

### 3.1 BUILDING MATERIALS

**L T P**  
**5 - -**

#### **RATIONALE**

Diploma holders in Architectural Assistantship are supposed to prepare working drawings of buildings. Knowledge of building materials and their behavior under varied climatic conditions is very essential from the point of construction for providing detailed specifications in the working drawings. Therefore, the course in building materials includes imparting basic knowledge in the properties and use of the basic materials like: stones, bricks, lime, cement, paints, timber, exterior and interior finish, glass, plastics, building hardware, roofing materials etc.

Teachers are expected to demonstrate the samples of different materials, discuss their properties with particular reference to their use and appearance in particular situations depending upon climate and environmental conditions of the site, where the materials are to be used. Students should be encouraged to collect samples of various materials and efforts should be made to maintain a good building material museum.

#### **NOTE:**

The students are also expected to go through Architecture Journals like inside – Outside, Interiors today, Design and Interiors, Architect and builder, Builders Friend etc. They should make scrapbook of relevant brochures.

#### **DETAILED CONTENTS**

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|-----|--|---------|
| 1.  | Building Stones  | (03hrs) |
| 1.1 | Classification of rocks  |         |
| 1.1 | Characteristics of good building stones  |         |
| 1.2 | Utility of stones  |         |
| 1.3 | Common building stones   |         |
| 1.4 | Prevailing market rates and sizes  |         |
| 1.5 | Transportation costs   |         |
| 1.6 | Standard measurements in the carriage transport  |         |
| 1.7 | Storage systems/stacking system  |         |
| 2   | Bricks   | (04hrs) |
| 2.1 | Classification of bricks – properties and uses of first class, second-class, third class; over burnt bricks and under burnt brick – their field tests. |         |
| 2.2 | Characteristics of a good brick  |         |
| 2.3 | Size and weight of a standard brick and commonly available brick   |         |
| 2.4 | Fire bricks, its properties, uses and availability   |         |
| 2.5 | Availability of various types of bricks in the market e.g. machine made bricks, handmade bricks.   |         |
| 2.6 | Transportation cost with different modes of transportation and stacking of bricks on the site  |         |
| 2.7 | Introduction to Brick Tiles  |         |

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|----|--|----------|
| 3  | Lime   | (01hrs)  |
|    | 3.1 Classification and uses of lime.   |          |
|    | 3.2 Setting action of fat lime and hydraulic lime  |          |
|    | 3.3 Storing of lime  |          |
| 4  | Cement   | (05 hrs) |
|    | 4.1 Uses of cement   |          |
|    | 4.2 Composition of Portland cement   |          |
|    | 4.3 Setting and hardening of cement  |          |
|    | 4.4 Types of cement, their properties and uses, with specific reference to pozzolona and OPC, grades of OPC                                      |          |
|    | 4.5 Transportation and storage of cement.  |          |
| 5. | Aggregates (types, uses and transportation)  | (03 hrs) |
|    | 5.1 Coarse Aggregates  |          |
|    | 5.2 Fine Aggregates  |          |
| 6. | Mortar   | (04hrs)  |
|    | 6.1 Functions of Mortar  |          |
|    | 6.2 Preparation of cement mortar, lime mortar, lime cement mortar and their uses.  |          |
|    | 6.3 Proportion of mortar for different building works  |          |
| 7. | Concrete   | (07hrs)  |
|    | 7.1 Definition and grading of concrete.  |          |
|    | 7.2 Workability of concrete  |          |
|    | 7.3 Water - Cement Ratio   |          |
|    | 7.4 Compaction of concrete   |          |
|    | 7.5 Curing of concrete   |          |
|    | 7.6 Mixing, placing and uses of cement concrete.   |          |
|    | 7.7 Use of Flyash in concrete.   |          |
|    | 7.8 Concept of Reinforced cement concrete (RCC) and its grading  |          |
|    | 7.9 Necessity of providing reinforcement   |          |
|    | 7.10 Handling of RCC on site, quality and quantity (field checking) and taking measurement   |          |
|    | 7.11 Introduction to Ready-mix, self-compacting and light-weight concrete  |          |
| 8  | Timber   | (05hrs)  |
|    | 8.1 Characteristics and uses of common Indian timbers i.e. Sal, Deodar, Kail, Tali, Chir, Teak and introduction to some locally available timber |          |
|    | 8.2 Need for seasoning of timber, solar seasoning method of timber   |          |

- 8.3 Common methods of Preservation of timber.
- 8.4 Availability of different types of timber, measurement system and their comparative market prices.
9. Plastics (04hrs)
- Thermosetting and thermoplastics and their uses as materials in building, industry e.g. flooring, roofing, wall panelling, pipes, doors etc
10. Glass (05hrs)
- Types, sizes, usage, measurement systems and market prices of commonly used glasses in building construction:
- Sheet glass
  - Wired glass
  - Laminated safety glass
  - Plate glass
  - Insulating glass
  - Obscured glass
  - Coloured glass
  - Tinted glass
  - Heat absorbing glass
  - Glass blocks
  - Float glass
  - Toughened glass
  - Structural glazing
11. Introduction to Floor Finishes (uses, availability, market rates) (07hrs)
- Terrazzo Tiles and Flooring
  - Glazed terracotta and ceramic tiles
  - Cement Concrete Tiles
  - Marble stone, Kota stone, slate, red sand stone, granite – their tiles and slabs
  - Parquet (Wooden)
  - Linoleum tiles and rolls
  - PVC
  - Heavy duty flooring for industrial building
12. Introduction to wall Finishes (07hrs)
- Wall board homogeneous
  - Laminated fiber boards – types
  - Plastic wall tiles – their availability
  - Wall papers
  - Cork sheets and tiles
  - Thermocoal
  - Foam rubber tiles and rolls

- Textured paint finishes
  - Gypsum Boards – factory made and made in-situ
13. Ceiling Materials (Size, quality, their availability, types of finishes, uses, trade names, market rate) (07hrs)
- Hessian cloth
  - Gypsum plaster boards plaster of Paris board
  - Plain AC sheets
  - Plywood
  - Hard Board
  - Cellotex
  - Fibre Boards
  - Fibre glass
  - Asbestos tiles
  - Thermocol
  - Medium density fibre board (MDF)
14. Building hardware (sizes, applications) (05hrs)
- Note: Teacher may show these items to the students in material museum maintained by the department/market survey.
- Tower bolts
  - Hinges including concealed hinges
  - Door Handles
  - Door springs
  - Latches
  - Floor door stopper/floor springs and magnetic types stoppers
  - Fan light pivots
  - Mortice lock
  - Door closer – including hydraulic types
  - Ventilator chains
  - Wire gauze
  - Magnetic cupboard closers
15. Introduction to roofing Materials (their standard sizes, uses, availability, prices) (05hrs)
- Asbestos sheets
  - GI sheets
  - Shingles
  - Ferro-cement sheets
  - Fibre sheets
  - Slates
  - Mangalore tiles
  - Pan tiles
  - Corrugated PVC sheets

16. Kitchen and Toilet Fixtures- Specifications of kitchen and toilet fittings and fixtures, their popular brand names, shapes and sizes. (03hrs)
17. Paints (03hrs)  
(Types, uses, coverage area: brand names and cost)
- Water based paints
  - Distempers
  - Oil based paints and emulsions
  - Cement paints
  - Acrylic emulsions
  - Melamine finishes
  - Varnishes
  - Spirit polish, wax polish
  - Lacquers
  - Stucco
  - Tar and Bitumen paint
  - Glazing putty
- 18 Adhesive – Introduction, type and application (02 hrs)

Note for the examiner: The paper setter should ask questions from various topics related to applications, transportation and costs (introduction) and not on the manufacturing details and lab testing of the materials.

Note: The study should be supported by market survey of materials with brands, sizes, rates and availability. An exercise should be conducted to take the students to building material exhibitions and make them aware of new materials being launched in market and let them prepare a brief report on the application of new materials and understand how to choose a material for a specific purpose after evaluating its availability, cost, performance and elegance etc.

Teachers should demonstrate samples of various materials while imparting classroom instruction. Teachers may also arrange some field visits to manufacturing production units and retailer shops like cement, kilns, timber saw mills and seasoning plants, hardware shops, glass houses etc. Students should be encouraged to collect samples of various materials and catalogues of manufacturer. The students may maintain a scrapbook for this purpose. A museum of building construction, materials may be developed where samples of latest materials their specifications, characteristics, rates availability (supplier and relevant codes may be kept) to enhance the level of understanding of the students. The application of various materials should be shown to students in various buildings of importance, as reference

## **INSTRUCTIONAL STRATEGY**

This is one of the fundamental subject covering basic building construction and finishing materials. Teachers should demonstrate samples of various materials while imparting

classroom instruction. Teachers may also arrange some field visits to manufacturing/ production units and retailer shops like cement, kilns, timber saw mills and seasoning plants, hardware shops, glass houses etc. Students should be encouraged to collect samples of various materials and catalogues of manufacturer. The students may maintain a scrapbook for this purpose. A museum of building construction, materials may be developed where samples of latest materials their specifications, characteristics, rates, manufacturer (supplier and relevant codes may be kept) to enhance the level of understanding of the students

### RECOMMENDED BOOKS

1. Sharma, SK; and Mathur, GC; "Engineering Materials;" Delhi-Jalandhar, R. Chand and Co.
2. Surendra Singh; "Engineering Materials;" New Delhi, Vikas Publishing House Pvt. Ltd.
3. Chowdhuri, N; "Engineering Materials;" Calcutta, Technical Publishers of India.
4. Bahl, SK; "Engineering Materials;" Delhi, Rainbow Book Co.
5. Bahl, SK; "Engineering Materials;" Delhi, Rainbow Book Co.
6. Rangwal "Building Materials", Standard Publishers.
7. Civil Engineering Materials by PD Kulkarniet. al.; Tata McGraw Hill Publishing Co. Ltd., New Delhi – 110 002
8. TTTI, Chandigarh "Civil Engineering Materials:" New Delhi Tata McGraw Hill Publication
9. Kulkarni, GJ; "Engineering Materials;" Ahmedabad, Ahmedabad Book Depot.
10. Shahane; "Engineering Materials"; Poona, Allied Book Stall.

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	03	4
2	04	6
3	01	2
4	05	6
5	03	4
6	04	6
7	07	8
8	05	6
9	04	6
10	05	6
11	07	8
12	07	8
13	07	8
14	05	6
15	05	6
16	03	4
17	03	4
18	02	02
<b>Total</b>	<b>80</b>	<b>100</b>

### 3.2 BUILDING CONSTRUCTION-I

**L T P**  
**- - 6**

#### 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 to building construction comprising of 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 from site visit. While conducting viva, teachers should ask specific questions on various topics.

#### DETAILED CONTENTS

Note: The theory shall be taught along with the drawing work and there will not be a separate exam for the theory.

Sr. No.	Theory	Drawing Work
1.	Brick work and stone work <ul style="list-style-type: none"> <li>➤ Different sizes and types of bricks</li> <li>➤ Wall thickness, T-junctions, cross junction in English Bond (Flemish only introduction)</li> <li>➤ Brick jallies and Reinforced brick work</li> <li>➤ Stone facings and claddings and classification of masonry</li> </ul>	1. Drawing of different shapes and sizes of bricks 2. Drawings of 9" thick brick wall in English Bond junctions, cross junction with 9" thick brick wall 3. Jallies (any three designs) 4. Drawings of lintels and arches of various types
2.	Openings in walls <ul style="list-style-type: none"> <li>➤ Classification of arches as per shape and material</li> <li>➤ Classification of lintels of different materials, precast and cast-in-situ</li> </ul>	

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|--|--|
| <p>3. Damp Proof course: (DPC)</p> <ul style="list-style-type: none"> <li>➤ Sources of dampness and effects of dampness</li> <li>➤ Classification as per hardness or rigidity of material</li> <li>➤ BIS stipulation of damp proofing</li> <li>➤ Treatment of building components for effective damp proofing</li> </ul> <p>4. Foundations</p> <ul style="list-style-type: none"> <li>➤ Different types of foundations with reference of advantage of one over the other</li> <li>➤ Foundations of different types with reference to method of construction</li> </ul> <p>5. Doors and windows</p> <ul style="list-style-type: none"> <li>➤ Definitions, functions, sizes, location and classification</li> <li>➤ Joints used in doors and windows</li> <li>➤ Fly Proof stroller</li> </ul> <p>6. Flooring</p> <ul style="list-style-type: none"> <li>➤ Constituents and types of floorings for ground and upper floors</li> <li>➤ Floor finishes</li> </ul> | <p>5. Drawing of section through a single storey showing horizontal and vertical DPC with specifications</p> <p>6 Drawing of spread Foundation and application of DPC on spread foundation and basements</p> <p>7. Drawing of door frames including fixing.</p> <p>8 Drawing of different types of doors (paneled/flyproof flush) showing joints and fixtures in detail.</p> <p>9. Drawing of different types wooden windows</p> <p>10 Drawing of single wooden floor and double wooden floor</p> <p>11.Cast-in-situ floorings</p> |
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## 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; Khanna Publisher, New Delhi
2. Building Construction by SP Bindra and SP Arora; publisherDhanpatRai& Co.  
New Delhi
3. Building Construction by BC Punmia; Publisher Laxmi Publication, New Delhi
4. Building Construction by Sushil Kumar, Standard Publisher, New Delhi
5. Construction of Buildings (Vol I and II) by Barry
6. Building Construction by VB Sikka; Publisher Tata McGraw Hill Publisher, New  
Delhi
7. Building Construction by Rangwala; Publisher Charotar Publishing House Pvt.  
Ltd., New Delhi

### 3.3. BUILDING SERVICES

**L T P**  
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#### **RATIONALE**

Students of Architectural Assistantship at diploma level are expected to prepare working drawings for fixing of various fittings and fixtures, water supply and sanitary installations. Also students should be well conversant with electrical and mechanical installations in the buildings. For this purpose, it is essential that the students are taught various aspects of building services like: sanitation, water supply, electrical layout and air conditioning. Therefore, the subject of building services is very important for students undergoing diploma courses in Architectural Assistantship.

Teachers while imparting instructions are expected to show various fixtures and fittings, water supply and sanitary installations at work sites and by making use of literature, models, chart and other audio-visual aids so that students are able to comprehend the hardware used. Teacher should specifically point out problem areas and other environmental considerations while teaching this subject.

#### **DETAILED CONTENTS**

1. Water Supply (12hrs)
  - 1.1 Water as a natural resource, public health significance of water quality, demand of water for domestic, commercial, industrial and public utility purposes as per BIS standards. Per capita demand, leakage and wastage of water and its preventive measures
  - 1.2 System of water supply – continuous, intermittent, their advantages and disadvantages
  - 1.3 Storage and Distribution of Water: Different methods of water distribution boosting water, gravity and pressure distribution by storage tanks of individual buildings
  - 1.4 Hot water supply for buildings including solar water heating.
  - 1.5 Service connections, types and sizes of pipes, water supply fixture and installations
  - 1.6 Concept of Rain water harvesting
2. Drainage (16hrs)
  - 2.1 Principles of drainage, surface drainage; combined and separate system of drainage, shape and sizes of drains and sewers, storm water over flow chambers, methods of laying and construction of sewers
  - 2.2 House drainage: traps – shapes, sizes, types, materials and function

- 2.3 Inspection chambers – sizes, and construction
- 2.4 Ventilation of house drainage – anti siphonage and vent pipes, single stack and double stack system
- 2.5 Functions and working of sinks, wash basins,, water closets, flushing cisterns, urinals, – sizes and types
- 2.6 Septic tanks, seepage and soak pits
- 2.7 Simple exercises on layout plans for toilet and kitchens for public and residential buildings including the placement, distances and fixing details.
- 3. Sound Insulation (08 hrs)
  - 3.1 Behaviour of sound propagation,
  - 3.2 Acoustics in building, acoustical defects such as echo, reverberation, sound foci, methods of correction, special requirements in Bldgs like auditorium, conference halls, studios etc
  - 3.3 Acoustical materials and their uses in various buildings
  - 3.4 Simple exercises on sound insulation
- 4. Lighting and Electrical Fittings (10hrs)
  - 4.1 Electrical distribution-conduits for wiring, types of wiring, types of switches, various terms used in lighting-illumination, Lux, lumen etc. distribution panels, MCB'S, ELCBS
  - 4.2 Methods of lighting, quality of light of mercury lamps, incandescent types of lamps, fluorescent tubes, CFL and other lamps, thumb rules for calculation of illuminating level, various systems of wiring and their sustainability
  - 4.3 Symbolic representation of electrical fittings for different work areas in residential building (e.g. bed room, living room, kitchen, study and toilet)
  - 4.4 Preparation of electrical layout of a simple residential building
  - 4.5 Precautions to avoid electrical accidents
- 5. Heat, Ventilation and Air Conditioning (HVAC) (08 hrs)
  - 5.1 Behaviour of heat propagation, thermal insulating materials and their co-efficient of thermal conductivity

- 5.2 General methods of thermal insulation. Thermal insulation of roofs, exposed walls
  - 5.3 Ventilation: Definition and necessity
  - 5.4 System of ventilation (Mechanical)
  - 5.5 Principles of air conditioning
  - 5.6 Air cooling
  - 5.7 Different types of Air conditioning systems and their use in buildings
  - 5.8 Essentials of air-conditioning system
6. Vertical Transportation Systems (04 hrs)
- Classification and types of lifts, lift sizes, provision and installation, escalators, sizes, safety norms to be adopted
7. Fire Fighting Services (04 hrs)
- Causes of fire in Buildings, classification of building materials according to fire rating; fire alarm systems introduction to fire fighting system, precaution and controlling devices (fire panels, door and windows automation, fire hydrants and sprinklers) fire escape elements (staircases, ramps, etc.), provisions in building from fire safety angle as per BIS; heat detectors, and fire detection system.
8. Integration of lighting, air-conditioning, acoustics and other services/systems in buildings (02 hrs)

Note: Students shall prepare a scrapbook for all the above 8 numbers of topics

### **INSTRUCTIONAL STRATEGY**

Building services are as important as any other part of the building. The teachers, besides classroom teaching should supplement the instruction by arranging field visits. Students may be encouraged to collect information, pamphlets and catalogues from different market/ manufacturing sources and prepare a scrapbook of the latest machines/fittings available for building services. Teachers may also encourage the students to go through relevant BIS codes for each topic. The subject knowledge should be used in preparing services drawings in the subject of Architectural design.

### RECOMMENDED BOOKS

1. Handbook of Designing and Installation of Services in Building Complex – High-rise Buildings by VK Jain, Publication. Khanna Publishers, New DelhiKhanna Publishers, New Delhi.
2. Water and Waste Water Technology by Mark J. Hammer and Mark J. Hammer(Jr.); Prentice Hall of India (P) Ltd., New Delhi – 110 001
3. A Text Book of Environmental Science by Subramanian; Narora Publicity (Pvt.) Ltd., New Delhi – 110 002
4. NationalBuilding Code

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	12	18
2	16	22
3	08	12
4	10	18
5	08	12
6	04	6
7	04	6
8	02	6
<b>Total</b>	<b>64</b>	<b>100</b>

### 3.4 STRUCTURE MECHANICS

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#### RATIONALE

This is a fundamental course. Which covers principles of Applied Mechanics and Strength of Materials. The course covers force systems, Centroid and Moment of Inertia, Stress and Strain, Shear force and Bending moment calculations/diagrams and Bending Stresses. After going through this course the student shall be able to appreciate the behavior of different structural elements.

#### DETAILED CONTENTS

1. Force system and Equilibrium (12hrs)
  - 1.1 Force: Definition, effect, characteristics, representation and types of forces
  - 1.2 Force Systems: Coplanar and Non coplanar force systems
  - 1.3 Types of coplanar Forces: Collinear, Concurrent, Parallel, Non concurrent and Non parallel.
  - 1.4 Resultant force and components of a force
  - 1.5 Laws of forces: Parallelogram, Triangle and polygon Laws of forces
  - 1.6 Free Body Diagram, Lamis theorem (No proof)
  - 1.7 Calculation of resultant of coplanar force systems
  - 1.8 Concept of Moment, Characteristics of moment, resultant moment, Varignon's theorem (No proof)
  - 1.9 Concept of couple, moment of a couple
  - 1.10 Equilibrium of rigid bodies
  
2. Centroid and Moment of Inertia (14 hrs)
  - 2.1 Definition of centre of Gravity and Centroid
  - 2.2 Centroid by method of moments of areas for square, rectangular, triangular, L-shape, T-shape and I shape cross- sections.
  - 2.3 Moments of Inertia by methods of moments and Radius of Gyration.
  - 2.4 Parallel axis theorem (no derivation)
  - 2.5 Moment of Inertia of rectangular section.

- 2.6 Moment of inertia of a Triangular section (no derivation)
- 2.7 Moment of Inertia of a Circular section.
- 2.8 Perpendicular Axis Theorem (no derivation)
- 2.9 Numerical on moment of inertia of Rectangular, Triangular and Circular laminas only.
  
- 3. Stress and Strain (06 hrs)
  - 3.1 Elasticity, Elastic limit
  - 3.2 Definition of stress and strain
  - 3.3 Types of stress and strain
  - 3.4 Stress strain curve for mild steel
  - 3.5 Hooks Law (Numerical)
  
- 4. Shear Force and Bending Moment (26hrs)
  - 4.1 Types of loads- Dead load, Live load, snow, wind and seismic loads as per IS: 875
  - 4.2 Types of loading: Point load, Uniformly distributed load and uniformly varying load.
  - 4.3 Types of Supports: Hinge, Roller and fixed supports, Types of reactions provided by each type of support.
  - 4.4 Types of Beams: Simply supported, cantilever, overhanging and continuous beams (description only)
  - 4.5 Concept of bending moment and shear force.
  - 4.6 Bending moment and shear force diagrams for simply supported, cantilever and over hanging beams subjected to point loads and uniformly distributed loads only
  - 4.7 Calculation of location and magnitude of Max Bending moment and point of contra flexure
  
- 5. Bending stresses in Beams (14hrs)
  - 5.1 Introduction: Tension, compression
  - 5.2 Simple Bending and assumption of Simple Bending Theory.

- 5.3 Position of Neutral Axis.
- 5.4 Section Modulus. Moment of Resistance. Application of flexure equation ( $M/I = f/y = E/R$ ) (no derivation)
- 5.5 Maximum and permissible bending stresses.
- 6. Analysis of Perfect Frames (8 hrs)
  - 6.1 Types of pin jointed frames. Assumptions in computing the forces in members of a perfect frame. Analysis of perfect frames by method of joints.

### **INSTRUCTIONAL STRATEGY**

This subject is introduced so that diploma holder in Architectural Assistantship may appreciate the concepts and principles of structural design of various elements of building and are able to apply the knowledge gained through the subject for the design of simple and small components. Teacher should give simple exercises involving the applications of various concepts and principles being taught in the subject. Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged/guided to solve the tutorial problems independently. Teacher may conduct weekly small quiz sessions to know the students' level of understanding and if need be teacher may reinforce the concepts and principles related to structural behaviour of elements/members of building components.

### **RECOMMENDED BOOKS**

1. Structure Mechanics for Architects – Prof. Harbhajan Singh, Pub. Abhishek Publications, Chandigarh
2. Mechanics of Solids- DK Singh-Galgotia Publications Pvt. Ltd., New Delhi.
3. Fundamentals of Applied Mechanics- AS Sarao Victor GambhirGauravAgrawal. By SatyaPrakashanNew Delhi.
4. Structural Mechanics-VS Prasad-Golgotia Publication Pvt. Ltd., New Delhi.
5. Engineering Mechanics and strength of Materials-Dr RK Bansal –Laxmi Publications Pvt. Ltd., New Delhi.
6. A text book of Engineering Mechanics- RK Rajput-DhanpatRai Publications Pvt. Ltd., New Delhi



7. Introduction to structural Mechanics- PS Smith-Macmillan Press Ltd., (UK).
8. Applied strength of Materials-Alfred Jensen and Harry McGraw- Hill Book Company London.
9. Theory of Structures by Rajeev Kumar; SatyaPrakashan, New Delhi.
10. Structural Analysis (Vo. 1 & 2) by SS Bhavikatti; Vikas Publishing House Pvt. Ltd., New Delhi – 110 014
11. Computational structured Machines by S. Rajasekran&G.Sankar Subramanian; Prentice Hall of India (P) Ltd., New Delhi – 110 001

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	12	16
2	14	18
3	06	08
4	26	30
5	14	18
6	08	10
<b>Total</b>	<b>80</b>	<b>100</b>

### 3.5 ARCHITECTURAL DRAWING-III

**L T P**  
**- - 6**

#### RATIONALE

The students of diploma holder in Architectural Assistantship should have sufficient skills to draw perspective drawings. Besides this they should also be introduced to sciography in plans, elevations. They should be given sufficient exercises in rendering of perspective drawings, so that they are able to perform well in the field/industry.

#### DETAILED CONTENTS

1. Perspective (01 sheet)
  - Introduction to basic terminology (picture plane. Vanishing point. Station point, cone of vision)
  - Introduction to types- 1 point. 2 point (vanishing point method)
2. Simple Perceptive
  - Geometrical of shapes incorporating all views: cone, cubes, cylinders etc.
  - Birds eye view
  - Normal eye view
  - Worms eye view to clarify concepts (02 sheets)
  - 2 point perspective of a given plan (vanishing point method) (02 sheets)
  - 1 point perspective of a given plan (drawing room and kitchen) (02 sheets)
3. Introduction to Sciography (in plans and Elevations)
  - Basic Geometrical shapes (cube, cylinder, cone, etc). (01 sheet)
  - Difference between shade and shadow on basic geometrical shapes (01 sheet)
  - Shade and shadow of a basic building
    - (a) Drawing (Plan and elevation) supplied by teacher (01 sheet)
    - (b) Drawing of student's choice(s) (01 sheet)
    - (Residential building)
4. Introduction to Rendering
  - Demo by teacher in different mediums-colour pencils, crayon. Colour wash, markers etc.
  - Rendering techniques in pen and inks/ Different colour mediums (02 sheets)
  - Rendering of a given perspective (01 sheet)

Total no. of sheets = 14

## **INSTRUCTIONAL STRATEGY**

This subject is one of the most important, fundamental and practical subject for diploma in Architectural Assistantship. Teachers should lay emphasis on practical work by the students and give repetitive exercises in free hand sketching, colouring and rendering like sketching, shades and shadows, lettering, printing forms and other important component of architecture. Teachers should lay stress upon perfect line work, properties, dimensioning, lettering and printing by the students in the classroom. Students should maintain portfolio of the work done by them throughout the session. Viva voce examination may be conducted by the teacher on completion of each assignment

## **RECOMMENDED BOOKS**

1. Engineering Drawing by P.S Gill; Publisher S K Kataria and Sons, Ludhiana
2. Building Construction – by Sikka; Publisher Tata McGraw Hill Publisher, New Delhi
3. Rendering with Pen and ink by Arthur L. Guphill, Susan E. Meyer

### 3.6 HISTORY OF ARCHITECTURE – II

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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: pre-historic architecture, important civilizations, (Indian, Egyptian, Greek and Roman), medieval architecture in Europe, and temple architecture and Budhish 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. TempleArchitecture in India. (20 hrs)
  - Evolution of temple and its various parts
  - Dravidian style (Southern) General characteristics, planning, motifs and treatment of different parts, construction methods and materials (e.g. shore temple at Mahabalipuram, MaduraiTemple.)

IndoAryanTemple

  - LingarajaTemple at Bhubhaneshwar, KandariyaMahadeo at Khajuraho, SunTemple at Modhera; These examples must be studied with reference to: Architectural form, planning components, construction methods, materials, motifs (ornamentation)

JainTemple

  - DilwaraTemple at MountAbu, RanakpurTemple.General architectural characteristics, construction methods, materials and ornamentation.
2. Early Christian Architecture (04 hrs)
  - Development of church plan (Basilican), construction methods and general architectural characteristics of St. Peters, Rome

3. Byzantine Architecture (04 hrs)
  - Centralized plans and construction methods for dome of St. Sophia Church)
4. Romanesque Architecture (04 hrs)
  - General architectural characteristics, materials and construction methods for the Pisa group of buildings.
5. Gothic Architecture (06hrs)
  - Main visual and construction vocabulary of Gothic Arch at Notre Dame Paris, and Reims Cathedral)
6. Renaissance Architecture (10hrs)
  - Early Renaissance Architecture. General architectural characteristics (Florence cathedral)
  - Late Renaissance architecture. General characteristics and Role of Michael Angelo & Palladio (eg. St. Peter's Rome. The Building of the Capitoline Hill Rome & Villa Capra)

### INSTRUCTIONAL STRATEGY

The subject may be taught through audiovisual aids, slides, PowerPoint presentations so as to explain salient architecture 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 and B Fischer, Publisher McGraw Hill Book, New Delhi
2. History Builds the Town:- Arthur Kohn; Khanna Publisher, New Delhi
3. A history of Architecture: Settings and Rituals-Spiro Kostof; Oxford University Press UK -
4. Town Building in History:- Hiron; Vikas Publishing House Pvt., New Delhi
5. World Architecture:- Michael Raeburn, LBS Ltd. Faraday Close Durrington Worthing West Sussex
6. Internet Sources/Various search engines may also be used for additional information on some topics.
7. History of Architecture:- Sir Banister Fletcher, Vikas Publishing House, New Delhi
8. History of Architecture:- Satish Grover (Hindu), Publisher Roli Books (P) Ltd. Delhi
9. History of Architecture:- Percy Brown; Publisher, Taraporevala Sons, New Delhi
10. Indian Architecture (Hindu and Buddhist):- Percy Brown

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	20	30
2	4	10
3	4	10
4	4	10
5	6	15
6	10	25
<b>Total</b>	<b>48</b>	<b>100</b>

### 3.7 ARCHITECTURAL DESIGN - II

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#### **RATIONALE**

Diploma holders in Architectural Assistantship find employment with private architects and also majority of them go for self-employment. Therefore, they are required to develop aptitude/skills to design residential, commercial and other public buildings. Teachers while imparting instructions/giving assignments to students are expecting to teach various elements of design like form function, balance, light of shadow, shape, plane, volume, line, rhythm, proportions, textures and other such related elements. Teachers are also expected to show various types of designs of small building to develop and appreciation for this subject. Teachers should also motivate students to maintain sketch book/portfolio of all the assignments given to the students.

#### **DETAILED CONTENTS**

1. Anthropometric Studies and graphical representation of:
  - (a) Vehicles (01 sheet)  
 Parking norms along with turning radii for two-wheelers, cars, buses, vans etc. Standard road widths.
  - (b). Street furniture (03 sheets)  
 Standards for drinking fountains, waiting queues at bus stops, garden seats, waste bins, telephone booths, street lights, foot paths, public walkways, railing etc.
  - ( c) Graphic Representation of plant material (ground cover, foliage, shrubs, trees) human figures. (02 sheets)
- 2.. Study of spaces and layout of furniture for various activities in small structures comprising public utilities like Fuel Station, Milk Bar, Florist, Kiosk and Guard House. The study is to be presented through plans, elevations, sketches etc.
- 3 Introduction of Structure Systems (Briefly) :Design of a single storey structure such as weekend cottage, milk bar etc.  
 Drawings to be produced:
  - Site plan
  - Plans
  - Elevations
  - Sections
  - Views
  - Block Model
- 4 Time Problem: Plan showing furniture layout and section through a given mono-functional space such as a Café, classroom in a nursery school.etc.parking lot.

## **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, rhythm, 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; Publisher Tata McGraw Hill Publisher, New Delhi
2. Architects Data by Neufert; Publisher Blackwell Publishing Ltd. 9600 Garsington Road, *Oxford*, OX4 2DQ, UK..
3. Space, Time and Order by DK Ching; Publisher John Wiley & Sons, Wiley
4. Architectural Aesthetics by Sangeet Sharma, Abhishek Publication, 57-59, Sector 17, Chandigarh

## **ECOLOGY AND ENVIRONMENTAL AWARENESS CAMP**

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

This is to be organized at a stretch for 3 to 4 days. Lectures will be delivered on following broad topics. There will be no examination for this subject.

1. Basics of ecology, eco system and sustainable development
2. Conservation of land reforms, preservation of species, prevention of advancement of deserts and lowering of water table
3. Sources of pollution - natural and man made, their effects on living and non-living organisms
4. Pollution of water - causes, effects of domestic wastes and industrial effluent on living and non-living organisms
5. Pollution of air-causes and effects of man, animal, vegetation and non-living organisms
6. Sources of noise pollution and its effects
7. Solid waste management; classification of refuse material, types, sources and properties of solid wastes, abatement methods
8. Mining, blasting, deforestation and their effects
9. Legislation to control environment
10. Environmental Impact Assessment (EIA), Elements for preparing EIA statements
11. Current issues in environmental pollution and its control
12. Role of non-conventional sources of energy in environmental protection