NEP-2020 Aligned Curriculum for

Three Year (Six Semester) Diploma Programme in

ARCHITECTURAL ASSISTANTSHIP

CURRICULUM FOR THIRD AND FOURTH SEMESTER

For the State of Uttar Pradesh

Prepared by:
Curriculum Development Centre
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PREFACE

An important issue generally debated amongst the planners and educators world over is how technical education can contribute to sustainable development of the societies struggling hard to come in the same bracket as that of the developed nations. The rapid industrialization and globalization has created an environment for free flow of information and technology through fast and efficient means. This has led to shrinking of the world, bringing people from different culture and environment together and giving rise to the concept of world turning into a global village. In India, a shift has taken place from the forgettable years of closed economy to knowledge based and opens economy in the last few decades. In order to cope with the challenges of handling new technologies, materials and methods, we have to develop human resources having appropriate professional knowledge, skills and attitude. Technical education system is one of the significant components of the human resource development and has grown phenomenally during all these years. Now it is time to consolidate and infuse quality aspect through developing human resources, in the delivery system. Polytechnics play an important role in meeting the requirements of trained technical manpower for industries and field organizations.

In order to meet the requirements of future technical manpower, we will have to revamp our existing technical education system and one of the most important requirements is to develop outcome-based curricula of diploma programmes. The curricula for diploma programmes have been revised by adopting time-tested and nationally acclaimed scientific method, laying emphasis on the identification of learning outcomes of diploma programme.

The real success of the diploma programme depends upon its effective implementation. However best the curriculum document is designed, if that is not implemented properly, the output will not be as expected. In addition to acquisition of appropriate physical resources, the availability of motivated, competent and qualified faculty is essential for effective implementation of the curricula.

It is expected of the polytechnics to carry out job market research on a continuous basis to identify the new skill requirements, reduce or remove outdated and redundant courses, develop innovative methods of course offering and thereby infuse the much needed dynamism in the system.

Director

Institute of Research Development & Training

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1. SALIENT FEATURES OF DIPLOMA PROGRAMME IN ARCHITECTURAL ASSISTANTSHIP

1)	Name of the Programme	:	Diploma Programme in Architectural Assistantship
2)	Duration of the Programme	:	Three years (Six Semesters)
3)	Entry Qualification	:	Matriculation or equivalent NSQF Level as Prescribed by State Board of Technical Education, UP
4)	Pattern of the Programme	:	Semester Pattern
5)	NSQF Level	:	Level – 5
6)	Ratio between theory and	:	40 : 60 (Approx.) Practice

7) **Industrial Training**

Four and six weeks of industrial training is made mandatory after the II and IV semesters during summer vacation. Total marks allotted to industrial training will be respectively 50 & 100. In the last (6^{th} Semester) we have made the one semester Industrial training/Internship as optional along with usual classroom training.

8) **Ecology and Environment**

As per Govt. of India directives a subject on Environmental Science has been incorporated in the curriculum.

9) **Entrepreneurship and Start-ups**

A full subject Entrepreneurship & Start-ups has been incorporated in the curriculum. A full subject on Construction Management, Accounts and Professional Practice has been incorporated in the curriculum.

10) **Student Centred Activities**

A provision of min.4 hrs per week has been made for organizing Student Centered Activities for overall personality development of students. Such activities will comprise of co–curricular activities such as expert lectures, self-study, games, hobby classes like photography, painting, singing etc. seminars, declamation contests, educational field visits, NCC, NSS, library and other cultural activities.

11) **Project work**

A project work has been included in the curriculum to enable the student get familiarize with the practices and procedures being followed in the industries and provide an opportunity to work on some live projects in the industry.

2. PROGRAM OUTCOMES (POs)

PO1: Basics and Discipline specific Knowledge

Assimilate knowledge of basic mathematics, science and engineering fundamentals.

PO2: Problem's Analysis and solution

Identify, analysis and solve problems using standard methods and established techniques.

PO3: Design and Development

Design solutions for technical problems.

Assist in designing components, systems, or processes to meet specific requirements.

PO4: Engineering Tools, Experimentation, and Testing

Use modern engineering tools and appropriate techniques to conduct experiments as per BIS standard.

PO5: Socio/Economic/Environmental impact assessment/remedy.

Apply relevant technologies while considering societal needs, environmental impact keeping in view sustainable and ethical responsibilities.

PO6: Project Management and Communication

Apply engineering management principles, work effectively as an individual or in a team, and communicate clearly on activities.

PO7: Lifelong Learning

Recognize the importance of continuous learning and actively pursue self-improvement to keep pace with technological developments.

3. EMPLOYMENT OPPORTUNITIES FOR DIPLOMA HOLDERS IN ARCHITECTURAL ASSISTANTSHIP

Keeping in view, the present scenario of activities in the field of Architecture, following employment opportunities are visualized for diploma holders in Architectural Assistantship:

a) Wage Employment in:

i) State Department of Architecture
ii) State Department of Town and Country Planning
iii) Central Public Works Department
iv) State Housing Boards and Corporations
v) State Urban Development Agency
vi) Railways
vii) Military Engineering Services
viii) Local Bodies
ix) Survey of India
x) State Electricity Department/Boards
xi) Telecommunication Department
xii) Teaching profession
xiii) Public sector / private construction companies/ Architectural firms or Offices.
xiv) Service sector i.e. Estate Offices of Business organizations/ Universities/Colleges, Hotels , Hospitals etc. specially for repair and maintenance of buildings and their upkeep.
xv) Supervision work for various construction sites.
xvi) Drafting on AutoCAD / Revit for Outsourcing companies
xvii) Technical institutions.

b) Self employment opportunities:

i) Approved building planner from Local Authorities
ii) Execution and supervision of Renovation projects
iii) Preparation of 3-D Perspective views of buildings for Architects and consultants
iv) Own unit / enterprise for
a) Model Making
b) Landscaping
c) Drawings on CAD/ REVIT

v) Interior design related works like: White washing, distempering, repair and maintenance of buildings, POP work, texture work, false ceiling, specialized flooring ,Anti - termite treatment etc.

vi) Establishing an Outsourcing company of Computerized Drafting

vii) Construction material suppliers/ marketing

viii) Estimating and costing jobs/ bill of Quantities

ix) Water proofing of existing and new building

x) Rain water harvesting system installation

xi) Services to architectural and construction firms:

-Site Supervision
-Site Surveying and layout
-Estimation and Billing
-Site/ marketing of building components
-Liaison work

4. LEARNIG OUTCOME OR COMPETENCY PROFILE OF DIPLOMA HOLDERS IN ARCHITECTURAL ASSISTANTSHIP

Keeping in view the employment opportunities given above, following are the important activities (priority-wise) of diploma holders in Architectural Assistantship:

i) Preparation and Interpretation of drawings:
- Preliminary drawings (Line plans, sketching, tracing)
- Presentation drawings (Rendering in black and white, colour, perspective drawings
- Submission drawings
- Structural drawings
- Working drawings and detailing
- Preparation of prints and plots and their upkeep
- Maintenance of drawing records and files
- Services drawings

ii) Preparation of small building designs, master plans and layouts

iii) Site supervision/ management i.e. measuring, surveying and inspection

iv) Preparation of models:
- Study models
- Block models
- Detailed Model

v) Assistance in preparation of tender documents and cost estimates, including valuation

vi) Preparation of submission documents for approval from Development Authorities

vii) Interior designing, execution and layout

viii) Management of Architect's office

ix) Market survey of construction materials

Keeping in view the employment opportunities and job profile of diploma holders of Architectural Assistantship, following LEARNING OUTCOME or competencies are required to be developed in the students:

i) Development of skills in free-hand sketching, lettering and preparation of presentation, submission, structural and working drawings and detailed thereof

ii) Development of basic knowledge and skills for preparing small building designs and layouts

iii) Development of skills in model making using different materials

iv) Development of skills in preparation of municipal drawings/ submission drawings, corporation drawings and related documents

v) Development of knowledge and skills in site management comprising of measurement, surveying and inspection

vi) Development of basic knowledge and skills in preparing rough estimates, preparation of detailed estimates and tender documents for small buildings

vii) Development of skills in taking out prints/ plots, cloth mounting, colouring and folding of prints and their up keep

viii) Appreciation of basic knowledge regarding various building materials and construction techniques

ix) Development of basic knowledge about elements & principles of theory of design

x) Development of basic knowledge of history of architecture, town planning and building bye-laws, with emphasis on construction techniques

xi) Development of knowledge and skills in applications of computers in architecture

xii) Development of basic understanding of resource systems helping in the financing of small enterprises

xiii) Development of basic knowledge of climatology, environment and ecology

xiv) Understanding the behavior of structural elements of building

xv) Development of basic understanding of building services

xvi) Development of communication and managerial skills

xvii) Development of basic hand-on practice skills

xviii) Demonstrate appropriate values and attitude.

5. DERIVING CURRICULUM AREAS FROM LEARNING OUTCOME / COMPETENCY PROFILE

Sr.	Competency Profile	Curriculum Areas
1.	Apply basic principles of Mathematics and Science to solve engineering problems	• Applied Mathematics • Applied Physics • Applied Chemistry
2.	Development of skills in free-hand sketching, lettering and preparation of presentation, submission, structural and working drawings and detailed thereof	• Graphic Presentation and Art • Architectural Design • Construction and Material • Building Science (Climatology, P.H.E. and Electrical services) • Structure
3.	Development of basic knowledge and skills for preparing small building designs and layouts	• Architectural Design • Building Science (Climatology, P.H.E. and Electrical services) • Construction and Material • Landscape Design
4.	Development of skills in model making using different materials	• Architectural Design
5.	Development of skills in preparation of municipal drawings /submission drawings / corporation drawings	• Architectural Design • Municipal Drawing
6.	Development of knowledge and skills in site management comprising of measurement, surveying and inspection	• Construction and Material • Surveying • Construction Management, Accounts and Professional Practice
7.	Development of basic knowledge and skills in preparing tender documents, rough estimates and also preparation of detailed estimates for small buildings	• Surveying • Estimating, Costing and Specifications
8.	Development of skills in taking out prints, cloth mounting, colouring and folding of prints/ plots and their up keep	• Working Drawing • Architectural Design • Construction Management, Accounts and Professional Practice • Basics of Information Technology

9.	Development of basic knowledge regarding various building materials and construction techniques	• Construction and Material • Project and Professional Training
10.	Appreciation of basic knowledge about elements and principles of theory of design	• Graphic Presentation and Art • Architectural Design
11.	Development of basic knowledge of history of architecture, town planning and building drawings with emphasis on computer techniques	• Computer Aided Design • Town Planning • History of Architecture
12.	Development of basic knowledge and skills in applications of computers in architecture	• Basics of Information Technology • Software Applications in Architecture
13.	Development of basic understanding of resource systems helping in the financing of small enterprises	• Construction Management, Accounts and Professional Practice
14.	Development of basic knowledge of climatology, environment, Energy conservation and ecology	• Building Science (Climatology, P.H.E. and Electrical services) • Environmental Studies • Energy conservation
15.	Understanding the behaviour of structural elements of building	• Structures
16.	Development of basic understanding of building services	• Building Science • Architectural Design
17.	Development of communication and Soft skills	• Communication Skills • Student Centred Activities
18.	Use basic concepts and principles of fluid mechanics as applied to Architectural practices.	• Applied Mechanics
19.	Development of basic hand-on practice skills	• Workshop Practice
20.	Demonstrate appropriate values and attitude.	• Student Centred Activities • Universal Human Values

6. ABSTRACT OF CURRICULUM AREAS

i) HUMANITIES & SOCIAL SCIENCES COURSES (HS)

1. Communication Skills in English
2. Sports & Yoga
3. Entrepreneurship and Starts-ups

ii) BASIC SCIENCES COURSE (BS)

4. Mathematics
5. Applied Physics
6. Applied Chemistry*

iii) ENGINEERING SCIENCE COURSE (ES)

7. Engineering Graphics
8. Engineering Workshop Practice
9. Introduction to Information Technology
10. Fundamental of Mechanical and Electrical Engg.
11. Engineering Mechanics

iv) PROGRAMME CORE COURSE (PC)

1. History of Architecture
2. Graphic Presentation and Art*(Student of Architectural Assistantship may opt for this subject in place of Applied Chemistry)
3. Construction and Material-I
4. Architectural Design-A (Theory of Design)
5. Building Sciences (Climatology, P.H.E. and Electrical services)
6. Architectural Design-B (Model Making, Working Drawings, Perspective view)
7. Surveying
8. Construction and Material-II
9. Computer Aided Design
10. Structure-A
11. Architectural Design-B (Interior Schemes, Landscape Design, Municipal Drawings)
12. Town Planning
13. Estimating, Costing and Specifications
14. Professional Training (Internship)
15. Structure-B

16. Architectural Design-C (Group Housing, Commercial Complex, Community Buildings)
17. Earthquake Engineering Concepts
18. Software Applications in Architecture
19. Construction and Material-III
20. Construction Management, Accounts and Professional Practice
21. Portfolio (Major Project)

v) **PROJECT WORK, SEMINAR AND INTERNSHIP IN INDUSTRY OR ELSE WHERE**

- Summer Internship-I (4 weeks) after IInd Semester.
- Summer Internship-II (6 weeks) after IVth Semester.
- Major Project (In-House)/Internship / Industrial Training.

vi) **AUDIT COURSES (AU)**

- Environmental Science
- Essence of Indian Knowledge and Tradition
- Indian Constitution

OR

OPEN ELECTIVE (ADVANCED SKILL CERTIFICATE COURSE)

SR.NO.	COURSE NAME
1.	Course Conducted By Infosys Pringboard
2.	Course Conducted By Tcs Ion
3.	Course Conducted By Nasscom - Futureskills
4.	Course Conducted By Nptel
5.	Moocs Through Swayam
6.	Conducted By Aicte-Elis And Centrally Funded Technical Institutes
7.	Conducted By C-Dac
8.	Conducted By Certifications Conducted B Y The Institute Of National Importance (Iit,Nit,Iiit Etc.)
9.	Conducted By Isro E-Learning
10.	Conducted By Other Relevant Government, International/National Platforms Of Repute
11.	Conducted By Neilit

Or

Proposed Courses from TATA Technologies Ltd.

1. Fundamentals of Innovation and Design Thinking
2. Product Design and Development
3. Product Verification and Analysis
4. Advanced Automobile
5. Electric Vehicle
6. Internet of Things
7. Advanced Manufacturing
8. Advanced Welding & Painting using Simulator
9. Process Control & Automation
10. Industrial Robotics
11. Artisan using advanced tool
12. Advanced Plumbing

Note: Students may opt for any of the above advanced skill development courses and may get certificate against 02 credits (as mentioned in open elective-01).

7. STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN ARCHITECTURAL ASSISTANTSHIP

THIRD SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credit(C) (L+T)+P =C	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External	COURSE TYPE & CATEGORY
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT						
		L	T	P/Drg		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot		
3.1	Architectural Design-A	2	-	8	2+4=6	40	60	100	100	8	50 (Viva)	3	150	250	(PRACTICUM / THEORY+VIVA)
3.2	Surveying	2	-	-	2+0=2	40	-	40	60	3	-	-	60	100	PROGRAM CORE (THEORY)
3.3	Construction And Materials-I	2	-	4	2+2=4	20	40	60	90	3	-	-	90	150	(PRACTICUM / THEORY)
3.4	Building Science (Climatology, PHE & Electrical Services)	2	1	-	3+0=3	40	-	40	60	3	-	-	60	100	PROGRAM CORE (THEORY)
3.5	Surveying Lab	-	-	4	0+2=2	-	60	60	-	-	40	3	40	100	PROGRAM CORE (PRACTICAL)
3.6	Programme Elective -1 (a) CAD (Computer Aided Design) (b) Working Drawing	1	-	4	1+2=3	20	40	60	-	-	40	3	40	100	PROGRAM CORE (PRACTICUM+ viva)
3.7	Summer Internship -I (4Weeks after 2nd Sem.)	-	-	-	1	-	50	50	-	-	-	-	-	50	(PRACTICAL)
#Student Centered Activities(SCA)		-	-	6	-	-	50	50	-	-	-	-	-	50	
Total		9	1	26	21	160	300	460	310		130		440	900	

NOTE:-

(1) Each period will be of 60 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks

(4) Remaining periods will be utilized for revision etc.

(5) PRACTICUM: It means that the teacher supervise and involves students in practical application of previously studied theory.

STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN ARCHITECTURAL ASSISTANTSHIP
FOURTH SEMESTER

Sr. No.	SUBJECTS	STUDY SCHEME Periods/Week			Credit(C) (L+T)+P =C	MARKS IN EVALUATION SCHEME								Total Marks of Internal & External	COURSE TYPE & CATEGORY
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT						
		L	T	P/Drg		Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot		
4.1	Architecture Design-B	1	-	8	1+4=5	40	60	100	100	8	50 (Viva)	3	150	250	(PRACTICUM / THEORY+VIVA)
4.2	History of Architecture	2	1	-	3+0=3	40	-	40	60	3	-	-	60	100	PROGRAM CORE (THEORY)
4.3	Construction And Materials-II	1	-	4	1+2=3	30	30	60	90	3	-	-	90	150	(PRACTICUM / THEORY)
4.4	Structure-A	2	1	-	3+0=3	40	-	40	60	3	-	-	60	100	PROGRAM CORE (THEORY)
4.5	Estimating, Costing And Specifications	3	-	-	3+0=3	40	-	40	60	3	-	-	60	100	PROGRAM CORE (THEORY)
4.6	Open Elective –01 (Q) a) Renewable Energy Technologies b) Energy Efficiency and Audit	2	-	-	2+0=2	50*	-	50*	-	-	-	-	-	-	OPEN ELECTIVE (THEORY)
	*Advance Skill Development c) Advance Plumbing (Tata Tech.)														CERTIFICATION COURSE
4.7	Essence of Indian Knowledge & Tradition (Q)	2	-	-	0	50*	-	50*	-	-	-	-	-	-	(AUDIT COURSE)
#Student Centered Activities(SCA)		-	-	9	0	-	50	50	-	-	-	-	-	50	
Total		13	2	21	19	190	140	330	370		50		420	750	

NOTE:-

1. (Q) - It is compulsory to appear & to pass in internal assessment, But marks will not be included for division and percentage of obtained marks.
2. # Student Centered Activities will comprise of co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visit, Library, N.C.C., NSS, Cultural Activities and self-study etc.

8. GUIDELINES FOR ASSESSMENT OF STUDENT CENTRED ACTIVITIES (SCA)

It was discussed and decided that the maximum marks for SCA should be 50 as it involves a lot of subjectivity in the evaluation. The marks may be distributed as follows

i) 15 Marks for general behavior and discipline.

(by HODs in consultation with all the teachers of the department)

ii) 10 Marks for attendance as per following:

(by HODs in consultation with all the teachers of the department)

a. 75 - 80% 06 Marks

b. 80 - 85% 08 Marks

c. Above 85% 10 Marks

iii) 25 Marks maximum for Sports / NCC / Cultural / Co-curricular / NSS activities as per following:

(by In-charge Sports/NCC/Cultural/Co-curricular/NSS)

a. 25 - State/National Level participation

b. 20 - Participation in two of above activities

c. 15 - Inter-Polytechnic level participation

Note: There should be no marks for attendance in the internal sessional of different subjects.

THIRD SEMESTER

PRACTICUM	3.1 ARCHITECTURAL DESIGN -A	L	T	P
		2	-	8

COURSE OBJECTIVE:

Basic Design of Architecture is the foundation and first step for the beginners, who enter in the field of Architecture. It deals with theory of elements of architecture like form, graphics, composition, texture, colour, balance, etc. It is expected that the subject will fulfill the need. 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 design related assignments to students are expected to teach the application of various elements of design like form function, balance, light and 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.

COURSE OUTCOME:

- Explain basic principles of architectural design, such as form, space, scale, proportion, balance, and rhythm.
- Recognize the relationship between human needs and built environments.
- Apply creative thinking and problem-solving in developing architectural concepts.
- Translate user requirements into functional and aesthetically pleasing design solutions.

TOPIC WISE DISTRIBUTION OF PERIODS

Units	Topics	L	T	P
UNIT-I	Basic Design	**4**	**-**	**16**
UNIT-II	Introduction To Architectural Design	**4**	**-**	**16**
	A.Theory	**8**	**-**	**32**
	B. Design Studio -1. Small Simple Structures	**6**	**-**	**32**

		2. Single Storey Structures			
UNIT-III	Presentations-	1.Interior Schemes	**2**	**-**	**8**
		2. Perspective & Sciography	**2**	**-**	**4**
		3. Models	**2**	**-**	**4**

DETAILED CONTENTS

UNIT -I BASIC DESIGN:

1. Understanding Of Fundamentals (Space And Architecture):

Understanding of General Design Principals and Elements of design through simple drawings and sketching of objects available in nature and surroundings.

UNIT – II INTRODUCTION TO ARCHITECTURAL DESIGN :

A.Theory :

1. FORM AND TRANSFORMATIONS :

Additive, dimensional subtractive exercises primarily through 3-D models of simple geometry.

2.**Order In Architecture :**
Geometrical, structural, dimensional, material, spatial orders through observation of surroundings as well as simple exercises in 2D and 3D.

3. **Anthropometry:**
Introduction to human dimensions and functions in different posture through measured drawing of a class room, hostel room etc (Basic activities only).

4.**Structure System :**
Introduction of different types of structures i.e. trabeated, arcaded, vector active, form active and tensile through showing examples.

B. DESIGN STUDIO:

Design Problems:

Show examples to create forms, understanding of different types of space including circulation in a residence, office and school.

1. Small Simple Structures:
Design of small simple structures like milk booth, bus stop / petrol pump, small shop,

exhibition gate, hostel room etc.

2. Single Storey Structures:

Studio workshop which include simple and small design of a single storey structure problems involving horizontal/vertical circulation such as weekend cottage, milk bar, clinics, nursery schools etc.

Drawings to be produced:

- Site plan
- Floor Plans
- Elevations
- Sections
- Views
- Block Model

Time Problem: Plan showing furniture layout and section through a given mono-functional space such as a Café, classroom in a nursery school, parking lot etc.
(Minimum two projects to be done).

UNIT-III PRESENTATIONS:

1. Interior Schemes:

Preparing interior schemes for small residences, clinics, nursery and classroom in a primary school, restaurants, shops, sub-post office etc including plan showing furniture layout and section.

2. Perspective & Sciography:

Perspective, Sciography and Rendering be added so that the students may submit rendered drawings, and perspective drawing be prepared for at least one design.

3. Models:

One model of design in detail to be prepared by the students for which the materials etc. shall be supplied from the institution. 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.

INSTRUCTIONAL STRATEGY

- Drawing and model making skill will be taught along with the subject to improve

the abilities to understand space and form.

- Teachers, while imparting instructions, are expected to teach various elements used in designing buildings, they may make use of models and audio-visual aids to clarify the concepts. Group discussion and seminars may also be organised to discuss various concepts and principles involved in the design. It is recommended that they may organize visits to working sites to clarify the concepts and principles.

– 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.

- This is a practical oriented subject. Teacher should arrange visits to some of Model rooms of important buildings. Each student should be given independent exercises to make models. Teacher may procure some models of residential, group housing, commercial and public buildings made from different materials and demonstrate to the students.

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.

RECOMMENDED BOOKS

1. The Thomes and Hudson Manual of Rendering with Pen and Ink Robert W. Gill.
2. Rendering in Pen and Ink by Arthur L. Guptill edited by Susan .E. Meyer.
3. Time Saver Standards for Building Types by Joseph De Chiara and John Callendera; Publisher Tata McGraw Hill Publisher, New Delhi
4. Architects Data by Neufert; Publisher Blackwell Publishing Ltd. 9600 Garsington Road, *Oxford*, OX4 2DQ, UK **..**
5. Space, Time and Order by DK Ching; Publisher John Wiley & Sons, Wiley
6. Architectural Aesthetics by Sangeet Sharma, Abhishek Publication, 57-59, Sector 17, Chandigarh

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
UNIT-I	20	15
UNIT-II	98	70
UNIT-III	22	15
Total	**140**	**100**

THEORY	3.2 SURVEYING	L	T	P
		2	-	-

COURSE OBJECTIVE:

The important functions of a diploma holder in Architecture Assistantship includes the jobs of detailed surveying, plotting of survey data, preparation of survey maps and setting out works. The curriculum has been designed to develop the skill in each type of survey like chain surveying, compass surveying and leveling that the diploma holder in Architectural Assistantship will normally be expected to perform. Plane table surveying, contouring, theodolite surveying, curves and use of minor instruments have also been included in this subject.

Field work should be a selected one so that students can check their work and have an idea of the extent of error in the work done. As far as possible, the surveys done should be got plotted, as this will also reveal errors in the work and develop the skill of plotting.

COURSE OUTCOMES:

After completing the course, the students will be able:

- To attain knowledge about various measurement systems and the methods.
- To use the various measuring equipments / instruments and their applications.
- To develop the skill of keeping and maintaining field records in book.
- To develop the skill of preparing plotted drawings of the field.
- To acquire knowledge of calculating area of regular and irregular fields.
- To develop the skill of finding out levels and to draw contours on drawing sheet.

TOPIC WISE DISTRIBUTION OF PERIODS

Units	Topics	L	T	P
1	Chain Survey	**5**	**-**	**-**
2	Areas	**5**	**-**	**-**
3	Compass Surveying	**5**	**-**	**-**
4	Leveling	**5**	**-**	**-**
5	Theodolite	**2**	**-**	**-**
6	Plane Table Surveying	**4**	**-**	**-**
7	Total Station	**2**	**-**	**-**
	TOTAL	**28**	**-**	**-**

DETAILED CONTENTS

Introduction:

- Basic principles and types of surveying.
- Concept of surveying, purpose of surveying, measurements; Linear and angular, units of measurements
- Instruments used for taking these measurement, classification of survey based on instruments
- System of conversion of land measurements from traditional revenue Maps / records to MKS system.

1. CHAIN SURVEY:

Different kinds of chains, Principles of chain survey, Equipment and instruments. The field book, method of keeping the field book. Obstacles in chain survey, Correction of length and areas due to error in chain length from standard length.

2. AREAS:

Computation of areas of regular figures. Computation of areas of irregular figures by means of formulas, Mean ordinate method, Trapezoidal rule, Simpson's rule, Area by means of planimeter.

3. COMPASS SURVEYING:

Prismatic compass, its use, whole circle bearings and reduced bearing. Magnetic variation, Local attraction and its elimination. Compass Traversing, Plotting, Closing error and its adjustment by graphical and other methods.

4. LEVELLING:

Theory of leveling, Entering the readings in level book, Computing of RL by "Line of collimation" method, "Rise & Fall" method. Curvature and Refraction, Reciprocal Leveling, Temporary and permanent adjustments of Dumpy levels, contours and their uses. Contour interval, Characteristics of contours, Methods of contouring

5. THEODOLITE: (Brief idea only)

The use of theodolite in taking horizontal and vertical angles. Interpretation of plans from architectural point of view.

6. PLANE TABLE SURVEYING:

Purpose of plane table surveying, Equipment used in plane table survey, centering, leveling and orientation of plane table. Methods of plane table surveying - Radiation, Intersection, Traversing, Resection, Two point problem and Three point problems.

7. TOTAL STATION (Brief Idea Only)

The use of Total Station in finding the Horizontal and Vertical angles as well as finding out level in building elevation.

INSTRUCTIONAL STRATEGY

This is highly practice-oriented course. While imparting theoretical instructions, teachers are expected to demonstrate the use of various instruments in surveying, stress should be laid on correct use of various instruments so as to avoid/minimize errors during surveying. It is further recommended that more emphasis should be laid in conducting practical work by individual students

RECOMMENDED BOOKS

1. "Surveying"; Narinder Singh; New Delhi, Tata McGraw Hill Publishing Co Ltd.
2. "Text Book of Surveying"; Hussain, SK and Nagraj, MS; New Delhi, S Chand and Co Ltd.
3. "A Text Book Surveying and Levelling"; Deshpande, RS; Poona, United Book Corporation
4. "A Text Book of Surveying" Kocher, CL; Ludhiana, Katson Publishing House
5. "Surveying and Leveling, Kanetkar, TP and Kulkarni, SV., ", Poona, AVG Parkashan
6. "Surveying and Leveling-Vol.2" Kanetkar, TP; and Kulkarni, SV; Poona, AVG Prakashan
8. "Surveying and Leveling- Vol.2", Punima, BC; Delhi Standard Publishers Distributors, Delhi
8. "A Text Book of Surveying Vol. 2", Shahai, PB; Oxford and IBH Publishing Co.
9. Fundamentals of Surveying by Roy SK; Prentice Hall of India (P) Ltd., New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Periods Allotted (Hrs)	Marks Allotted (%)
1	5	20
2	3	15
3	5	18
4	5	18
5	3	06
6	5	18
7	2	05
Total	**28**	**100**

PRACTICUM	3.3 CONSTRUCTION AND MATERIALS-I	L	T	P
		2	-	4

(The Study of Constituents, Properties, Uses & Application)

COURSE OBJECTIVE:

The subject deals with the properties and uses of different elementary building materials like brick, stone, timbers etc. and the construction principles of various components of buildings like foundation, masonry, lintels, etc. The knowledge of working materials is a must for a designer. The paper aims at fulfilling the need.

TOPIC WISE DISTRIBUTION OF PERIODS

Units	Topics	L	T	P
1	Elementary Building Materials	**4**	**-**	
2	Timber	**4**	**-**	
3	Construction	**6**	**-**	
4	Brick Foundation and D.P.C.	**6**	**-**	
5	Arches & Lintels	**2**	**-**	
6	Doors & Windows	**2**	**-**	
7	Types of Roof	**4**	**-**	
	TOTAL	**28**	**-**	**56**

DETAILED CONTENTS

1. ELEMENTRY BUILDING MATERIALS:

   Brick, Stone, Lime, Cement and Concrete.

2. TIMBER:

   Defects and decay, seasoning preservation and different varieties of Timber.

3. CONSTRUCTION:

   Elements of Building :

   Terminology, Nomenclature of various parts of building from foundation of roof which support to making a complete wall section from foundation of parapet.

General principles of construction in brick toothing, brick on edge and brick on end etc., Bats and closers , Bonds in Brick work, stretching bond, English bond, double and single Flemish Bonds etc. in different types of mortars.

4. BRICK FOUNDATIONS & D.P.C. :

Definition and purpose of foundations, Introduction to different types of foundations. Timbering to trenches for foundations. Study of simple strip foundations for load bearing walls and piers, method of laying D.P.C.

5. ARCHES & LINTELS:

Definition & terms used in Arches, construction of Arches in brick and stone. Different types of lintels.

6. DOORS & WINDOWS:

Introduction to joints in carpentry and various types of doors & window, construction of door / window frames.
Introduction of Batten doors, Ledged and batten doors and Ledged, Braced and batten doors, Details of Paneled doors and Flush doors. Details of hardware related to these doors.

7. TYPES OF ROOF:

Introduction to different types of roofs roof covering with their suitability to various functions e.g. flat, couple, close couple, Lean to and double lean to roof. Roof coverings with thatch, slate and tile.

LIST OF PRACTICALS:

1. Identification of different types of building materials.

2. Different types of bonds in brick masonry.

The studio and workshop periods are devoted to the solution of simple construction problems and details.

Note: Total minimum of 10 sheets to be assigned.

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 underlying concepts, principles, and procedures.

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. Building Construction by WB Mckay; Longman Publication, Khanna Publisher, New Delhi
2. Building Construction by SP Bindra and SP Arora; publisher Dhanpat Rai & 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
8. A Course in Civil Engineering by V.B.Sikka, Published by Tata McGraw Hill Publisher,New Delhi
9. Sharma, SK; and Mathur, GC; "Engineering Materials;" Delhi-Jalandhar, S. Chand and Co.
10. Surendra Singh; "Engineering Materials;" New Delhi, Vikas Publishing House Pvt. Ltd.
11. Choudhary, N; "Engineering Materials;" Calcutta, Technical Publishers of India.
12. Gurcharan Singh; Engineering Materials, Standard Publishers Distributors, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Periods Allotted (Hrs)	Marks Allotted (%)
1	5	20
2	3	15
3	5	18
4	5	18
5	3	06
6	5	18
7	2	05
Total	**28**	**100**

THEORY	3.4 BUILDING SCIENCE (CLIMATOLOGY, P.H.E. & ELECTRICAL SERVICES)	L	T	P
		2	1	-

COURSE OBJECTIVE:

The subject deals with basic requirements for building orientation in respect of climatic conditions. The essential human needs of water supply, sewage disposal and electrical services in buildings have been included in this subject. Students 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.

LEARNING OUTCOMES

After completing the course, the students will be able to:

- To attain knowledge about ecosystem, Environment and its resources.
- Comprehensive knowledge of climatic impact on the built environment.
- To develop the skill of preparing working drawings of plumbing system.
- To have knowledge about plumbing and sanitary fixtures and their use.
- Select materials and fixtures to make a layout as per given specification/drawing.
- To develop the skill of preparing working drawings of Electrical system.
- To know about Electrical fixtures and Lighting effect on exterior and interiors.
- To know about lift/escalator, fire-fighting system, HVAC and its application
- To understand the use and application of Acoustic materials in buildings.

TOPIC WISE DISTRIBUTION OF PERIODS

Units	Topics	L	T	P
UNIT-I	Climatology	**6**	**3**	**-**
UNIT-II	Public Health Engineering			
	A. Water Supply	**6**	**3**	**-**
	B. Sewerage & Drainage	**8**	**4**	**-**
UNIT-III	Electrical Services/ Mechanical Services	**8**	**4**	**-**
	TOTAL	**28**	**14**	**-**

DETAILED CONTENTS

1. CLIMATOLOGY:

Climate geographical and physical factors, Temperatures, Rainfall, Wind, Sky, ground, Vegetation, Micro climate and Macro climate, seasons, movement of the sun, sun charts, use of climatic data, Climatic factors in designing buildings, sun protection devices.

1. General Introduction (06 Pds)

- 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 (02 Pds)

- Macro-micro climatic effects
- Concept of comfort zone and bio-climatic chart
- Climatic evaluation by season

3. Sun Control and shading devices (without calculations) (06 Pds)

- 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

2. PUBLIC HEALTH ENGINEERING:

a. **Water Supply:** (08 Pds)

Sources of water supply impurities of Domestic water, Domestic water supply, Water piping system, Average consumption of water for various activities based on Per Capita Calculation of water consumption.

b. **Sewerage & Drainage:** (10 Pds)

Internal and external drainage, Basic principles of sanitation and disposals of waste matter from the building. Plumbing of buildings. Different system of plumbing of toilets in buildings. To prepare sanitary and water disposal schemes for waste water and surface drainage.

Planning of bathrooms and lavatory block in domestic buildings, standard type of sanitary fittings and fixtures, Joints, Traps, Flushing cisterns, Manholes and septic tank, Intercepting Chambers/Inspection chambers and their location, Ventilation of sewers. With detailed knowledge of various available materials of pipe.

3. ELECTRICAL/ MECHANICAL SERVICES:

Electrical Services : (06 Pds)

House wiring, L & F points, Electrical and Mechanical Fixtures, Simple electrical layouts showing panels, Distribution boards, Consumer units, Circuit breakers, High Resistance Circuit (HRC) various types of switches, sockets, conduits. with detailed knowledge of various sizes and materials of wires.

Mechanical Services : (02 Pds)

Types of Lifts, Working of lifts with details of lift section describing various parts of lifts. Escalator- types of escalators, Fundamentals of escalators, Function and working of escalators.

Fire Detection, Fire Alarm and Fire Fighting : (02 Pds)

Fire detection equipment - Heat and smoke sensors, Fire alarm System.

Fire-fighting Equipment - Ladders, Snorkel Ladder, Fire Fighting Pump and Water Storage, Hose and Hose Fitting, Dry and wet risers, Automatic sprinklers, Fire extinguisher, Fire escape, Fire doors and water curtains.

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. A material lab cum Museum must be made available for effective and functional teaching.

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.

Students are supposed to show Water supply, Sanitary, Electrical arrangements in one of the small house. They should show Water supply line, Sewer line showing the position of Manholes, Septic tank, Traps etc.

STUDY REPORT AS AN ASSIGNMENT

A study report on the effect of climate and environment on contemporary buildings such as residential, commercial and public buildings should be prepared by the students. The study should emphasize on orientation of court-yards, windows, jallies, chajjas, landscape and various other sun and wind control devices.

RECOMMENDED BOOKS

1. Handbook of Designing and Installation of Services in Building Complex - High-rise Buildings by VK Jain, Publication. Khanna Publishers, New Delhi Khanna 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. National Building Code

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	12	30
2	18	45
3	12	25
Total	**42**	**100**

PRACTICAL	3.5 SERVEYING LAB.	L	T	P
		-	-	4

COURSE OBJECTIVE:

Field work should be a selected one so that students can check their work and have an idea of the extent of error in the work done. As far as possible, the surveys done should be got plotted, as this will also reveal errors in the work and develop the skill of plotting.

COURSE OUTCOMES:

After completing the course, the students will be able:

- To attain knowledge about various measurement systems and the methods.
- To use the various measuring equipments / instruments and their applications.
- To develop the skill of keeping and maintaining field records in book.
- To develop the skill of preparing plotted drawings of the field.
- To acquire knowledge of calculating area of regular and irregular fields.
- To develop the skill of finding out levels and to draw contours on drawing sheet.

FIELD WORK:

CHAIN SURVEYING:

Ex.(i) (a) Ranging a line.
(b) Chaining a line and recording in the field book.
(c) Testing and adjustment of chain.

Ex.(ii) Chain survey of a small area. Plate 1

Ex.(iii) Chaining a line involving obstacles in ranging.

Ex.(iv) Use of Planimeter for computing areas

COMPASS SURVEY:

Ex.(v) (a) Setting the compass and taking observations.
(b) Measuring angles between the lines meeting at a point by prismatic compass.

Ex.(vi) Traversing with the prismatic compass and chain of a closed traverse. (Recording and plotting by included angles) Plate 2

Ex.(vii) Determination of local attraction at a station by taking fore and back

bearing.

Ex.(viii) To find true bearing of a line at a place.

LEVELLING:

Ex.(ix) To find the difference of level between two distant points by taking staff readings on different stations from the single setting.

Ex.(x) To find the difference of level between two points by taking atlest four change points. Plate 1

Ex.(xi) Setting a gradient by IOP level. Plate 1

Ex.(xii) Contouring of a small area by indirect methods Plate 1

PLANE TABLING:

Ex. (xiii) (a) Setting the plane table Plate-1
(b) Marking the North direction.
(c) Plotting a few points by radiation method.

Ex. (xiv) (a) Orientation by Plate-1
- Trough compass
- back sighting.

(b) Plotting a few points by intersection method.

Ex. (xv) Traversing an area with a plane table (at least four lines) Plate-1

Ex. (xvi) (a) Two point problem. Plate-2
(b) Three point problem by - Trial and error method. (Lehman's Rule)

THEODOLITE:

Ex. (xvii) Drill for taking out the theodolite, mounting on the tripod and placing it back in the box.

Ex.(xviii) Reading the vernier and working out the least count, measurement of horizontal angles by repetition method. Plate 1

Ex. (xix) Measurement of vertical angles by the use of theodolite.

TOTAL STATION:

Ex. (xx) Demonstration of Total Station

Ex. (xxi) Measurement of Levels in Building Elevation

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3.6 PROGRAMME ELECTIVE-I

PRACTICAL	(a) CAD (COMPUTER AIDED DESIGN)	L	T	P
		1	-	4

COURSE OBJECTIVE:

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 (Latest version or AutoCAD2025)** (04 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** (04 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** (10 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** (06 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** (14 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** (10 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** (09 hrs)

- Dimension type, style, unit
- 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. as per plotting paper size.

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

8. **Plotting Drawings** (05 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

9. **Introduction of 3-D Modeling for making Perspective views** (08 hrs)

INSTRUCTIONAL STRATEGY

This is a highly practical oriented subject. Efforts should be made by the teachers to procure relevant software and give practical exercises to individual students, so that they develop proficiency in operating computer software 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 software, so that they develop confidence and are able to work independently.

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

3.6 PROGRAMME ELECTIVE-I

PRACTICAL	(b) WORKING DRAWING	L	T	P
		1	-	4

COURSE OBJECTIVES:

To understand working drawings/ detail drawings necessary for final execution of a project.

COURSE OUTCOME:

After undergoing the subject knowledge the students will be able to;

- Apply the purpose, scope, conventions and workflow of Architectural working drawings.
- Prepare a complete scaled submission drawing for municipal corporation/ development authority.
- Centre-line, plans, sections, elevations, door-window schedules, stair / railing, compound wall, electrical, plumbing, toilet and interior layouts.
- Use the working drawing set as a tool to supervise construction work at site.

TOPIC WISE DISTRIBUTION OF PERIODS

	Topics	L	T	P
Unit-I	PLANS	3	-	12
Unit-II	SECTION, ELEVATION	3	-	12
Unit-III	ELECTRICAL PLUMBING	3	-	12
Unit-IV	TOILET AND KITCHEN	2	-	10
Unit-V	STAIRCASE	3	-	10

DETAILED CONTENTS

Making complete set of working Drawings and Details for the residence presented earlier or any other small project designed in any of the previous semester. The drawings to also incorporate electrical and plumbing details complete with schedule and all specifications. The Working Drawings and details to include:

UNIT-I

1. Site plan
2. Foundation layout with details of foundations.
3. Ground floor Plan.
4. First Floor Plan.
5. Terrace Plan

UNIT-II

1. Sections
2. Elevations.
3. Doors and Windows details

Unit-III

1. Electrical Layout in at least one of the two Floors.
2. Plumbing Layout in at least one of the two Floors.

Unit-IV

1. Toilet details complete with all fixtures and their specifications.
2. Kitchen details complete with all fixtures and their specifications.

Unit- V

1. Staircase Details including railings.

INSTRUCTIONAL STRATEGY

- Course would be covered through lectures and display.
- Regular studio work for total grasp.
- Visit locally available construction sites.

RECOMMENDED BOOKS –

1. The Professional Practice Of Architectural Working Drawings By B.S. Rao
2. Building Drawing By M.G. Shah, C.M. Kale, S.Y. Patki
3. Working Drawing Handbook By Keith Styles And Andrew Bichard
4. Civil Engineering Drawing By M. Chakraborti
5. Architectural Drawing By D.K. Ching
6. Building Construction And Drawing By Sushil Kumar

SUGGESTED DISTRIBUTION OF MARKS

Units	Time Allotted (Periods)	Marks Allotted (%)
1	15	20
2	15	20
3	15	20
4	13	20
5	12	20
Total	**70**	**100**

FOURTH SEMESTER

PRACTICUM	4.1 ARCHITECTURAL DESIGN -B	L	T	P
		1	-	8

(Studio, Working drawing, interior schemes Architectural forms, models & seminars)

COURSE OBJECTIVE:

The architectural design has been divided in three papers A,B, & C. Paper-A deals with the fundamental concepts and principles of design and Paper-B deals with the application of these principles for making certain categories of buildings of common use. The paper-C deals with the design of many more buildings of common utility and their interior decoration and civic and municipal bye-laws under effect.

COURSE OUTCOME:

- Design simple architectural spaces such as residential units, small public buildings, or community structures.
- Understand spatial organization and circulation patterns in architectural layouts.
- Prepare architectural drawings (plans, elevations, sections) using manual and computer-aided drafting (CAD).
- Use appropriate graphic techniques to visually communicate design ideas.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topics	L	T	P
1.	Studio	6	-	36
2.	Working Drawing	2	-	30
3.	Interior Schemes and Architectural Forms	5	-	24
4.	Model	1	-	22
	TOTAL	14	-	112

DETAILED CONTENTS

1. **STUDIO:**

Understanding of building bye laws : Horizontal and Vertical circulations, materials restrictions, different types of area and their role i.e. Floor area ratio (FAR), Floor space index (FSI), Carpet area, Floor area, Plinth area, Built up area, Covered area, usable area, circulation area, super area, height restriction, Setbacks, Ground coverage or foot print, Width of road and right of way and other related terms/ bye laws of concern local authority.

Understanding of Design according to climate and site constraints : sun movement, air movement, sloped/ contoured site, building orientation, space placement and proposed construction materials should be in-support (Vernacular) to climate responsive building.

Design exercises could be focused on Duplex residential building, Primary school, commercial complex, library buildings with reading room, small hospital, picnic spot, college canteen, recreation building etc. having plan elevation, section, perspective of above buildings, views showing the interior scheme (work of student must reflect the understanding of fundamentals like; inter - space co-relation and their connectivity to each other as described in syllabus of Architectural Design "A").

2. **WORKING DRAWING:**

Working drawing of at least one design be prepared. All drawings submitted will be rendered, design seminar be added like IIIrd semester Architectural Design-A.

3. **INTERIOR SCHEMES AND ARCHITECTURAL FORMS:**

Preparing interior schemes for single rooms, especially in residential houses, offices, Entrance lobbies etc. Draw plans, Elevations and colour schemes.

Architectural Murals for different types of buildings such as Auditorium, Recreation centers, Museums etc. Rendering of all types of perspectives in pencil, ink and colours.

Acoustics: Brief description of basic terms used in acoustics and reverberation time, Acoustical treatment on walls, Floors and ceilings to be taught to students especially for small recording studio, seminar halls etc.

4. **MODEL:**

One model of a design to be prepared by the students for which materials may be selected out of; photographic mount board, Wood, Acrylic sheet be used for making models.

NOTE :

At least Two Submission should be drawn on AUTOCAD and to be presented on suitable size of sheet with desired scale.

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
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, New Delhi
4. Architectural Aesthetics by Sangeet Sharma, Abhishek Publication, Chandigarh

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	42	40
2	32	25
3	29	25
4	23	10
Total	**126**	**100**

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THEORY	4.2 HISTORY OF ARCHITECTURE	L	T	P
		2	1	-

COURSE OBJECTIVES:

The past work is always a foundation for progress. The knowledge of past achievements in any field is helpful for improvement and restoration. The knowledge of this course will help the students to understand how political, physical, social, economic and technological change affects the architecture, materials and construction techniques. So this subject provide the students a sense of historical developments in this field to appreciate the past skills, technology and materials used in the construction of buildings.

COURSE OUTCOME:

- Identify and describe major architectural styles and elements from ancient to modern periods, including Indian and global traditions.
- Analyze and compare architectural forms, construction techniques, and materials used in historic structures.
- Illustrate the evolution of architectural features such as domes, arches, columns, and vaults through sketches and diagrams.
- Appreciate and document traditional Indian architecture, including temple, Islamic, and colonial architectural styles.
- Apply knowledge of historical architecture to inspire design ideas and contextual relevance in contemporary projects.

TOPIC WISE DISTRIBUTION OF PERIODS

	Topics	L	T	P
Unit-I	Basic of Indian Architecture	07	03	-
Unit-II	Basic of Islamic Architecture	06	03	-
Unit-III	Western Architecture-I	05	03	-
Unit-IV	Western Architecture-II	05	02	-
Unit-V	Modern Architecture	05	03	-

DETAILED CONTENTS

UNITS -1 BASIC OF INDIAN ARCHITECTURE: (10 periods)

The study of the Indian Architecture, with special emphasis on the concept of form and structure, from earliest time and to include Buddhist, Hindu and Jain Periods.

1. **Buddhist Architecture**
   (a) Stupa (Sarnath, Sanchi)
   (b) Chaityas & Viharas (Ajanta & Ellora)

2. **Hindu Architecture**
   (a) Northern style(Sun Temple Konark, Kandariya Mahadev (Khajuraho M.P.)
   (b) Dravidian style (Brihadeeshwar Temple Thanjavur, Meenakshi Temple Madurai)

3. **Jain Architecture**
   (a) Temple Architecture (Adinath Temple, Dilwara Jain Temple)

UNITS -II BASIC OF ISLAMIC ARCHITECTURE: (9 periods)

(a) Imperial Style (Qutub Complex)
(b) Provincial style - (Jaunpur – Atala Masjid, Jami masjid , Bijapur – Gol Gumbad)
(c) Mughal Style (Buland Darwaza ,Humayun's Tomb, Red fort Delhi)

UNITS -III WESTERN ARCHITECTURE-I : (7 periods)

(a) Egyptian & West Asiatic (Pyramid of Giza ,Ziggurat – Ur Nammu, Sphinx)
(b) Greek & Roman Order - (Parthenon , Colosseum)
(c) Early Christian (**B**asilica-St. Peter's Rome)

UNITS -IV WESTERN ARCHITECTURE-II: (7 periods)

(a) Byzantine Architecture (St. Hagia Sophia)
(b) Gothic Architecture (Norte Dame,Paris)
(c) Renaissance Architetcure (Florence Cathedral)

UNITS -V MODERN ARCHITECTURE: (9 periods)

(a) Mies Van Der Rohe (Seagram Building)
(b) Frank Lloyd Wright (Falling Water)

Contemporary / Post Independence Architecture In India

(a) Le Corbusier (Secretariate Chandigarh)
(b) Charles Chorea (Bharat Bhawan)
(c) B.V. Doshi (C.E.P.T. University)

INSTRUCTIONAL STRATEGY

The subject may be taught through audiovisual aids, slides, Power Point 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. History Of Architecture by G.K. Hirasker
2. A History Of Architecture by Banister Fletcher

3. History Of Architecture by Satish Grover
4. History Of Architecture by Percy Brown
5. Indian Architecture , Percy Brown

SUGGESTED DISTRIBUTION OF MARKS

Units	Time Allotted (Periods)	Marks Allotted (%)
1	10	20
2	9	20
3	7	20
4	7	20
5	9	20
Total	**42**	**100**

PRACTICUM	4.3 CONSTRUCTION AND MATERIALS-II	L	T	P
		1	-	4

COURSE OBJECTIVE:

The fundamentals of the paper has already been dealt with in the previous semester and the students are aware of the materials and construction principles involved. With the development of the technology, many a more materials have come up. Their use in modern architecture is inevitable so their knowledge is also vital. These materials have been given place in this paper to make the knowledge complete.

COURSE OUTCOMES:

After completing the course, the students will be able :

- To acquire knowledge about various construction materials and their application.
- To understand the planning and details of staircase for its best placement.
- To draw the details of various elements of doors and windows.
- To draw the details of various elements of floors and cavity walls and their application methods.
- To acquire knowledge to stop entry of dampness and termite in buildings.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topics	L	T	P
1.	Materials	4	-	8
2.	Doors & Windows	2	-	16
3.	Staircases	3	-	16
4.	Damp Proofing	1	-	4
5.	Floors & Cavity Walls	4	-	12
	TOTAL	14	-	56

DETAILED CONTENTS

UNIT-I MATERIALS:

Properties and uses of Building materials such as Asbestos, Gypsum Product, Various types of Glass, Various types of Building Boards (Particle Board, Fiber Board, Block Board and Ply Board laminates), Plastics, Corks, Rubber, Aluminum, Steel, Various Flooring materials, Damp Proofing and Water Proofing Materials. Different types of adhesives.

UNIT-II DOORS AND WINDOWS:

Study of elements of buildings such as doors and windows in metal and wood including, sliding door, rolling shutter, revolving and collapsible doors, skylights.

UNIT-III STAIRCASES AND RAMPS:

- Definition and types of staircases as per staircase nomenclature, Planning and layout of staircase, Staircases of different materials; R.C.C., steel and Timber.
- Definition and types of ramps, purpose, slopes or Gradients.
- Drawing a dog leg wooden staircase
- Spiral steel staircase
- RCC staircase cast-in-situ

UNIT-IV DAMP PROOFING:

Definition and types of D.P.C. (damp proof course), Vertical D.P.C. and Damp proofing of Basements, Water tanks, Roof top Terraces. Special damp proofing arrangements for bathroom, W.C. and kitchen

UNIT-V FLOORS AND CAVITY WALLS:

Types of floor Cement Concrete flooring, Terrazzo flooring, Timber flooring, Various types of tile flooring. Purpose of providing cavity walls, Types of cavity walls.

Total Number of Drawings: Min. 10

INSTRUCTIONAL STRATEGY

Class instruction is to be supplemented by studies models and visit to construction sites.The studio periods are to be devoted to preparation of detailed construction drawings of all the above building elements. 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 underlying 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; ; publisher Dhanpat Rai & 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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Periods Allotted	Marks Allotted (%)
1	12	20
2	18	25
3	19	25
4	05	10
5	16	20
Total	**70**	**100**

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THEORY	4.4 STRUCTURES - A	L	T	P
		2	1	-

COURSE OBJECTIVES:

The subject is an important part of Architectural Assistantship Curriculum. Study of this subject enables the student to distinguish between different types of stresses and strains in the material, under the action of external forces. The student will learn to analyse simple structural elements for their design, which he usually needs in their professional life. The contents of the subject have been selected in such a way as they form the basis of structural design proposed to be taught in the succeeding year.

LEARNING OUTCOMES

After completing the course, the students will be able:

- To acquire knowledge about various construction materials and their application in terms of Structural safety and strength.
- To understand the planning and details of various types of building structures such as concrete, steel and wood.
- To calculate various loads over a structural member.
- To calculate bending moment and shear force for a particular structural member.
- To draw the details of load bearing members like footings, columns, beams and slabs.
- To draw the details of reinforcement in various concrete structural members.
- To acquire knowledge of design of reinforcement for small concrete structure.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topics	L	T	P
1.	Bending Moment and Shear Force	4	-	2
2.	Bending and Shear Stresses	4	-	2
3.	Combined Direct & Bending Stresses	5	-	2
4.	Slopes and Deflection of beams	5	-	3
5.	Columns & Struts	5	-	2
6.	Structural Steel Connections A. Riveted Joints B. Welded Joints	5	-	3
	TOTAL	28	-	14

DETAILED CONTENTS

1. Bending Moment and Shear Force:

Concept of a beam, and supports (Hinged, Roller and Fixed). Types of Beams: Simply supported, cantilever, fixed overhang and continuous beams, types of loads (distributed, point and varying). Concept of Bending Moment & Shear Force. Sign conventions. Bending moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to uniformly distributed, concentrated and uniformly varying loads. Relationship between load, shear force and bending moment. Point of maximum B.M. and contra flexure, concept of fixed and continuous beams.

2. Bending and Shear Stresses

Assumption of theory of simple bending. Derivation of the equation. M/I=F/Y=E/R. Concept of second moment of area, Radius of gyration, Theorems of parallel and perpendicular axes, Second Moment of area for sections: rectangle, triangle, circle, trapezium, angle, Tee, I, Channel and compound sections. Moment of resistance, section modulus and permissible bending stresses, Bending stresses in circular sections.

3. Combined Direct & Bending Stresses:

Concentric and eccentric loads, eccentricity, effect of eccentric load on the section, middle third rule; stresses due to eccentric loads. Examples in the case of Short columns, chimneys and dams.

4. Slopes and Deflections of Beams:

Definition of slope and deflection, sign convention. Circular bending. Calculation of maximum slope and deflection for the following standard cases by double integration or moment area method.

(1) Cantilever having point load at the free end. Cantilever having point load at any point of the span. Cantilever with uniformly distributed load over the entire span. Cantilever having U.D.L. over part of the span from free end. Cantilever having U.D.L. over a part of span from fixed end.

(2) Simply supported beam with point load at centre of the span. Simply supported beam with U.D.L. over entire span.

NOTE: All examples will be for constant moment of inertia without derivation of formulae.

5. Columns & Struts:

Definition of long column, short column and strut, slenderness ratio, equivalent length, critical load, collapse Load, end conditions of column. Application of Eular's and Rankine's formula (no derivation), simple numerical problems based on Euler's and Rankine's formulae.

6. Structural Steel and Connections

(A) Riveted Joints:

Types of rivets, permissible stresses in rivets. Types of riveted joints, Failure of riveted joints, Assumptions made in the design of riveted joints. Specification for riveted joints. Design of riveted joints for axially loaded members.

(B) **Welded Joints:**

Comparison between riveted and welded joints, types of welds, permissible stresses in welds, types of welded connections, strength of welded joint, Design of welded joints for axially loaded members.

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- Structural Mechanics-VS Prasad-Golgotia Publication Pvt. Ltd., New Delhi.
3- A text book of Engineering Mechanics- RK Rajput-Dhanpat Rai Publications Pvt. Ltd., New Delhi
4- Theory of Structures by Rajeev Kumar; Satya Prakashan, New Delhi.
5- Structural Analysis (Vo. 1 & 2) by SS Bhavikatti; Vikas Publishing House Pvt. Ltd., New Delhi – 110 014

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	06	15
2	06	15
3	07	15
4	08	18
5	07	17
6	08	20
Total	**42**	**100**

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THEORY	4.5 ESTIMATING, COSTING & SPECIFICATIONS	L	T	P
		3	-	-

COURSE OBJECTIVES:

This is an applied engineering subject. Knowledge of this subject will enable the Architectural Assistant to work out the quantities and cost of works relating to buildings and public health. The teachers should lay more emphasis on practical's to the extent possible.

LEARNING OUTCOMES

After completing the course, the students will be able:

- To understand the conversion of units and their application.
- To understand the methods of finding the various quantities to be used in buildings.
- To take out the quantity based estimates of the components of building .
- To analyze be rates of varies materials and labour components of the building.
- To acquire knowledge of specifications of various materials to be finalized for the application in a building or construction site.
- To find out the complete valuation of a constructed building or a purposed building.
- To acquire the detail knowledge of application of public health engineering components and their estimated quantities and the rates .

TOPIC WISE DISTRIBUTION OF PERIODS

Sl. No.	Topics	L	T	P
1.	Introduction	3	-	-
2.	Units	3	-	-
3.	Methods of Taking Out Quantities	4	-	-
4.	Detailed Estimate	6	-	-
5.	Analysis of Rates	6	-	-
6.	Specifications	6	-	-
7.	P. H. E. Items	6	-	-
8.	Valuation	8	-	-
	TOTAL	42	-	-

DETAILED CONTENTS

1. INTRODUCTION:

Introduction to Estimating: Types of building estimates, drawings, to be attached with these estimates. Preparation of rough cost estimates.

2. UNITS:

Units of measurement and units of payment of different items of works related to buildings.
Conversion of units

3. METHODS OF TAKING OUT QUANTITIES:

Different methods of taking out quantities: Centre line in- to-in/out-to-out methods.

4. DETAILED ESTIMATE:

Preparation of a detailed estimate, together with practice in taking of detailed quantities for simple items of work in respect of simple single storied building not more than two rooms. All the quantities from excavation to parapet including finishes should be taken out from the drawings prepared by the students or suggested by the teacher concerned. Also calculate the details of measurement and abstract of cost with the help of current SOR (schedule of rates) of UPPWD. Preparation of summery of cost and form "J". This task must be dealt as a small project.

5. ANALYSIS OF RATES:

Steps in the analysis of rates for the following items of work, requirement of material, labour, sundries and contractors profit.

(a) Earth work in excavation in foundation and trenches.

(b) Earth work in filling in foundation, trenches and up to plinth level.

(c) Plain Cement concrete in foundation.

(d) Brick work in foundation.

(e) Brick work in super structure.

(f) Plastering and Pointing.

(g) Flooring.

(h R.C.C. work in foundations, columns, beams, lintels and sunshade.

(i) R.C.C. work in roof slab.

(j) Wood work in doors and windows frames.

(k) Wood work in shutters of doors and windows.

(l) White washing, distempering, waterproof cement paint on walls and ceiling.

(m) Painting or polishing on doors and windows.

6. SPECIFICATIONS:

Need, General specifications of buildings, methods of writing specifications. Detailed specifications of the above items of work as in Topic-5 above.

7. P. H. E. ITEMS:

Preparation of estimate of P. H. E. (Public Health Engineering) items.

i. Preparation of detailed estimate for laying a water supply line.

ii. Preparation of detailed estimate for sanitary and water supply fittings in a domestic building containing one set of toilet ,septic tank and soak pit.

8. VALUATION:

Purpose of valuation, Principles of valuation, Definitions of terms such as description sinking fund, salvage and scrap value. Valuation of a building property by replacement cost method and rental return methods. Method of calculation of standard rent.

RECOMMENDED BOOKS

1. Estimating and costing in civil engineering by Dutta B.N (in English & Hindi) UBS Publishers Distributors Ltd .
2. Estimating costing and valuation by Dr. R.P. Retholiya Prof. Bhavesh V. Modi and Mayur
   R. Rethaliya atal prakashan , Ahemdabad .
3. Civil Engineering Hand Book by P.N. Khanna UBS Publishers .
4. सिविल अभियांत्रिकी आंकलन एवं मूल्याङ्कन (Civil Engineering Estimating & Costing) by Dr. v i m a l Gupta and Manisha Agarwal; Neelkanth Publishers Pvt. Ltd.

5. Estimating, Costing and Valuation (Civil) by Pasrija, HD, Arora, CL and S.Inderjit Singh; New Asian Publishers, Delhi,
6. Estimating and Costing by Mahajan Sanjay; Satya Parkashan, Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	3	8
2	3	7
3	4	10
4	6	15
5	6	15
6	6	15
7	6	15
8	8	15
Total	**42**	**100**

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OPEN ELECTIVE-1	4.6 (A) RENEWABLE ENERGY TECHNOLOGIES	L	T	P
		2	-	-

COURSE OBJECTIVE

The aim of this course is to help the student to attain the following industry identified competencythrough various teaching learning experiences:

- Maintain the renewable energy technology equipment.

COURSE OUTCOMES

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associatedwith the above mentioned competency:

- Maintain ocean thermal energy technologies
- Maintain the optimised working of solar PV and CS power plants.
- Maintain the optimised working of large wind power plants
- Maintain the optimised working of small wind turbines.
- Maintain the optimised working of biomass-based power plants.

DETAILED CONTENTS

Unit – I Ocean Energy Technologies

Ocean energy map of India and its implications; Specification, Construction and working of the fol-lowing ocean energy technologies:

- Tidal power technologies
- Wave power technologies
- Marine current technologies
- Ocean Thermal Energy Conversion (OTEC) technologies

Unit – II Solar PV and Concentrated Solar Power Plants

- Solar Map of India: Global solar power radiation, Solar PV
- Concentrated Solar Power (CSP) plants, construction and working of: Power Tower, Parabolic
- Trough, Parabolic Dish, Fresnel Reflectors
- Solar Photovoltaic (PV) power plant: components layout, construction, working.
- Rooftop solar PV power system

Unit – III Large Wind Power Plants

Wind Map of India: Wind power density in watts per square meter, Lift and drag principle; long path theory, Geared type wind power plants: components, layout and working, Direct drive type wind power plants: components, layout and

working, Constant Speed Electric Generators: Squirrel Cage Induction Generators (SCIG), Wound Rotor Induction Generator (WRIG), Variable Speed Electric Generators: Doubly-fed induction generator (DFIG), wound rotor synchronous generator (WRSG), permanent magnet synchronous generator (PMSG).

Unit– IV Small Wind Turbines

- Horizontal axis small wind turbine: direct drive type, components and working.
- Horizontal axis small wind turbine: geared type, components and working.
- Vertical axis small wind turbine: direct drive and geared, components and working.
- Types of towers and installation of small wind turbines on roof tops and open fields.
- Electric generators used in small wind power plants.

Unit– V Biomass-based Power Plants

- Properties of solid fuel for biomass power plants: bagasse, wood chips, rice husk, municipalwaste.
- Properties of liquid and gaseous fuel for biomass power plants: Jatropha, bio-diesel gobargas.
- Layout of a Bio-chemical based (e.g. biogas) power plant.
- Layout of a Thermo-chemical based (e.g. Municipal waste) power plant.
- Layout of a Agro-chemical based (e.g. bio-diesel) power plant.

Reference Books:

1. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi
2. Neill, Simon P.; Hashemi, M. Reza: Fundamentals of Ocean Renewable Energy: GeneratingElectricity from the Sea, Academic Press,
3. David M. Buchla, Thomas E. Kissell, Thomas L. Floyd, Renewable Energy Systems, PearsonEducation New Delhi , ISBN: 9789332586826,
4. Rachel, Sthuthi, Earnest, Joshua; -Wind Power Technologies, PHI Learning, New Delhi, ISBN:978-93-88028-49- 3; E-book 978-93-88028-50-9
5. Deambi, Suneel: From Sunlight to Electricity: a practical handbook on solar photovoltaic ap-plication; TERI, New Delhi ISBN:9788179935736
6. Gipe, Paul: Wind Energy Basics, Chelsea Green Publishing Co; ISBN: 978-1603580304
7. Wizelius, Tore, Earnest, Joshua - Wind Power Plants and Project Development, PHI Learning,New Delhi, ISBN:978-8120351660
8. Kothari, D.P. et aL: Renewable Energy Sources and Emerging Technologies, PHI Learning,New Delhi, ISBN: -978-81-203-4470-9
9. Bhadra, S.N., Kastha, D., Banerjee, S, Wind Electrical Systems installation; Oxford University Press, New Delhi, ISBN: 9780195670936.

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OPEN ELECTIVE-1	4.6 (B) ENERGY EFFICIENCY AND AUDIT	L	T	P
		2	-	-

COURSE OBJECTIVE

The aim of this course is to help the student to attain the following industry identified competencythrough various teaching learning experiences:

- Undertake energy efficiency measures and energy audit.

COURSE OUTCOMES

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry oriented COs associated with the above mentioned competency:

- Undertake energy efficiency activities
- Use energy efficient pumps, compressors and blowers
- Use energy efficient Air Compressors and DG sets
- Use energy efficient Lighting Systems
- Apply energy efficient electrical machines.
- Use Co-generation and relevant tariff for reducing losses in facilities.

COURSE CONTENTS

Unit – I Introduction to Energy Efficiency

Energy Scenario: Energy demand and supply, National scenario.

Energy Efficiency and Energy Conservation; concepts

Indian Electricity Act 2001; relevant clauses of energy conservation

BEE and its roles

Star Labeling: Need and its benefits.

Unit – II Pumping Systems, Fans and Blowers

Factors affecting pump performance Efficient Pumping system operation

Energy conservation opportunities in Pumping systems

Fan types, flow control strategies

Fan performance Assessment

Energy Conservation opportunities in Pumping systems

Tips for energy saving in fans and blowers

Unit – III Air Compressors and Diesel Power Generator sets

Classification of compressors

Pneumatic System components

Effect of various parameters on efficiency of Compressor

Capacity control of Compressors

Checklist for Energy Efficiency in Compressed air systems

Operating guidelines for diesel generator,

Operational factor's; Effects of improper ventilation of genset

Energy saving measures for DG sets

Unit –IV Energy Conservation in Lighting System

Replacing Lamp sources

Using energy efficient luminaries

Using light controlled gears

Installation of separate transformer / servo stabilizer for lightingPeriodic survey and adequate maintenance programs

Innovative measures of energy savings in lighting

Unit –V Energy Efficient Electrical Machines

Need for energy conservation in induction motor and transformer Energy conservation techniques in induction motor by:

Energy conservation techniques in Transformer

Energy Conservation Equipment: Soft starters, Automatic star delta convertor, Variable Frequency Drives, Automatic p. f. controller (APFC)

Energy efficient motor; significant features, advantages, applications and limitations.

Energy efficient transformers, amorphous transformers; epoxy Resin cast transformer / Drytype of transformer

Aggregated Technical and commercial losses (ATC),

Technical losses; causes and measures toreduce,

Commercial losses: pilferage, causes and remedies

Application of tariff system to reduce energy bill

Co-generation and Tariff; concept, significance for energy conservation

Unit– VI Energy Audit of Electrical Systems

Energy audit (definition as per Energy Conservation Act)

Energy audit instruments and their use Questionnaire for energy audit projects

Energy flow diagram (Sankey diagram)

Simple payback period, Energy Audit procedure (walk through audit and detailed audit). Energy Audit report format.

REFERENCE BOOKS:

1. Guide Books No. 1 and 3 for National Certification Examination for Energy Managers and Energy Auditors, Bureau of Energy Efficiency (BEE), Bureau of Energy Efficiency (A Statutory body under Ministry of Power, Government of India) (Fourth Edition 2015).
2. O.P. Gupta, Energy Technology, Khanna Publishing House, Delhi, Edition 2018, (ISBN: 978- 93-86173-683).
3. Henderson, P. D., India - The Energy Sector, University Press, Delhi, 2016. ISBN*: 978-* 0195606539
4. Turner, W. C., Energy Management Handbook, Fairmount Press, 2012, ISBN 9781304520708
5. Sharma, K. V., Venkataseshaiah; P., Energy Management and Conservation, I K International Publishing House Pvt. Ltd; 2011 ISBN 9789381141298
6. Mehta,V.K.,PrinciplesofPowerSystem,S.ChandandCo.NewDelhi,2016,ISBN 9788121905947
7. Singh, Sanjeev; Rathore, Umesh, Energy Management, S K KatariaandSons,New Delhi ISBN- 13: 9789350141014.
8. Desai, B. G.; Rana, J. S.; A. Dinesh, V.; Paraman, R., Efficient Use and Management of Electricity
   in Industry, Devki Energy Consultancy Pvt. Ltd.
9. Chakrabarti, Aman, Energy Engineering And Management, e-books Kindle Edition

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OPEN ELECTIVE-1	4.6 (C) ADVANCED PLUMBING (By Tata Technologies)	L	T	P
		1	-	2

1.1 COURSE OBJECTIVE

This course is designed to provide theoretical and practical end to end skills on Advanced Plumbing. it covers all the key aspects through orientation pipe terminology, different types of pipes and fittings, Advanced materials, Tools & Equipment like Pipe Vice, Taps, telescopic pipe cutter and other types, wall chaser machine, cutting of pipes, de-burring of pipes and their joining processes, covers installation, fixing, repairing and replacement of different taps, valves, faucet, water closet, bathtub, wash basin, urinals, kitchen sink, introduction water heater, installation of sanitary ware system and rain water harvesting system, solar heating system etc.
Also, this course includes understanding of reading and drawing, preparation of layouts etc.
It also includes knowledge about installation process, measuring process, inspection process, testing process, maintenance of time sheet, job card and other mandate documents, standard operating procedures etc.
It also provides overview of calibration and maintenance, plumbing standards, and Government Norms.

1.2 COURSE CONTENT

Sr No	Course contents
1	**Introduction to Industrial Safety Practices** • Fire Extinguishers & its Types • Safely handling Tools & Equipment • Use of proper Tools & Equipment & its maintenance • OSH & practices to be observed as a precaution
2	**Introduction to Plumbing** • Basics of Plumbing • Plumbing Terminology • Various components in the Plumbing (Pipes, fittings, sanitary wares, tools etc.) • Types of Pipes (PVC, Composites, Soil Waste and Rainwater, UPVC, CPVC, etc.) • Introduction to different types of Taps and Valves • Importance and Creation of Plumbing Check lists • Standard symbols used in plumbing drawing and its importance. • Reading of Plumbing drawing. • Making of schematic diagram of plumbing for water flow. • SWR (Soil-Waste-Rainwater) Pipes & fittings - installation method. • Wall chaser machine and its components. • Concept of Deburring tool, introduction to water meter, infrared thermometer, and Gas (Any Hydrocarbon based) Leak Detector instrument • Concept and application guidelines of Sink auger and PVC pipe cutters • Advance laser distance meter
3	**Pipes and Fittings**

	• Types of pipes and their selection criteria • Pipes and fittings Vs old process of laying or jointing • Introduction to type of pipe bends & pipe bending concept for water flow. • Method PVC pipe Cutting and Jointing, etc. • Importance of Telescopic pipe cutter • Fitting and fixing of UPVC, CPVC, etc. • Fitting using cold-welding joint • Concept of waste system plumbing and its installation • Concept and Installation of drainage, venting systems. • Different types of faucets and their application. • Kitchen sinks and its components • Sanitary wares installation guidelines. • Toilet installation guidelines • Bathtub installation guidelines. • Pressure testing machine and its components. • Water leakage detection methods. • Leak repair techniques and methodology. • Use of drain or cockup Rods
4	**Faucets and their Installation** • Introduction to different types of faucets. • Selection criteria of faucet. • Different components used in faucet. • Touchless faucet and study of its repair. • Guideline for Installation and replacement of batteries of faucet. • Advancements in terms of water efficiency and integration of electronic devices.
5	**Service Connections and Water Connections** • Concept of service connections • Connecting house sewer lines through chambers to mains • Drinking Water Connection from municipal connection through water meter to Overhead / Underground storage Tank • Rainwater Harvesting Filter Column for Bore-well Recharging system or connection to Underground Storage Tank • Water Closet-Floor & Wall Mounting Units and need of water seal for every closet. • Solar water heating system, its Installation, and connections. • Pressure boosting pump, its functions & applications, connecting to supply pipe • Basic knowledge of water tank cleaning to remove sediment, debris and other contaminants and safety precautions.
6	**SOP and Safety Equipment** • Introduction to Plumbing SOPs, standards, and Government Norms. • SOP of Plumbing for various types of cold and hot water pipe system • Auditing of OHS (Occupation Health & Safety) in plumbing shop. • Fire Sprinklers in workplace • SOP for installation of advanced Water Faucets and advanced sanitary ware. • Single Leaver Diverter, Concealed Flush Tank, Telephonic Mixers

1. **COURSE PRACTICALS**

Please conduct the practicals as per lesson plan:

1. Prepare list for Plumbing Safety standard and create a Do's and Don'ts chart.
2. List different components used in plumbing and explain its functions.
3. Make a list of wall chaser machine components and machine application.
4. Prepare a check list for sample plumbing layout to understand the plumbing system.
5. Draw plumbing layout by using standard symbols for residential building.
6. Cut different types of PVC pipes using various cutting tools at different angles.
7. De-burr the pipe to remove the burr or slag bits of material around the inner and outer periphery of the pipe for proper connection of pipe or joint.
8. Join various PVC pipes using solvent by Cold Welding Joint.
9. Measure the temperature inside pipe using infrared thermometer.
10. Monitor the flow of water through pipeline and understand the behavior of flow.
11. To check the water pressure using pressure testing machine.
12. Water leakage detection in the pipe distribution network, identifying such leaks, repairs.
13. Study methodology to detect the leakage of water and to repair it using various tools.
14. Cleaning clogs in sink and bathroom drains using sink auger.
15. Change the direction of pipe using elbow 90 deg and 45 Deg
16. Draw the diagram of wastewater plumbing showing all its components.
17. Draw the diagrams of drainage system, sinks and faucets showing all its components and list the applications of it.
18. Select faucets as per the different applications of plumbing system.
19. Create a plumbing drawing connection of faucet from source of water storage.
20. Study installation of touch less faucets.
21. Assemble and disassemble the touch less faucets to perform the basic troubleshooting and replacement of batteries.
22. Make a list of components in ranger bathtub and make its plumbing connection diagram.
23. Study the standard installation procedure of kitchen sink.
24. Study working principle and different components of water heater, water sprinklers, solar water heating systems, rainwater harvesting system, and water meter with its applications.
25. Make a list of soak pit benefits.

26. Study the installation of Water Closet – Floor & Wall Mounting Units concept and need of water seal for every closet.
27. Prepare a SOPs for repair and maintenance of plumbing for domestic plumbing system. For example, cleaning to remove chock up, debris and other contaminations etc.
28. Installation of advanced Water Faucets and sanitary ware.
29. Preparing a case study of plumbing system for various applications.
30. Case studies
31. Mini Project

2. COURSE OUTCOME

1. Able to understand the safety guidelines for plumbing equipment's and tools used in it.
2. Able to understand plumbing system and plumbing terminology.
3. Able to use different tools, equipment & fittings for plumbing. (Pipe Vice, wrenches, water pump pliers, Pipe cutter, threading dies, chain wrench, sink auger, internal pipe cutter etc.)
4. Able to perform distance measurement, temperature measurement, pressure testing using various instruments of plumbing.
5. Able to create the standard operating procedure (SOP) plumbing installation and maintenance.
6. Able to perform the de-burr operation for proper connection of pipes or joints.
7. Able to understand the joining process ad its selection criteria.
8. Able to read installation schematic drawing for plumber with various symbols.
9. Able to cut PVC pipes cut at various angles.
10. Able to join different PVC pipes using solvent by Cold Welding Joint.
11. Able to Change the direction of pipe using elbow, T joints etc.
12. Able to make a proposal plan for drainage system, sinks and faucets.
13. Able to measure the temperature inside pipe using infrared thermometer.
14. Able to understand the behavior of flow and methodology to detect the leakage in pipeline and to repair it using various tools
15. Able to install the touch less faucets and perform the basic troubleshooting and replacement of batteries.
16. Understand the importance of service connections.
17. Able to understand water pressure testing and leakage detection in pipeline.
18. Able to make a SOP for repair and maintenance of plumbing for domestic and industrial users.
19. Able to prepare layout for plumbing system of a small residential building.
20. Able to make a SOP of water tank cleaning to remove sediment, debris and other containments, installation of advanced Water Faucets and advanced sanitary ware.

21. Able to install water heater, solar heating system, water harvesting system & water sprinkler system.
22. Able to prepare Bill of Material
23. Able to prepare an estimation
24. Able to start own Business | Start up | Entrepreneurship.

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AUDIT COURSE	4.7 ESSENCE OF INDIAN KNOWLEDGE AND TRADITION	L	T	P
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COURSE OBJECTIVE:

Understand the fundamental aspects of the Indian Knowledge System, its integration with modern science, principles of Yoga and holistic healthcare, and practical applications in contemporary contexts.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to demonstrate knowledge of the following topics:

- Overview, importance, and relevance of the Indian Knowledge System, including Vedas, Upavedas, Vedangas, and Upangas.
- Relevance of science and spirituality, and contributions of ancient Indian science and technology.
- Basic principles of Yoga, benefits of holistic healthcare, and integration with modern healthcare.
- Practical applications and case studies of the Indian Knowledge System's relevance today.

COURSE CONTENTS

Unit 1: Introduction to Indian Knowledge System (07 Periods)

Overview of Indian Knowledge System

- Importance and relevance
- Introduction to the Vedas
- Upavedas
- Vedangas
- Upangas

Unit 2: Modern Science and Indian Knowledge System (07 Periods)

- Relevance of Science and Spirituality,
- Science and Technology in Ancient India

Unit 3: Yoga and Holistic Healthcare (07 Periods)

- Basic principles of Yoga
- Benefits of holistic healthcare practices
- Integration with modern healthcare

Unit 4: Case Studies / Assignment (07 Periods)

- Practical Applications / Case studies demonstrating the relevance of Indian Knowledge System in modern times

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	07	30
2	07	25
3	07	25
4	07	20
Total	28	100

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FIELD EXPOSURE (PROFESSIONAL TRAINING)

of the students (During summer vacation after IVth Semester)

It is needless to emphasize further the importance of Professional Training of students during their 3 years of studies at Polytechnics. It is Professional training, which provides an opportunity to students to experience the environment and culture of corporate construction offices/ Government construction and Design departments/ Practicing Architect's offices/ Construction Agencies/ Builder's Organisations / Design Consultation units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma Architect in the world of work and enables them to integrate theory with practice. Polytechnics have been arranging Professional training of students of various durations to meet the above objectives.

This document includes guided and supervised Professional training of a minimum of 6 weeks duration to be organised during the semester break starting after second year i.e. after IVth Semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, Working environment, Designing and Drafting process, important machines and Drafting tools used in the training organization.

Equally important with the guidance is supervision of students training in the office / organization by the teachers. A minimum of one visit by the teacher is recommended. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

An internal assessment of 100 marks has been provided in the study and evaluation scheme of Vth Semester. Evaluation of professional training report through viva- voce/ presentation aims at assessing student's understanding of Drafting various working drawings , Designing process, practices in offices/field organization and their ability to engage in activities related to problem solving in professional setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weightage to performance in testing, general behavior, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from Organisation. Teachers and students are requested to see the footnote below the study and evaluation scheme of IV Semester for further details.

10. RESOURCE REQUIREMENT:

- **Physical Resources:**

- **Total Space Requirements**

The total space for lecture room, tutorial rooms and drawing halls is work out by using following formula as per AICTE norms for all five disciplines i.e. civil, electrical, mechanical, automobile engineering and architectural assistantship

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N = (Ns/Cs)(H/Hw)(1/fu) where
N = Number of rooms required for each type.
N may be number of class rooms(Nc),
Number of tutorial rooms (Nt) or
Number of drawing halls (Nd)

Ns = Total Number of students in all years/semesters/disciplines

Cs = Class size (Number of students)

H = Number of hours per week of class room, lecture, tutorial or drawing as the case may be

Hw = Number of working hours per week

Fu = Utilisation factor (taken as 0.75)
Number of class rooms Nc = 10
Number of Tutorial rooms Nt = 2
Number of Drawing Halls Nd = 6

Space for Laboratories and workshops may be worked out as per AICTE norms(1995).

Note: A separate space and infrastructure for Art Studio is recommended for Architectural Assistantship department.

LAB REQUIREMENT:

1. Name of Laboratory: Drafting Studio

Sr. No	Particular	Qty.	Tentative Cost (Rs)
1.1	Adjustable drafting machines, AO size with drafter and adjustable	60	4,80,000
	a. Soft board panels for pining drawing 4'x 8', 3/4" thick	04	12,000
	b. Rapidograph pens (set of 8 pens) (Rotering)	04	10,000
1.4	Set up templates (for lettering, furniture, sanitary, geometric forms, kitchen, electric symbols)	04 each	1,600
1.5	Drawing instrument box (Stadtler) set of 12 pieces	04 set	8,000
1.6	Beam compass 36" long	04	2000
1.7	Miscellaneous drawing equipment: Scales, french curves, different kind of colours (water, oil and poster) brushes of different sizes, coloured inks, clutch pencils, razors, mixing Pallets, cutters for model making, vanishing stick, spray gun, drawing sheets etc.	LS	10,000
	Total		**5,23,600**
2.	**Name of Laboratory/Workshop : Art Studio**		
2.1	Donkey 1' x 3' with stand for sketch book	60	1,20,000
2.2	Wooden platform (revolving) for life study	01	1,500
2.3	Still life stand	02	1,000
2.4	Reflector with stand	02	5,000
2.5	Draperies for still life and model drawing	LS	2,500
2.6	Still life objects made of different materials	LS	5,000
2.7	Other miscellaneous items like: Calligraphy pen set, instrument box, inking pens, french curves, scissors, steel rules, mount cutters, pencils, erasers, sketch pens, brushes and papers, inks drawing pins, palettes etc	LS	20,100
	Total		**1,47,100**

2. Name of Laboratory/Workshop : Materials and Building Museum

S.No.	Particular	Qty.	Tentative Cost (Rs.)
3.1	Different types of bricks		Rs. 300,000/-
3.2	Different types of building stones		
3.3	Different types of sands		
3.4	Different types of paints and distempers		
3.5	Different types of wood		
3.6	Different types of wood products		
3.7	Different types of glass samples		
3.8	Different types of fasteners and adhesives		
3.9	Different types of sanitary wares	LS	
3.10	Samples of plumbing, fixtures to be installed as working Prototypes		
3.11	Samples of electric wires and conducting materials		
3.12	Samples of electric fixtures and fittings		
3.13	Samples of floor finishes and wall finishes		
3.14	Samples of different roofing materials		
3.15	Samples of false ceiling fixtures and finishes		
3.16	Samples of acoustics materials		
3.17	Samples of thermal insulating materials		
3.18	Samples of building hard ware		
3.19	Models, charts and other teaching aids		
	Total		**300,000/-**

3. Name of Laboratory/Workshop: Workshops

S.No.	Particular	Qty.	Tentative Cost (Rs.)
	Carpentry Shop		
4.1	Jig saw, 300 mm x 300 mm with 1/2 horse power motor	1	4,500
4.2	Wood planner, 2 horse power, 440 volts, width of plank 300 mm and length of table 1100 mm	1	15,000
4.3	Drilling machine, bench type 600x4000 rpm, size of table 250x250 mm	1	8,000
4.4	Universal wood working machine - 14 in one	1	1,50,000
4.5	Bench grinder	1	5,000
4.6	Carpentry work benches 4'x8'	10	20,000
4.7	Chain and chisel mortising machine	1	25,000
4.8	Wood turning lathe	1	10,000
4.9	Vertical sander	1	10,000
4.10	Carpentry hand tools, vices, holds, gauges and measuring tools	LS	35,000
4.11	Cutters, saws, blades for Acrilic Model Making	LS	10,000
	Welding Shop		
4.12	Oil cooled arc welding transformer, 3-phase with standard accessories	1	4000
4.13	M-4 Bench Spot welder	1	5,000
4.14	Oxy-acetylene gas welding set	1	12,000
4.15	Brazing equipment and accessories	1	5,000
	Painting Shop		
4.16	Spray painting gun with a small compressor	1	5,000
4.17	Miscellaneous painting brushes and materials	LS	500
	Electrical Shop		
4.18	General hand tools i.e. Screw driver sets, pliers, wrenches, tweezers, workshop scissors, hand drill machine, chisel, hammers	LS	5,000
4.19	Different types of wires, conduits, batteries, switches and other fixtures, testers, soldering iron	LS	10,000
	Total		**3,39,000**

5. Name of Laboratory/Workshop : Building Yard

5.1	The material required for Building Yard is mostly bricks, stones, cement, sand, mason tools, mild steel rods and timber planks	LS	5,000
	Total		**5000**

6. Name of Laboratory/Workshop : Survey Laboratory

S.No.	Particular	Qty.	Tentative Cost (Rs.)
6.1	Metric Chain 20 m length and set of arrows as per IS 1492	08	1,600
6.2	Metallic tape 20 m length in leather case and winding device as per IS 1492	06	1,200
6.3	Ranging rods made of conduit pipe 30 mm dia painted white and black with iron shoe	25	2,500
6.4	Optical square, prism type as per IS 7009	06	1,200
6.5	Prismatic Compass as per IS 1957 100m diameter made of brass	06	4,200
6.6	Plane table with all accessories as per IS 2539	06	7,200
6.7	Dumpy level as per IS 9613, Telescope lens 300 mm with plate bubble	06	15,000
6.8	Levelling staff, telescope type, 4m long	05	5,000
6.9	Transit vernier theodolite telescope lens 150-210 mm magnification 25 to 30 x Minimum focusing distance 1.5 m	02	40,000
	Total		**76,900**

7. Name of Laboratory / Workshop : Computer Laboratory

S.No.	Particular	Qty.	Tentative Cost (Rs.)
7.1	Intel Core-i 7 or the Latest configuration in the market	20	
7.2	Laser Printer HP 1200 series or Equivalent UPS 0.652 Kw (one for each system)	01	
7.3	Software: DOS Word processor, Spread sheet Storyboard, AutoCAD	LS	3,00,000
7.4	Video LCD Projector	1	2,40,000

7.5	Computer Furniture	10	20,000
	Total		**6,60,000**

8. Name of Laboratory/Workshop: Reprographic & AV

S.No.	**Particular**	**Qty.**	**Tentative Cost (Rs.)**
8.1	Electronic stencil cutting machine (with 2 speeds 300/600 rpm 230V)	01	30000
8.2	Photocopier (1.5 kw, 240 V, 50 Hz, warm Uptime 60 sec, 240 paper capacity 2000 sheets)	01	90,000
8.3	Duplicating machine electric operated	01	20,000
8.4	Overhead Projector (240 V, 650 W, focal length 254 mm at f/2.86, lens dia 90mm)	01	50,000
8.5	TV & VCR with remote control set	01	40,000
8.6	Automatic slide projector (240 W)	01	5,000
8.7	Edge binding machine, trimming machine and large stapler	01	8,000
8.8	Glass Top Tracing Table	01	3,000
		LS	20,000
8.9	Drawing Sheet (4 Nos)	LS	12,000
	Total		**2,15,000**

NOTE:

In addition to the above, laboratories in respect of physics, chemistry, applied mechanics, strength of materials, general engineering, workshops, Computer Centre etc. will be required for effective implementation of the course. Provision for overhead projector, TV with VCR facility, slide cum strip projector, 16 mm film projector, photocopier, PC-XT facilities, duplicating machines, drafting machines etc. has also to be made.

10.3 Furniture Requirement

Norms and standards laid down by AICTE be followed for working out furniture requirement for this course

10.4 Human Resources:

Weekly work schedule, annual work schedule, student teacher ratio for various group and class size, staffing pattern, work load norms, qualifications, experience and job description of teaching staff workshop staff and other administrative and supporting staff be worked out as per norms and standards laid down by the AICTE.

11 EVALUATION STRATEGY

INTRODUCTION

Evaluation plays an important role in the teaching-learning process. The major objective of any teaching-learning endeavor is to ensure the quality of the product which can be assessed through learner's evaluation.

The purpose of student evaluation is to determine the extent to which the general and the specific objectives of curriculum have been achieved. Student evaluation is also important from the point of view of ascertaining the quality of instructional processes and to get feedback for curriculum improvement. It helps the teachers in determining the level of appropriateness of teaching experiences provided to learners to meet their individual and professional needs. Evaluation also helps in diagnosing learning difficulties of the students. Evaluation is of two types: Formative and Summative (Internal and External Evaluation)

Formative Evaluation

It is an on-going evaluation process. Its purpose is to provide continuous and comprehensive feedback to students and teachers concerning teaching-learning process. It provides corrective steps to be taken to account for curricular as well as co-curricular aspects.

Summative Evaluation

It is carried out at the end of a unit of instruction like topic, subject, semester or year.The main purpose of summative evaluation is to measure achievement for assigning course grades, certification of students and ascertaining accountability of instructional process. The student evaluation has to be done in a comprehensive and systematic manner since any mistake or lacuna is likely to affect the future of students.

In the present educational scenario in India, where summative evaluation plays an important role in educational process, there is a need to improve the standard of summative evaluation with a view to bring validity and reliability in the end-term examination system for achieving objectivity and efficiency in evaluation.

- **STUDENTS' EVALUATION AREAS**

The student evaluation is carried out for the following areas:

- Theory
- Practical Work (Laboratory, Workshop, Field Exercises)
- Project Work
- Professional Industrial Training

A. Theory

Evaluation in theory aims at assessing students' understanding of concepts, principles and procedures related to a course / subject, and their ability to apply learnt principles and solve problems. The formative evaluation for theory subjects may be caused through sessional / class-tests, home-assignments, tutorial-work, seminars, and group discussions etc. For end-term evaluation of theory, the question paper may comprise of three sections.

Section-I

It should contain objective type items e.g. multiple choice, matching and completion type. Total weightage to Section-1 should be of the order of 20 percent of the total marks and no choice should be given in this section. The objective type items should be used to evaluate students' performance in knowledge, comprehension and at the most application domains only.

Section-II

It should contain short answer/completion items. The weightage to this section should be of the order of 40 percent of the total marks. Again, no choice should be given in section-II

Section-III

It may contain two to three essay type questions. Total weightage to this section should be of the order of 40 percent of the total marks. Some built-in, internal choice of about 50 percent of the questions set, can be given in this section

Table II : Suggested Weightage to be given to different ability levels

Abilities	Weightage to be assigned
Knowledge	10-30 percent
Comprehension	40-60 percent
Application	20-30 percent
Higher than application i.e. Analysis, Synthesis and Evaluation	Upto 10 percent

B. Practical Work

Evaluation of students performance in practical work (Laboratory experiments, Workshop practicals/field exercises) aims at assessing students ability to apply or practice learnt concepts, principles and procedures, manipulative skills, ability to observe and record, ability to interpret and draw conclusions and work related attitudes. Formative and summative evaluation may comprise of weightages to performance on task, quality of product, general behaviour and it should be followed by viva-voce.

C. Project Work

The purpose of evaluation of project work is to assess students ability to apply, in an integrated manner, learnt knowledge and skills in solving real life problems, manipulative skills, ability to observe, record, creativity and communication skills. The formative and summative evaluation may comprise of weightage to nature of project, quality of product, quality of report and quality of presentation followed by viva-voce.

D. Professional Industrial Training

Evaluation of professional industrial training report and viva-voce/ presentation aims at assessing students' understanding of materials, industrial processes, practices in the industry/field and their ability to engage in activities related to problem-solving in industrial setting as well as understanding of application of learnt knowledge and skills in real life situation. The formative and summative evaluation may comprise of weightages to performance in testing, general behaviour, quality of report and presentation during viva-voce.

12 - RECOMMENDATIONS FOR EFFECTIVE CURRICULUM IMPLEMENTATION

This curriculum document is a Plan of Action and has been prepared based on exhaustive exercise of curriculum planning and design. The representative sample comprising selected senior personnel (lecturers and HODs) from various institutions and experts from industry/field have been involved in curriculum design process.

The document so prepared is now ready for its implementation. It is the faculty of polytechnics who have to play a vital role in planning instructional experiences for the courses in four different environments viz. class-room, laboratory, library and field and execute them in right perspective. It is emphasized that a proper mix of different teaching methods in all these places of instruction only can bring the changes in stipulated student's behaviour as in the curriculum document. It is important for the teachers to understand curriculum document holistically and further be aware of intricacies of teaching-learning process (T-L) for achieving curriculum objectives. Given below are certain suggestions which may help the teachers in planning and designing learning experiences effectively. These are indicative in nature and teachers using their creativity can further develop/refine them. The designers of the programme suggest every teacher to read them carefully, comprehend and start using them.

(A) Broad Suggestions:

1- Curriculum implementation takes place at programme, course and class-room level respectively and synchronization among them is required for its success. The first step towards achieving synchronization is to read curriculum document holistically and understand its rationale and philosophy.

1. An academic plan needs to be prepared and made available to all polytechnics well in advance. The Principals have a great role to play in its dissemination and, percolation upto grass-root level. Polytechnics, in turn are supposed to prepare institutional academic plan.

2. HOD of every Programme Department along with HODs and in-charge of other departments are required to prepare academic plan at department level referring to institutional academic plan.

3. All lecturers/Senior lecturers are required to prepare course level and class level lesson plans referring departmental academic plan.

(B) Course Level Suggestions

Teachers are educational managers at class room level and their success in achieving course level objectives lies in using course plan and their judicious execution which is very important for the success of programme by achieving its objectives.

Polytechnic teachers are required to plan various instructional experiences viz. theory lecture, expert lectures, lab/workshop practical, guided library exercises, field visits, study tours, camps etc. In addition, they have to carry out progressive assessment of theory, assignments, library, practical and field experiences. Teachers are also required to do all these activities within a stipulated period of time. It is essential for them to use the given time judiciously by planning all above activities properly and ensure execution of the plan effectively.

Following is the gist of suggestions for subject teachers to carry out T-L process effectively:

1. Teachers are required to prepare a course plan, taking into account departmental academic plan, number of weeks available and courses to be taught.

2. Teachers are required to prepare lesson plan for every theory class. This plan may comprise of contents to be covered, learning material for execution of a lesson plan. They may follow steps for preparing lesson plan e.g. drawing attention, state instructional objectives, help in recalling pre-requisite knowledge, deliver planned subject content, check desired learning outcomes and reinforce learning etc.

3. Teachers are required to plan for expert lectures from field/industry. Necessary steps are to plan in advance, identify field experts, make correspondence to invite them, take necessary budgetary approval etc.

4. Teachers are required to plan for guided library exercises by identification of course specific experience requirement, setting time, assessment, etc. The assignments and seminars can be thought of as terminal outcome of library experiences.

5. Concept and content based field visits may be planned and executed for such content of course which is abstract in nature and no other requisite resources are readily available in institute to impart them effectively.

6. There is a dire need for planning practical experiences in right perspective. These slots in a course are the avenues to use problem based learning/activity learning/ experiential learning approach effectively. The development of lab instruction sheets for the course is a good beginning to provide lab experiences effectively.

7. Planning of progressive assessment encompasses periodical assessment in a semester, preparation of proper quality question paper, assessment of answer sheets immediately and giving constructive feed back to every student

8. The student centered activities may be used to develop generic skills like task management, problem solving, managing self, collaborating with others etc.

9. Where ever possible, it is essential to use activity based learning rather than relying on delivery based conventional teaching all the time.

10. Teachers may take initiative in establishing liaison with industries and field organizations for imparting field experiences to their students.

11. Students be made aware about issues related to ecology and environment, safety, concern for wastage of energy and other resources etc.

12. Students may be given relevant and well thought out project assignments, which are purposeful and develop practical skills. This will help students in developing creativity and confidence for their gainful employment.

13. A Project bank may be developed by the concerned department of the polytechnics in consultation with related Industry, research institutes and other relevant field organizations in the state.

13- LIST OF EXPERTS:

The following experts have participated/ contributed in workshop for Developing Curriculum Scheme / Competency Profile according to AICTE and NEP-2020, of Three Year Diploma course in Architecture Assistantship at IRDT Kanpur.

1. Ar. Kuldeep Srivastava, H.O.D. Architecture, Government Polytechnic, Lucknow
2. Ar. Komal Yadav, H.O.D. Architecture, Government Girls Polytechnic,Lucknow
3. Ar. Ruchi Singh, Lecturer, Architecture, Government Girls Polytechnic, Lucknow
4. Lt. Ar. Syed Yawar Husain Naqvi, Lecturer Architecture, Govt. Polytechnic, Deoria.
5. Ar. Sunil Kumar Gautam, Lecturer Architecture, Government Polytechnic, Deoria
6. Ar. Saurabh Bhatnagar, Lecturer Architecture, Government Polytechnic, Hardoi.
7. Ar. Avanish Kumar Katiyar, Lecturer Architecture, Government Polytechnic, Hardoi.
8. Ar. Amit Kumar Singh, Lecturer, Architecture, Government Polytechnic, Lucknow
9. Ar. Kapil Rao Brabhuddh, Lecturer Architecture, Government Polytechnic, Soron.
10. Ar. Vikas Kulshreshtha, Asstt. Prof., I.R.D.T., Kanpur.