of riveted joints
(b) Welded Connections- Types of welding, Types of welded joints, Design of fillet weld joint
4. Theory and design of laterally restrained single I-section, steel beams as per BIS: 800
5. Theory of Tension and compression members of a roof truss as per IS:800 (No Numerical)
6. Theory of axially loaded single I-Section steel column as per IS:800 (No numerical)
7. Types of column basis, column beam junctions (framed, seated) with neat sketches- Descriptive only (No design)
2 sheets, Drawing of a Fink Steel Truss with details of joints and anchoring arrangements on the supports and drawing column beam junction(framed and seated)

INSTRUCTIONAL STRATEGY

1. Teachers while imparting instructions are expected to take the students to explain the position of reinforcement in different elements of RCC structure with appropriate drawings
2. The connection details of structural connections be explained by visit to sites and by preparation of structural drawing
3. Student should be asked to prepare models of:
 - a) Various reinforcements in a group of 4 – 6 students
 - b) Structured steel connections
 - c) Timber trusses and floor
4. Relevant BIS codes should be referred
5. Students should be given an hour demonstration on uses of STAAD III Software

Note: Teachers should give simple problems for designing various RCC, steel and timber members. Teacher should develop appropriate tutorial exercises so that students may develop proper comprehension of the relevant concepts and principles. It would be advantageous if students are taken to construction site to show form work for RCC as well as placement of reinforcement in various structural members of the building. Practice in reading and interpreting drawings is an other important feature of this subject, so the teachers may procure some real life working drawings from the field and explain them to the students, followed by viva voce. Students may be taken to sites where the works of fabrication and erection of steel and timber structures are in progress. Students may be asked to prepare report about their observations during the field visits. Experts from the design and field organizations may be invited to deliver expert lectures.

RECOMMENDED BOOKS

1. Steel Structure for Architects – Prof. Harbhajan Singh, Pub. Abhishek Publications
2. Structures in Architecture - Prof. Harbhajan Singh Pub. Abhishek Publications
3. Structure- Daniel L Schodck
4. Structures in Architecture- Mario Salvadori
5. Treasure of RCC Designs-Sushil Kumar
6. Design of RCC structures for Architects by Prof. Harbhajan Singh
7. Design of Steel Structure – LS Negi
8. Design of Steel Structures- Arya and Azmani
9. Design of Steel Structures – IC Syal and Surendra Singh

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
Part-I	15	15
Part-II	45	45
Part-III	36	40
Total	96	100

4.5 WORKING DRAWING - I

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RATIONALE

Preparation of working drawings and detailing forms the most important activities of diploma holders in Architectural Assistantship. Students are expected to develop mastery of skills in preparing working drawings of different building components and their detailing.

Teachers while imparting instructions are expected to show various components of building under construction by organizing field visits or use models and other audio-visual media to clarify the concepts involved in preparing working drawings. Teachers are expected to lay considerable stress on proportioning, dimensioning, specification writing, lettering and composition of drawing work whilst supervising students. Teachers should also take into consideration environmental aspects while teaching preparation of working drawings.

DETAILED CONTENTS

1. Preparation of working drawings for a simple single storeyed residential building:
 - 1.1 Site Plan
Preparing site plan on a suitable scale with complete dimensioning showing plot area, covered/built-up portion within the site, Approach road, side roads, adjoining buildings/features, boundary wall with gates layout of sewage pipes, water supply pipes, rain-water pipes. (01 sheet)
 - 1.2 Preparation of foundation layout plan, section details of foundations for brick external wall, brick internal wall, brick partition wall, brick toe wall, brick boundary wall and R.C.C Column. (02 sheet)
 - 1.3 Ground Floor Plan
Preparation of Ground Floor plan with dimensions and specifications of various building components, schedule of joinery i.e. doors, window ventilators etc. along with showing the layout of sewage pipes, water supply pipes, Rain water pipe. (01 sheet)
 - 1.4 Terrace Plan:
Preparation of terrace plan with the rain water disposal details and overhead water tank (01 sheet)
 - 1.5 Section:
Cross and longitudinal sections (01 sheet)
 - 1.6 Elevations:
Front and rear elevations (01 sheet)
 - 1.7 Details of:
-Toilet (Plan, Elevations and Sections as required) (02 sheets)
- Kitchen (Plan, Elevations of Sections as required) (02 sheets)

Total No. of Sheets: 11

INSTRUCTIONAL STRATEGY

This subject forms the basis for making the students ready to work in the field and is highly practical oriented. Teachers, while imparting instructions in the class room, should lay emphasis on proportioning, dimensioning, specification writing, lettering and composition of the drawing work of the students. Field visits may be arranged to the construction sites of residential, commercial and public buildings to demonstrate various components/stages of buildings under construction. Students should be exposed to: the system of preservation and maintenance of working drawings at the site during the field visits. Teachers may procure some working drawings of existing/live buildings and present the same to the students. The students should be encouraged to maintain portfolio of the work done by them throughout the session and give seminar. Teachers may conduct viva voce on completion of each assignment. Experts from the design organizations may be invited to present case studies, to motivate the students. Repetitive exercises should be given to the students, till they develop confidence and attain proficiency. Relevant BIS codes and conventions may be referred/followed, while imparting instructions. Teachers may introduce the topics by giving simple set of instructions before giving any assignment to the students

RECOMMENDED BOOKS

1. Construction Details by OK Ching
2. Building Drawing by MG Shah, CM Kale, SY Patki

4.6 HISTORY OF ARCHITECTURE - III

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RATIONALE

The course on History of Architecture develops appreciation regarding past and current trends in the field of architecture. The knowledge of this course will help the students to understand how political, physical, social, economical and technological change affect the architecture, materials and construction techniques. The course covers broad topics like: Islamic Architecture in India, Industrial Revolution, Modern Architecture in Europe and America, Contemporary/post Independence Architecture in India.

The teacher should try to create interest among the students for this course by organizing site visits to the local old monuments. Audio-visual aids should also be used to explain various architectural developments. While imparting instructions, teacher should stress upon the context of form and space, construction methods structural systems and materials. The teacher should motivate the students to take general reference for form, drawings structural solutions and materials from the history, while designing their project.

DETAILED CONTENTS

1. Islamic Architecture in India (18 hrs)
 - 1.1 Introduction of Islam in India, new building types, structural system and ornamentation (Qutab Complex)
 - 1.2 Development of Indo-Islamic architectural style, the sultanate period of Lodhi's & Tughlaqs.- General architectural vocabulary and construction methods/materials of Lodhi Tomb & Tomb of Ghiya-ud-din Tughlag.
 - 1.3 Provincial Styles- Jaunpur and Bijapur (Jama Masjid and Gol Gumbaz)
 - 1.4 Mughal Architecture-General architectural characteristics to understand architectural vocabulary & construction methods in (Humayun Tomb, Fatehpur Sikri, Red Fort, Taj Mahal at Agra and Jama Masjid at Delhi).

2. Industrial revolution. (08 hrs)
 - 2.1 Industrial revolution and its impact on architecture.
 - 2.2 Influence of new construction materials and functional needs on building types and architectural form, bridges, exhibition halls.

3. Modern Architecture in Europe and America. (22 hrs)
 - 3.1 Emergence of modern architecture in Europe. Social, technological and aesthetic concerns of modern movement. New building materials (concrete, steel and glass) and their architectural expression.
 - 3.2 Philosophy and key works of Louis Sullivan, Walter Gropius, Frank Lloyd Wright, Mies Van De Rohe, Le Corbusier.
4. Contemporary/post Independence Architecture in India (16 hrs)

Work of Le Corbusier in India, Louis Kahn, Charles Correa, B.V. Doshi, Joseph Allen Stein and Raj Rewal.

(Minimum two buildings of each architect to be studied)

INSTRUCTIONAL STRATEGY

The subject may be taught through audiovisual aids, slides, PowerPoint presentations so as to explain salient architectural features and techniques. Emphasis must be laid on freehand drawing and each student should maintain a sketchbook.

RECOMMENDED BOOKS

1. Urban Pattern: Arthur B. Gallion.
2. History Builds the Town – Arthur Kohn.
3. World Architecture.
4. Architecture of Towns and Cities – Paul D. Spreinegen
5. Space, Time and Architecture – Sigfried B. Giedeon
6. The new Landscape – Charles Correa
7. Charles Correa – William Curtis
8. After the Masters – Bhatt & Scriver

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	18	28
2	08	12
3	22	34
4	16	26
Total	64	100

4.7 ARCHITECTURAL DESIGN - III

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RATIONALE

To develop an understanding of the inter-relationship of the various components of a small public building upto 2 storey.

DETAILED CONTENTS

Three exercises on architectural design spanning to 3-4 weeks duration to be done individually. The public building to be designed may be a small health-centre, nursery school, local neighbourhood shopping market or the like. The activity requirements should be laid down by the subject teacher. While the areas required for each activity should be worked out by the student on his learning from the anthropometric studies carried out earlier. The building must not exceed two storeys.

- Note:
1. The emphasis must be on site visits and case studies
 2. The final submission should be in the form of rendered drawings to explain the scheme and block/ detailed model must be included for each project.
 3. Each Design project must include the following drawings: Site plan, Detailed floor plans showing furniture layout, Sections, Elevations, Freehand 3-D views, Perspectives.

INSTRUCTIONAL STRATEGY

This is one of the most important practical oriented subject for diploma in architectural assistantship. While imparting instruction, special visits may be arranged to demonstrate and explain important architectural features of different types of residential, commercial and public buildings. Practicing architects may be invited from time to time to present case studies and to deliver expert lectures on important elements like form, function, balance, light of shadow, shape, plane, volume, line, rythem, proportions, textures and other such element appropriate to various designs. Teacher may present some of the already completed design works of practicing architects to the students and explain the important features and elements. Audio-visual material available in this field may be procured and presented to the students from time to time. Students should be encouraged to visit relevant web-sites and teachers should develop the design problems/assignments which can be taken up by the students using relevant and appropriate software. Students should be given group and independent design/drawing assignments and they should also maintain sketch book/portfolio of all the assignments given to them throughout the session. Teachers may conduct viva-voce on completion of each assignment. Students may present seminars towards the end of the session.

RECOMMENDED BOOKS

1. Time Saver Standards for Building Types by Joseph De Chiara and John Callendera
2. Architects Data by Neufert
3. Space, Time and Order by DK Ching
4. Architectural Aesthetics by Sangeet Sharma, Abhishek Publication, Chandigarh