CURRICULUM FOR DIPLOMA IN ARCHITECTURAL ENGGINEERING

Sem I, II, III, IV,

V & VI

Semester – I

Course Code	Name of the Course	TEACHING SCHEME in hours				EXAMINATION SCHEME				Total Marks
		L	T	P	C	Theory marks		Practical Marks		
						TH	TM	PR/OR	TW	
GN101	Communication Skills	-	-	2	2	-	-	50	50	100
GN105	Computer Fundamentals & Applications	-	-	4	4	-	-	50	50	100
AE101	Building Materials-I	3	-	-	3	75	25	-	25	125
AE102	Graphic – I	-	-	6	6	-	-	50	50	100
AE103	Architectural Drawing-I	-	-	8	8	-	-	50	100	150
AE104	Model Making –I	-	-	2	2	-	-	50	50	100
AE105	Building Construction-I	1	-	4	5	75	25	-	25	125
Total					**30**					**800**

Semester – II

Course Code	Name of the Course	TEACHING SCHEME in hours				EXAMINATION SCHEME				Total Marks
		L	T	P	C	Theory marks		Practical Marks		
						TH	TM	PR/OR	TW	
AE201	Building Materials-II	3	-	-	3	75	25	-	25	125
AE202	Graphics-II	-	-	6	6	-	-	50	50	100
AE203	Architectural Drawing-II	-	-	8	8	-	-	50	100	150
AE204	Model Making-II	-	-	2	2	-	-	50	50	100
CS303	Autocad	-	-	4	4	-	-	50	50	100
GN203	Environmental Studies	4	-	-	4	75	25	-	-	100
AE206	Building Construction-II	2	-	4	6	75	25	-	25	125
Total					33					800

GN 101 COMMUNICATION SKILLS

1. RATIONALE

This course deals with Student's proficiency in English by developing their skills in reading, writing and speaking. They will be able to appreciate the usage of grammar. Acquiring proficiency in English is absolutely essential for effective communication while serving on the job. It also deals with applications of the concepts and principles learnt. Using visuals in written communication and body language in oral communication highly enhances the effectiveness of the communication process. These and some other important aspects are discussed in this course. The practice-feedback-practice cycle is of utmost important for developing the communication competencies/skills.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
GN-101	**L**	**T**	**P**	**C**	**TH**	**TM**	**TW**	**PR/OR**	
Communication Skills		-	2	2	-	-	50	50	**100**

Minimum passing % : Practical 40%

Legends:

***L**-Lecture; **T** - Tutorial; **P** - Practical; **C**- Credit; **TH**- End Semester Theory; **TM** – Test Marks:*

***PR/OR** - End Semester Practical / Oral Examinations; **TW**- Term Work*

3. DETAILED COURSE CONTENTS

Unit 1 - Fundamental of Communication skills

Definition, components (message, sender, receiver, transmission medium and protocol), types(verbal & no-verbal, technological & non-technological, etc), importance of communication skills, effective communication skills (phatic stage, personal stage and intimate stage), barriers in effective communications(verbal, non-verbal), barriers while speaking, other barriers (individual's viewpoints, emotional block, etc.) methods of and hint to increase communication skills, body language.

Unit 2 – Presentation Skills

Methods and styles of presentations (seminars, speeches, etc), the plan, objectives, audience, structure (sequential, hierarchical, question oriented pyramid, meaty sandwich), tips for good beginning and end, aids to presentation (visual, verbal), delivery style (eyes, voice, expression, appearances, stance, etc), techniques for a good speech (repeat, draw (signs, pictures), jokes, etc).

Unit 3 - Technical Reports, Letter Writing, CVs

Functions of Reports (information, initiate action, recommend new procedures, recording, coordinating project), techniques (basic format, steps, appendices), types of reports (emphasis on progress reports, industrial visit reports, inspection reports, accident reports, survey report, report on seminars, workshop, technical gathering, etc).

Types of letters, format function, qualities of a good letter, examples of job applications, leave applications, complaints, purchase orders, enquiries replies etc.

Brief mention of importance of etiquette in email communication, importance of careful proofing the documents sent.

Curriculum Vitae – definition, sample, tips for a good CV, covering letter

Unit 4 - Soft Skills

Importance of values, attitude and etiquettes in communication, ethics and manners, courtesy, honesty and reliability; personal integrity, flexibility – adaptability, team skills – cooperation; ability to follow regulations; willingness to be accountable; Ability to relate to co workers in a close environment, non verbal communication, leadership skills – self directed, ability to direct and guide others, self-supervising; ability to relate to co workers in a close environment; positive attitude; positive work ethic, written communication Skills- basic spelling and grammar; reading and comprehension, personal hygiene and energy, interpersonal skills – communication skills with public, fellow employees, supervisors, and customers, motivation – willingness to learn; caring about seeing the company succeed; understanding what the world is all about; commitment to continues training and learning; critical thinking skills, grooming – good personal appearance.

Unit 5 - Language Workshop

The Reading, Listening, Writing, Speaking Skills will be tested

1. **Reading Skills:**

   Articles from the newspapers, magazines, journals etc. will be given to the students to read aloud thus checking their pronunciation, clarity and their style of reading.

2. **Listening Skills:**

   Passages, Topics, Stories, Speeches of eminent people will be read or played. The students have to listen and their listening skills will be tested.

3. **Writing Skills:**

   a) Students to write on any given topic

   b) Students to compose their own stories

   c) Students will be given a particulars situation i.e. accident, college gathering etc. and asked to write a report

4. **Speaking Skills:**

a) Students to speak on any given topic

b) Narrate a story written by them.

Group discussions in the classroom. This could include debates, discussion on current issues, role-playing.

4. List of Experiments :

- Oral presentation about technical products for five minutes.
- Seminar Presentation/Report writing and presentation on identified topics from science and technical subjects for short duration.
- Group discussion on science and technical topics.
- Organise mock interviews.
- Organise debates.
- Extempore speech for three minutes on a topic.
- Observe a process and reproduce orally in own words for three to five minutes.
- Arrange video recording of presentations for self-feedback.

5. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Year of Publication
1	Wren and Martin	Practical English Grammar	1992
2	John Sinclair (ed.),	Collins Cobuild English Grammar	William Collins & Sons Cp., London 1990
3	Krishna & Mohan,	Effective English Communication	Tata McGraw Hill, New Delhi 2000
4	Randolf, Quirk & Sidney Greenbaum	University Grammar of English	1993
5	Tiwari, N.P. et al ,	Communication Skills for Technical Students – Book	Somaiya Publications, 1995
6	Tiwari, N.P. et al,	A Communicative Grammar of English	Somaiya Publications, 1989

GN-105 - COMPUTER FUNDAMENTALS & APPLICATIONS

1. RATIONALE

The course on Computer Fundamentals & Applications will enable the students to understand the basic concepts related to computer fundamentals, Data Representation & Number Systems, Computer Languages, operating system, Computer Software and Internet Technology and will be able to apply the same in different areas of electronics engineering. Laboratory practice will help in developing the requisite skills.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
GN-105	**L**	**T**	**P**	**C**	**TH**	**TM**	**TW**	**PR/OR**	
Computer Fundamentals & Applications	-	-	4	4	-	-	50	50	**100**

Minimum passing % : Theory 40%

Legends:
***L**-Lecture; **T** - Tutorial; **P** - Practical; **C**- Credit; **TH**- End Semester Theory; **TM** – Test Marks:*
***PR/OR** - End Semester Practical / Oral Examinations; **TW-** Term Work*

3. DETAILED COURSE CONTENTS

UNIT 1 Computer Fundamentals

1.Introduction to Computer

2. History, Evaluation, Classification and Generations of computers

3.Organisation of the Computer System

4. Hardware

Input device, Memory or Storage Devices, Processing Unit, Output device, Scanner

Printers.

5. Communication technology and evolution of communication mediums

6. Software

System software

Application Software

Shareware

Freeware

Open Source

7. Concept of Computer Viruses

Definition

Types

Preventive Measures

UNIT 2 Operating System

1. Introduction to operating system

Definition Functions , Types, Examples, Comparisons of Various Operating Systems

2. Windows Operating System-

GUI(Graphical user Interface), desktop, Start Menu, Task Bar, Status Bar, Scroll Bar, Title Bar, Toolbar, Menu Bar. File Organization: Creating, Saving, Deleting, Renaming, Cutting, Pasting, copying, moving, Searching Files and Folders. Applications: My Computer, Recycle Bin, Windows Explorer, Control Panel.

UNIT 3 Application Software

1. MS Word

- Introduction
  - Starting MS Word
  - Creating, saving and opening a document
  - Editing commands-Cut, Copy, Paste, Paste Special
  - Text Formatting, Bullets and Numbering, Borders and shading etc.
  - Tabs, Style, Views
  - Insert Table, Picture, OLE Objects, etc.
  - Checking Spelling and Grammar, Thesaurus
  - Page Layout & Printing
  - Mail Merge.

2. MS Excel

- Create, Save and open a worksheet
- Entering data – text, numbers and formulae in a worksheet, Hyperlink
- Navigating within a Worksheet and also between different Worksheets of a Workbook
- Inserting and deleting cells, rows and columns in a worksheet
- Select, copy, paste and delete cell data within the worksheet
- Using various formulae and inbuilt functions like Trigonometric, Statistical, Logical, Data Sorting
- Update worksheets using special tools like spell check and auto correct.
- Setup the page and margins of worksheets for printing
- Enhance worksheets using charts & graphs

3. MS Power Point

- Introduction and starting the program
- Starting a presentation
- Adding new slide
- Saving and Opening presentation
- Text formatting options
- Copy, Move and delete slides and text
- Applying designs
- Using Animations
- Slide Transitions, Hyperlink
- Insert clip art
- Viewing the presentation

UNIT 4 The Internet

Networks, Advantages of networking, Types of networks.

- History and Functions of the Internet
- Working with Internet
- Web Browsers, World Wide Web, Uniform Resources Locator and Domain, Names, Issues related to web security.
- Uses of Internet
- Search for information, Email, Chatting, Instant messenger services, News Group, Teleconferencing, Video-Conferencing, E-Commerce and M-Commerce.

Email

- Manage an E-mail Account
  E-mail Address, Configure E-mail Account, log to an E-mail, Receive E-mail, Sending mails, sending files an attachments and Address Book

- Downloading Files

4. SUGGESTED LIST OF EXPERIMENTS

S. No.	Unit No.	List of Experiments
1	**1**	Identify Input and output devices
2	**1**	Calculate capacity of different storage device
3	**2**	Identify OS and different application software s loaded on that OS
4	**3**	Load Windows operating system. Configure and load relevant device drivers
5	**4**	Practice on Windows 95/98/2000 ; o Starting Windows, Exploring the desktop, Arranging windows, My Computer, The start button, Creating Shortcuts, Practice on moving and sizing of windows o Study of file organization: creating, copying, moving, renaming and deleting o Practice on Windows Accessories- Notepad, Word Pad and Paint

		o Editing document & formatting text, Previewing and printing document/Image file o Practice on Windows Explorer o Recycle bin o Shutting down windows
6	**4**	Practice on MS-Word ; o Create and format document o Edit and Modify text- changing font size type and style o AutoText, AutoComplete, AutoCorrect, grammar and spellchecker, Find and replace of text o Open save and print a document o Insert, modify table o Insert graphics o Mail merge
7	**5**	Practice on Microsoft Excel o Create, save & format worksheet o Open and save worksheet file o Edit & modify data o Use formula and functions o Split windows and freeze pans o Data sort and security features o Create, edit, modify and print worksheet. o Create and edit charts
8	**5**	Practice on PowerPoint o Create, edit, insert, move, slides o Open and save presentation o Insert picture, audio slide layout, action button o Apply custom animation o Present slide show
9	**6**	Practice on: o Identification of type of Account. o Connecting to internet o Dial up access o Web browsing o Searching websites o Information searching o Email services o Creating email accounts & Receiving and sending mails

5. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication & Year
1	Norton Peter	Introduction to Computers (special Indian edition)	Tata McGraw Hills New Delhi, 6th Edition, 2005 ISBN: 0070593744
2	Kahate Atul	Information Technology	Tata McGraw Hills New Delhi, ISBN-13:9780070593718
3	Williams Stalling	Using Information technology: A Practical Introduction to Computers and Communication	Tata McGraw Hills New Delhi,
4	Curtin	Information Technology: The Breaking Wave (book only)	Tata McGraw Hills New Delhi, ISBN:0074635581
5	Ravichandran, D	Introduction to Computers and Communication	Tata McGraw Hills New Delhi, ISBN: 0070435650
7	Douglas E.	The Internet Book	Prentice Hall of India, New Delhi, 3rd Edition, ISBN: 812032286X
8	Basanbhara S.K.	Computer Today	Nita Mehta Publications, 2003 ISBN: 8186340742

(AE101) – BUILDING MATERIALS-I

1. RATIONALE

The students of this course are to be introduced to the basic materials used in building construction, their characteristics, comparative advantages, etc. Also locally available and new/ innovative building materials are to be introduced in the curriculum.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
AE101 BUILDING MATERIALS- I	L	T	P	C	TH	TM	PR/OR	TW	125
	03	-	-	03	75	25	-	25	

Minimum passing Percentage 40%
TW shall consist of prescribed number of assignments and shall be progressively assessed.

3. COMPETENCIESTO BE DEVELOPED THROUGH THIS COURSE

The Students will be able to

a. Know all the necessary standard data of any basic and commonly used building material like sizes, forms, measurements, costs, availability, advantages, uses, defects, etc.

b. Identify characteristics and peculiarities of all basic and commonly used building materials.

c. Approve quality of any building material whether it is suitable for the use as per the required specifications

d. Understand the relevance of their use and the precautions to be taken in the process.

4. DETAILED COURSE CONTENT

Unit 1 : STONES

A. Classification of rocks, locally used examples in each type, their characteristics, use, etc.

B. Qualities of good building stone, Types of stones used in building industry, their properties, uses, availability, costs, Field test.

Unit 2 :BRICKS

A. Introduction as an artificial building material, Requirements of good brick earth, description of manufacturing techniques of hand-made and machine made bricks.

B. Qualities of good bricks, Types of bricks, their properties, uses in building industry, availability, costs, Field test, comparison of brick and stone.

C. Building blocks of other alternate materials like fly ash, cement, compressed stabilized earth blocks (CSEB) and their properties.

Unit 3 :CEMENT

A. Definition, composition, properties.

B. Storage of cement, Field test, Types of cements like ordinary cement, Rapid hardening, low heat, pozzuolona, coloured and white cement and their uses in the building industry.

Unit 4 :LIME

A. Introduction to Lime as a building material, its sources.

B. Classification of Lime, their comparison, Uses in building industry, Field test.

Unit 5: AGGREGATE

A. Definition, Classification- fine and coarse.

B. Sources of sand, Classification of sand, Properties of good sand, function of sand in mortar, Field test.

C. Types of coarse aggregate, different sizes, their uses.

Unit 6: MORTARS

A. Definition, preparation, properties of good mortar.

B. Classification based on binding material like cement, Lime, Mud and gypsum, Precautions in using mortar, Uses of mortar in building industry.

C. Types of special mortars and their use.
Unit 7: STEEL A. Definition, Types- mild, medium and hard steel, their properties. B. Market forms and sizes of each type, Uses in building industry, Defects of steel.
Unit 8: ALUMINIUM A. Introduction, properties of Aluminum. **B.** Market forms and sizes of each type, Uses in building industry
Unit 9: TIMBER A. Definition, Important varieties of Indian timber, Qualities of good Timber, Preservation, Seasoning, Storage of Timber. B. Market forms and sizes, Uses in building industry, Defects in Timber, Advantage of Timber as a building material.
Unit 10: ROOFING MATERIALS A. Tiles- Qualities of good tiles, Types of roof tiles, Market forms and sizes. B. A/C sheets- Qualities, Market forms and sizes of A/C sheets. C. G.I sheets- Qualities, Market forms and sizes of G.I. sheets, Advantages and dis-advantages of all the above
Unit 11: FIELD WORK (Term Work) A. Visit to local outlets to understand and visualize various building materials, their costs and use in building industry for Unit 1 to Unit 10. Report to be submitted as group work for all 10 Units.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (Theory)

Unit No.	Topic	Teaching Hours	Theory Marks Distribution for End Semester Exam			
			Total (TH)			
1	Stones	06	08			
2	Bricks	06	10			
3	Cement	06	09			
4	Lime	02	04			
5	Aggregate	03	06			
6	Mortars	03	06			
7	Steel	03	08			
8	Aluminium	02	04			
9	Timber	07	12			
10	Roofing materials	04	08			
	Total	42	75			
11	Field work(Termwork) 1. Notebook Assessment 2. Report writing 3. Teacher's assessment	06				(TW) 10 10 05
	Total	48				25

6. SUGGESTED ACTIVITIES

- Explanation and discussion on each topic from Unit 1 to Unit 10 is to be dealt with
- Report writing for the site visits and actual material samples are to be presented as group discussion and should be guided/ done separately and assessed as termwork
- Note book is to be assessed at least before every periodic test and final submission for termwork.

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	S.C. Rangawala	Engineering materials	Charotar Publishing house
2	Sushil Kumar	Engineering materials	Standard Pub. Dist. Delhi
3	G.J. Kulkarni	Engineering materials	
4	Arora/ Agarwal	Civil Engineering materials	New India Pub. House, Jalandar
5	T.T.T.I.	Civil Engineering materials	Tata Mc. Graw Hill, New Delhi

(AE102) – GRAPHICS-I

1. RATIONALE

The students of this course are to be introduced to the tools and the techniques of drafting. They are revised some of the basic geometrical constructions related to drawing like various types of lines/shapes and then introduced to orthographic projections.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
AE102 GRAPHICS- I	L	T	P	C	TH	TM	PR/OR	TW	100
	-	-	06	06	-	-	50	50	

Minimum passing Percentage 40%
TW shall consist of prescribed number of assignments and shall be progressively assessed.

3. COMPETENCIESTO BE DEVELOPED THROUGH THIS COURSE

The students should be able to

a. Write neat and pleasant lettering styles using free hand.

b. Handle any tool of drafting and know its use

c. Understand basic geometrical construction of lines, shapes, curves from the given data.

d. Understand different drawing elements like point, line, planes, and primary solids as prisms/pyramids and draw them in orthographic projections like plans, elevations and sections.

4. DETAILED COURSE CONTENT

Unit 1 : BASIC DRAWING AND LETTERING SKILLS

A. Introduction to various types of lines used in drawings and understanding their representative value, eg, projection line, hidden line, lineweight.

B. Introduction to various types of lettering fonts, its construction styles and features, developing free hand writing skills at different sizes and styles.

Unit 2 : BASIC GEOMETRICAL CONSTRUCTION

A. Use of drafting tools like set squares, T-squares, scales, pencils, erasers, etc.

B. Construction of lines, bisecting lines/angles, drawing perpendicular and parallel lines, construction of curves from points, construction of polygons with construction method and with set squares, understanding the included angles, etc.

C. Construction of geometrical curves like Parabola, Hyperbola, ellipse, Cycloid, Involute, Spiral.

Unit 3: ORTHOGRAPHIC PROJECTIONS

A. Introduction to theory on Orthographic projections, format of drawing orthographic projections in plan and elevations (front, left view, right view), introduction to drawing elements like point, lines, planes and primary solids.

B. Orthographic projections of points, lines, planes and solids with positions perpendicular and parallel to the principle planes.

C. Orthographic projections of composite solids with positions perpendicular and parallel to the principal planes.

Unit 4 : SECTIONS

A. Orthographic projections of sections of primary and composite solids with positions perpendicular and parallel to the principal planes.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (Practical)

Unit No.	Topic	Teaching Hours	Marks distribution for Termwork	Marks distribution for End semester Exam
1	Basic drawing and lettering skills	12	08	08
2	Basic geometrical constructions	26	10	10
3	Orthographic projections	40	22	22
4	Sections	18	10	10
	TOTAL	**96**	**50**	**50**

6. SUGGESTED ACTIVITIES

- At least 4 styles of lettering should be practiced on Unit-1 and assessed for Termwork
- At least 3 full imperial sheets are to be done on Unit-2 and assessed for Termwork
- At least 4 full imperial sheets are to be done on Unit-3 and assessed for Termwork
- At least 2 full imperial sheets are to be done on Unit -4 and assessed for Termwork.

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	N.D. Bhatt/ V.M. Panchal	Engineering Drawing	R.C. Patel Charotar Book stall, Anand
2	N.D. Bhatt	Elementary Engineering Drawing	R.C. Patel Charotar Book stall, Anand

(AE103) – ARCHITECTURAL DRAWING I

1. RATIONALE

Architectural drawing is one of the important courses for a student of Architectural Engineering. Drawing is the language for communicating design ideas. Since a student of Architectural Assistantship is novice to the programme, syllabus is designed to train him initially to Read a building drawing, art of measuring and sketching. This shall lay a firm foundation for subsequent syllabus in architectural drawing.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
AE103 Architectural drawing -I	L	T	P	C	TH	TM	PR/OR	TW	150
	-	-	8	-	-	-	50	100	

Minimum passing Percentage 40%
TW shall consist of prescribed number of assignments and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The course content should be taught and implemented with the aim to develop different types of skills eg Reading a building drawing, freehand sketching, measuring and drawing to scale building elements, furniture, and in the end be able to plan a small interior space.

4. DETAILED COURSE CONTENT

Unit 1: INTRODUCTION TO ARCHITECTURAL DRAWING

- Definition of architecture–
- Scope And Role of architectural assistant
- importance of drawing as means of communication

Unit 2 : TECHNIQUES OF SKETCHING

- Principles of sketching
- Materials for sketching
- Still life sketches, view finder ,architectural elements
- Different types of signs and symbols used in Architectural drawings to represent items like North direction, scale, parking, trees, vehicles, etc.

Unit 3 ANTHROPOMETRY

- Body proportions
- Study of furniture—measurements and understanding its relevance to surrounding spaces and human Activities like sitting, squatting, dining etc.

Unit 4. INTERIOR LAYOUT

- internal circulation
- Placement of doors windows
- Aesthetics in interiors.
- Case study and Analysis of existing interior layout
- Furniture layout –in various single volume spaces eg. Waiting, reception, display storage

Unit 5. DRAWING SCALE

- Standard guidelines for building drawing
- Drawing sheet –dimensioning -Lettering
- Elevations of various objects eg .steps, flag post and other various elements

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (Practical)

Unit No.	Topic	Teaching Hours	Marks distribution for termwork	Marks distribution for End Semester Exam
1	Introduction to architectural drawing	04	10	5
2	Techniques of sketching	20	20	10
3	Anthropometry	24	20	10
4	Interior layout	48	30	15
5	Drawing scale	32	20	10
	TOTAL	**128**	**100**	**50**

6. SUGGESTED ACTIVITIES list exercises

Unit 1: Prepare a file on different plan types.

Unit 2: Maintain a sketch book for the exercises

Unit 3: One sheet on body dimensions related to activities

One sheet on human proportions related to furniture

Unit 4: Assignments on interior layout

Unit 5: Two sheets on various architectural elements drafted

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books
1	V.S.Pramar	Fundamentals in Architecture
2	Francis D. K.Ching	Form and space in Architecture
3		Neuferts Data- Building Types
4		Time Saver Standards- Building types

(AE104) – MODEL MAKING I

1. RATIONALE

The students of this course are to be introduced initially to making models of objects so as to develop ability to understand and visualize 3- dimensional forms. Further the students have to understand making of a proper detailed model of a Residential house understanding the scale, various model making techniques, materials and tools.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
AE104 Model Making-I	L	T	P	C	TH	TM	PR/OR	TW	100
	-	-	02	02	-	-	50	50	

Minimum passing Percentage 40%
TW shall consist of prescribed number of assignments and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The students shall be able to

a. Handle cutting and fixing of basic volumes, eg, cubes, prisms, cylinders, pyramids, cones, etc.
b. Make models of building furniture, landscape components, like trees, shrubs, etc.
c. Make detail model of Ground +1 architectural structure like a house, shop, milk booth, etc, using various materials.

4. DETAILED COURSE CONTENT

Unit 1: INTRODUCTION TO BASIC MODELS d. Introduction to various types of materials, tools, cutting and pasting techniques. e. Transferring the drawing details on the model making material and cutting it perfectly. f. Assembling and pasting all the components together to make basic objects like cube, prisms, pyramids, etc.
Unit 2 : MODELS OF FURNITURE AND LANDSCAPE ELEMENTS a. Model to be made of building furniture like chair, sofa, table, etc. as per required scale using different types of relevant materials. b. Model to be made of Landscape elements like trees, shrubs, vehicles, etc. and/or building finishes as per required scale using different types of relevant materials.
Unit 3 MODEL OF ARCHITECTURAL STRUCTURE a. Detail model of an Architectural Ground/G+1 structure to required scale using multiple materials combinations. The structure can of a House, or interiors of shops, watchman's cabin, etc. b. Stress to be laid on neat cutting, pasting, correct sizes/scale, well finishing and colouring /painting. c. Model to be arranged on a relevant base with necessary landscape, street detailing, etc.

4. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (Practicals)

Unit No.	Topic	Teaching Hours	Marks distribution for termwork	Marks distribution for End semester Exams
1	Introduction to basic models	8	10	10
2	Models of furniture and landscape elements	10	15	15
3	Model of architectural structure	14	25	25
	TOTAL	**32**	**50**	**50**

5. SUGGESTED ACTIVITIES

- At least 2 models should be made on UNIT-1 of basic objects and assessed for termwork.
- At least 1 detailed model of building furniture to be assessed for termwork
- At least 1 detailed model of an architectural structure along with the landscape components/ building finishes and assessed for termwork

6. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	Joseph Chiara and John Callen	Time Saver Standards- Building types	Mc. Graw Hill int. Book Co.
2	Joseph Chiara and John Callen	Time Saver Standards- for Architectural Design Data	Mc. Graw Hill int. Book Co.
3	Sleeper	Building Planning Design and standards	John Wiley & sons, New York

(AE105) - BUILDING CONSTRUCTION I

1. RATIONALE

The students of this course are to be introduced to the building construction techniques as part of Architecture. This curriculum should impart the knowledge of identifying and understanding building components and basic techniques of wall constructions.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
AE105 Building Construction-I	L	T	P	C	TH	TM	PR/OR	TW	125
	01	-	04	05	75	25	-	25	

Minimum passing Percentage40%

TW shall consist of prescribed number of assignments and shall be progressively assessed.

3. COMPETENCIES TO BE DEVELOPED THROUGH THIS COURSE

a. The students should be able to identify building components with their technical names, basic descriptions, functions etc, and to sketch it out.
b. The students should be able to graphically represent building materials, other signs/symbols and also understand the relevance of various types of lines used in drawings.
c. The students should be able to recognize and understand the use of various construction tools, equipments, etc.
d. The students should be able to understand and draw the basic bonds in brick wall constructions and the materials required for it.

4. DETAILED COURSE CONTENT

Unit 1: INTRODUCTION TO BUILDING COMPONENTS

a. Identifying building structures as composed of various components which can be identified under different terms/titles and sub-titles of their parts.
b. Freehand Sketch in correct proportions of each component, detailed identifying characteristics, materials used in their construction, functional role, etc of each of such components.
c. Components which can be dealt with in detail for the above topics are like, Foundation, plinth, walls, floors, different types of openings, lintels, arches, Mangalore tile roofs, different types of roof slopes, staircase, balconies, terrace, railings, compound walls, wall finishes, etc.

Unit 2: GRAPHICAL REPRESENTATIONS

a. Different types of lines used in drawings and understanding their representative value.
b. Different types of signs and symbols used in Architectural drawings to represent items like North direction, scale, parking, trees, vehicles, etc.
c. Different types of representations of all building materials in section and elevation.

Unit 3: CONSTRUCTION TOOLS AND EQUIPMENTS

a. Identify various designations (in local language also) of workers required on a typical construction site and the job/work they handle.
b. Identify the tools (in local language also) used by each of such workers for handling their job. Freehand sketch, functions, advantages, etc of each of such tools.
c. Identify the equipments (in local language also) used in all processes of construction works and their functions, advantages, costs, etc.

Unit 4: WALLS IN BRICKS

a. Introduction to brick masonry, definition, terminology,standard brick(size/parts),other brick types available in the market, closers,bats, etc, sketches of items wherever possible.
b. Bonds in bricks- (Strecher Bond, Header Bond, English Bond, Flemish Bond)- definition, charesteristics,advantages, drawings in plan and elevation to be dealt of simple piers, simple straight walls and right angled corner junctions in walls. Atleast two different thickness variations to be dealt for English and Flemish Bond drawings.

Unit 5: FIELD WORK

a. Visit local sites under construction to understand and visualize various building components, various workers – theirs jobs, tools, equipments and wall construction in bricks as mentioned from Unit 1 to Unit 4. Total atleat 3 visits and report to be complied of each visit.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (Theory)

Unit No.	Topic	Teaching Hours	Marks distribution for termwork	Marks distribution for End Semester Exam
1	Introduction to building components	20		**25**
2	Graphical Representations	10		**10**
3	Construction Tools and Equipments	15		**15**
4	Walls in Bricks	25		**25**
	Total	70		**75**
5	Field Work (Term Work) 1. Note Book assessment 2. Report writing 3. Teacher's assessment	10	10 10 05	
	TOTAL	**80**	**25**	

6. SUGGESTED ACTIVITIES

- Sketches can be generated either in classroom or actual site locations pertaining to the respective Unit 1 to Unit 4 as and when being dealt with. Visual slides/pictures can also be shown from internet/ presentations, etc. All the sketches/drawings are to be assessed for term work.
- Report writing for the site visits should be guided/ done separately and assessed as term work.
- Note book is to be assessed at least before every periodic test and final submission for term work.

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	S. C. Rangawala	Building Construction	Charotar Publishing House Pvt. Ltd.
2	Sushil Kumar	Building Construction	Standard Pub. Dist. Delhi
3	Dr. B. C. Punmia	Building Construction	Laxmi Pub. New Delhi
4	S.P.Arora/ S.P.Bindra	Building Construction	Dhanpat Rai & Sons, Delhi
5	G.V. Khanolkar	Foresight- Work guide for Building Construction	Foresight Pub., Alto-Betim, Porvorim, Goa

(AE201) Building Materials – II

1. RATIONALE

The students of this course are to be introduced to finishing materials used in building construction, their characteristics, comparative advantages, etc. Also, new and advanced materials are discussed so as to generate a sense of their applicability in building industry.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
Code AE201	L	T	P	C	TH	TM	PR/OR	TW	125
Building Materials II	03	-	-	03	75	25	-	25	

Minimum passing Percentage 40%
TW shall consist of prescribed number of assignments and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

a. The students will know all the necessary data of the finishing building materials like sizes, forms, measurements, costs, availability, advantages, uses, defects, etc.
b. The students should be able to identify their characteristics, peculiarities and precautions to be taken when in use.
c. The students should be able to approve quality of these building materials whether it is suitable for the use as per the required specifications
d. The students are introduced to advanced materials in construction and their relevance of use.

4. DETAILED COURSE CONTENT

UNIT 1

CONCRETE

A. Definition, Properties, Proportioning of ingredients, Grades, production, water-cement ratio, Placing, Compaction and Curing of concrete.

B. Requirements of good cement concrete, types, Uses, and field Test.

C. Requirements and use of light weight concrete, precast concrete, coloured concrete, water-proof concrete, and lime concrete, etc. Introduction to concrete blocks and its use

UNIT 2

FLOOR FINISHING MATERIALS:

A. Requirement of various floor finishing materials viz Glazed earthern wares cement concrete P.V.C. Wood linoleum, bitumen mastic and rubber

B. Choice of flooring material according to its use details of laying.

UNIT 3

PAINTS AND VARNISHES:

A. Introduction to paints, its constituents, preparation and Types

B. Requirements and uses of a good paint, dry and oil bound distemper. Introduction to Varnishes, its uses and types

C. Process of painting on new and old surfaces like Wood work, metal such as iron, steel, G.I. and Plastered surfaces. Methods. of Distempering, white washing, colourwashing, applying French polish, Wax polish and oiling on woodwork,.

UNIT 4

INDUSTRIAL FORMS OF TIMBER:

A. Definition, varieties- veneers, Plywoods, Battenboard, Fiberboards, Impreg timbers, Compreg timbers. And their uses.

B. Market sizes and their uses in the building industry.

UNIT 5

PLASTICS:

A. Introduction to Plastics, composition and it major classification

B. Properties of Plastics and use of Plastics in the Building industry

UNIT 6

ADHESIVES:

A. Definition, Advantages and Disadvantages.

B. Various market types and their uses in the building industry.

UNIT 7

GYPSUM:

A. Introduction to various chemical compositions of Gypsum, Properties and Advantages.

B. Market forms and their use in building industry.

UNIT 8

BITUMEN:

A. Introduction to Bitumen

B. Market forms and their uses in the building industry.

UNIT 9

GLASS:

A. Introduction to chemical composition, classification, Properties of Glass.

B. Types of Glass and their uses, treatment of Glass, special varieties of Glass used in the building industry.

UNIT 10

PIPES AND FITTINGS:

A. Requirements of different types of pipes used in water supply, strorm water drainage, sanitary sewage and their advantages/ dis- advantages.

B. Fittings for the above.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Topic	Teaching Hours	Marks distribution for Termwork	Marks distribution for End Semester Exam
1	Concrete	10	05	15
2	Floor finishing materials	06	03	09
3	Paints and varnishes	06	03	09
4	Industrial forms of timber	09	04	13
5	Plastics	02	01	03
6	Adhesives	02	01	03
7	Gypsum	03	02	06
8	Bitumen	02	01	03
9	Glass	05	03	08
10	Pipes and fittings	03	02	06
		48	**25**	**75**

6. SUGGESTED ACTIVITIES(Termwork)

1) Explanation and discussion on each topic from Unit 1 to Unit 10 is to be dealt with

2) Note book assessment is to be done at least before every periodic test and final submission for term work.

3) Visit to local outlets to understand and visualize various building materials, their costs and use in building industry for Unit 1 to Unit 10. Report to be submitted as group work for all 10 units.

4) Report Writing for the site visits and actual material samples are to be presented as group discussions and should be guided/ done separately and assessed as termwork.

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	S.C. Rangawala	Engineering Materials	Charotar Publishing House
2	Sushil Kumar	Engineering Materials	Standard Pub. Dist. Delhi.
3	G.J. Kulkarni	Engineering Materials	
4	Arora/ Agarwal	Civil Engineering Materials	New india Pub. House, Jalander
5	T.T.T.I.	Civil Engineering Materials	Tata McGraw Hill, New Delhi.

(AE 202) GRAPHICS- II

1. RATIONALE:

The students of this course shall understand advanced orthographic projections of inclined objects and 3 dimensional isometric projections. They shall also learn development and intersections of surfaces of various objects like prisms and pyramids and rendering with pencil techniques.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
AE202 Graphics-II	L	T	P	C	TH	TM	PR/OR	TW	100
	-	-	06	06	-	-	50	50	

Minimum passing Percentage 40%
TW shall consist of prescribed number of assignments and shall be progressively assessed.

3. COMPETENCIESTO BE DEVELOPED THROUGH THIS COURSE

The students shall be able to

a. Visualize and draw orthographic projections of objects with inclined positions
b. Visualize and draw an object/building in 3- Dimensional isometric projections
c. Understand and draw development of 3- Dimensional objects like prisms and pyramids.
d. Visualize the intersections of surfaces for various objects and draw the same in orthographic projections.
e. Render any drawings for presentations.

4. DETAILED COURSE CONTENT

UNIT 1: ORTHOGRAPHIC PROJECTIONS

A. Orthographic projections of prisms and pyramids with positions inclined to any one principal planes

B. Orthographic projections of prisms and pyramids with positions inclined to both the principal planes.

UNIT 2: ISOMETRIC PROJECTIONS

A. Introduction to the family of 3- dimensional drawings, theory of isometric projections

B. Construction of isometric projections of simple/ composite objects like prisms and pyramids with straight/ inclined/ curved lines and buildings.

Unit 3

DEVELOPMENT OF SURFACES

A. Development of all types of prisms using parallel line method and pyramids using radial line method.

B. Development of sloping roof forms

UNIT 4: INTERSECTION OF SURFACES

A. Orthographic projections of interpenetrating primary solids like prisms and pyramids showing their lines of intersections

UNIT 5: PENCIL RENDERING

A. Importance in architectural presentations

B. Use of tools, grades of pencils, charcoal pencil, colour pencils, types of papers

C. Techniques of rendering, i.e. shading, stippling, smudging, linework, creating textures.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (Practicals)

Unit No.	Topic	Teaching Hours	Marks distribution for termwork	Marks distribution for End Semester Exam
1	Orthographic projections	24	12	12
2	Isometric projections	18	10	10
3	Development of surfaces	18	10	10
4	Intersection of surfaces	20	10	10
5	Pencil rendering	16	8	8
	TOTAL	96	50	50

6. SUGGESTED ACTIVITIES (assessed for Term-work)

- At least 3 full imperial sheets are to be done on Unit-1
- At least 2 full imperial sheets are to be done on Unit-2
- At least 2 full imperial sheets are to be done on Unit-3
- At least 2 full imperial sheets are to be done on Unit-4
- At least 1 full imperial sheets are to be done on Unit-5

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	N.D. Bhatt/ V.M. Panchal	Engineering Drawing	R.C. Patel Charotar Book Stall, Anand
2	N.D. Bhatt	Elementary Engineering Drawing	R.C. Patel Charotar Book Stall, Anand
3	Shah/ Kali/ Patki	Building Drawing	Tata Mc. Graw Hill Pub. Co, Bombay
4	Albert O. Halse	Architectural Rendering	
5	Philip Crowe	Architectural Rendering	
6	Robert W. Gill	Rendering with Pen And Ink	Thames and Hudson

(AE203) Architectural Drawing II

1. RATIONALE

Having acquired skills to read, measure and sketch drawings in the earlier semester, this subject shall enable the student to derive functional and architectural space, from which the Architectural form can be evolved. This subject aims at developing self confidence to plan small single - unit structures independently.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
AE203 Architectural drawing II	L	T	P	C	TH	TM	PR/OR	TW	150
	-	-	8	8	-	-	50	100	

Minimum passing Percentage 40%
TW shall consists of prescribed number of sheets and shall be progressively assessed .

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The course content should be taught and implemented with the aim to develop skills in measured drawings, deriving architectural spaces and analyzing elements and principles of design, and to design single room unit structure like bus shelter, watch man's cabin, etc

4. DETAILED COURSE CONTENT

UNIT 1

CONCEPT OF ARCHITECTURAL SPACES

i) Study of Aesthetic Space and Functional space

ii) Derivation of Architectural spaces

e.g. meditation hall, monuments, Religious structure (temple, chapel) , watchman's cabin, individual rooms in a house.

UNIT 2

BASIC DESIGN IN ARCHITECTURAL FORM

A) Elements of Design

- Introduction to point, lines, shapes and forms
- Study of Characteristics of each element
- Application in Architecture

B) Principles of Design

- Importance of composition in Architecture
- Composition of elements (with respect to linear, radial, cluster, grid and centralized form, etc.)
- Understanding of terminology: i.e. axis, balance, symmetry, focus, hierarchy, rhythm, dynamics, Proportions and scale in Design.

C) Colour and Texture in Design

- Importance of colours and textures.
- Introduction to colour schemes
- Types of textures
- Composition with colour and texture.

UNIT 3

DEVELOPMENT OF DESIGN

- Design of a single unit structure

(Note: Application of all topics covered above is mandatory)

viz, bus stop, shop, watchman's cabin etc.

UNIT 4

MEASURED DRAWING

- Importance of measured drawing in building Documentation, redesigning, conservation
- Techniques (Preparing of sketch, use of measurement tools, use of graph paper, etc)
- Preparation scaled drawings (plans, sections, elevations, details)

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (Practicals)

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1	Concept of architectural spaces	16	12	6
2	Basic design in architectural form	32	24	12
3	Development of design	48	40	20
4	Measured drawing	32	24	12
	Total	128	100	50

6. SUGGESTED ACTIVITIES(assignments)

Note: All assignments to be related to a single unit structure

UNIT 1:

- To review examples of Functional space, aesthetic space, and Architectural space (*through pictures of architectural spaces from books and other sources*) *(A1 size sheet -1 No.)*

- To derive Architectural spaces (*in plan and section*) e.g. meditation hall, monuments, Religious structure, watchman's cabin, individual rooms in a house.etc *(A1 size sheet -1 No.)*

UNIT 2:

- To identify Elements of Design (*through review of architectural pictures from books and other sources and freehand sketches*)
  (A1 size sheet -1 No.)

- To identify various Basic Forms and their derivatives (through review of architectural pictures from books and other sources and freehand sketches)
  (A1 size sheet -1 No.)

- To identify Compositions of elements (with respect to linear, radial, cluster, grid and centralized form, etc.) (through review of architectural pictures from books and other sources and freehand sketches)
  (A1 size sheet -1 No.)

- To prepare Composition of elements (points and lines) within a given architectural space.
  (A1 size sheet -1 No.)

- To prepare Compositions using Principles of Design i.e. axis, balance, symmetry, focus, hierarchy, rhythm, dynamics, Proportions and scale, within a given architectural space.
  (1 A1 size sheet)

- To prepare a Composition with colour and texture on the given architectural surfaces.
  (A1 size sheet -1 No.)

UNIT 3:

- To Design and prepare drawings (plan, sections ,elevations)for the Single-unit structure
  (Number of sheets as per scope of the project)

- Preparation of model to scale

UNIT 4:

- Site visit
- To maintain a sketch book for sketches & measurements
- Preparation of scaled drawings (use of graph paper)
- Drafting of Plans, Sections, Elevations and details, etc.
  (Number of sheets as per scope of the project)

6. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books
1	V.S.Pramar	Fundamentals in Architecture
2	Francis D. K.Ching	Form and space in Architecture
3		Neuferts Data- Building Types
4		Time Saver Standards- Building types

(AE204) – MODEL MAKING II

1. RATIONALE

The main aim of the curriculum is to make the students develop the ability to make the various detailed components of a building model. Also the students will be able to model façade treatments for mid- rise buildings as well as create sloping topography for a site.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
AE204 Model Making- I	L	T	P	C	TH	TM	PR/OR	TW	100
	-	-	02	02	-	-	50	50	

Minimum passing Percentage 40%
TW shall consist of prescribed number of assignments and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The students shall be able to

a. Make detail model of building components like stairs, balconies, cornices, railings, chajjas, doors, windows, wall treatments (cladding like tiles, stone, etc.)
b. Create a contoured site as per the given sloping topography
c. Create detail of façade treatments for mid-rise buildings

4. DETAILED COURSE CONTENT

Unit 1 BUILDING COMPONENTS a. Detailed models of stairs, balconies, cornices, railing, chajjas, doors, windows, wall treatments (cladding like tiles, stone, etc.)
Unit 2 **SITE LAYOUT** b. Techniques in making contours c. Details in contours consisting of block models of buildings.
Unit 3 **MODEL OF A MID-RISE ARCHITECTURAL STRUCTURE** d. Model of a G+3 storied building with detail of façade treatments. e. Model to be arranged on a relevant base with necessary landscape, street detailing, etc.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (Practicals)

Unit No.	Topic	Teaching Hours	Marks distribution for Termwork	Marks distribution for End Semester Exams
1	Building Components	12	20	20
2	Site Layout	8	10	10
3	Model of a mid-rise architectural structure	12	20	20
	TOTAL	**32**	**50**	**50**

6. SUGGESTED ACTIVITIES assessed for termwork

- Detailed models of building components given in UNIT-1 .
- At least 1 detailed model of site layout with building blocks given in UNIT-2.

- At least 1 detailed model of an architectural G+3 structure along with the site given in UNIT-3

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	Joseph Chiara and John Callen	Time Saver Standards- Building types	Mc. Graw Hill int. Book Co.
2	Joseph Chiara and John Callen	Time Saver Standards- for Architectural Design Data	Mc. Graw Hill int. Book Co.
3	Sleeper	Building Planning Design and standards	John Wiley & sons, New York

(AE206) -BUILDING CONSTRUCTION II

1. RATIONALE

The students of this course are introduced to building as a load bearing/frame structure. This curriculum should impart the knowledge of construction detailing of all the components of the sub-structure and super-structure.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
AE206	**L**	**T**	**P**	**C**	**TH**	**TM**	**PR/OR**	**TW**	
Building Construction-II	02	-	04	06	75	25	-	25	**125**

Minimum passing Percentage 40%

TW shall consist of prescribed number of assignments and shall be progressively assessed.

3. COMPETENCIES TO BE DEVELOPED THROUGH THIS COURSE

- The students should be able to identify all building components of a Load bearing and framed structure, majorly of sub-structure and super-structure.
- The students should be able to do technical drawings(Plan, elevation, Section) of the different building components of foundations, walls, openings, floor and staircase including alternative materials and sizes in each type.
- The students should be able to understand the characteristics, functions, advantages, choice of materials, techniques of construction, etc of each component as above.

4. DETAILED COURSE CONTENT

UNIT 1: STRUCTURES

a. Identifying building structures as load bearing and framed structures composed of various components which can be identified under different terms/titles and sub-titles of their parts.
b. Understanding use of composite materials in building components, their compatibility with each other and characteristics of bonding.

UNIT 2: FOUNDATIONS

a. Definition, Function, Essential requirements of a good foundation, bearing capacity of soil, different types- shallow and deep.
b. Detail drawings of shallow foundations of walls and piers in brick, stone, R.C.C., etc.
c. Setting out of foundation wall trenches and pier footings- drawings and site execution.

UNIT 3: WALLS

a. Load bearing and Non-load bearing types, Stone masonry- Terminology, stone dressing, classification, different types of joints, supervision of stone masonry construction.
b. Brick Masonry- Bonds in Bricks at junction and quoins in English and Flemish bond of at least 2 wall thicknesses.
c. Supervision of Brick masonry works, strength of brick masonry, other structures in brickwork, defects, comparison of brick and stone masonry
d. Composite Masonry- Detailing of composite materials for walls like Brick/Stone, R.C.C./Brick, Reinforced Brick Masonry, etc.

UNIT 4: OPENINGS

a. Lintels- definition, terminology, classification based on materials, detailing of each type.
b. Arches- definition, terminology, stability, classification based on shape, materials and centers, scaffolding, detailing of each type.

UNIT 5: FLOOR AND WALL FINISHES

a. Floor finishes- Components of a floor, selection of flooring material, types of floorings- like glazed, earthen ware, cement concrete, P.V.C., linoleum, wood, Bitumen and rubber, characteristics of each and details of laying.
b. Wall finishes- Plastering- Terminology, types of mortars, number of coats, types of plaster finishes, special effects, and defects. Pointing- definition and types.
c. Wall Cladding- Different materials of cladding, their choice and fixing.

UNIT 6: ROOFS a. Construction details of sloping roofs in different materials like tiles, sheets etc.
UNIT 7: STAIRS a. Introduction, terminology, requirements of a good staircase, considerations of comfort. b. Types of stairs- classification based on shapes- drawings and characteristics of each.
UNIT 8: FIELD WORK a. Visit local sites under construction to understand and visualize various building construction activities mentioned in Unit 1 to Unit 7. Total at least 3 visits and report to be compiled of each visit for topics to be conveniently selected across all Units from 1 to 7.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (Theory)

Unit No.	Topic	Teaching Hours	Marks distribution for termwork	Marks distribution for End Semester Exam
1	Structures	06		06
2	Foundations	18		12
3	Walls	18		16
4	Openings	12		10
5	Floor and wall finishes	18		13
6	Roofs	06		06
7	Stairs	12		12
	Total	90		75
8	Field Work (Term Work) 4. Drawing sheets- 8 5. Report/Note Book 6. Teacher's assessment	06		(TW) 15 05 05
	Total	96		25

6. SUGGESTED ACTIVITIES

- Drawing sheets are to be made at least 1 each imperial size sheets for Unit-1, 2, 6 and 7 and 2 each for Unit-3 and 4 as and when dealt with. Visual slides/pictures can also be shown from internet/presentations, etc for explanations/ discussions. All the drawings are to be assessed for term work.
- Report/Note book is to be assessed after every site visits and at least before every periodic test and final submission for term work.

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	S. C. Rangawala	Building Construction	Charotar Publishing House Pvt. Ltd.
2	Sushil Kumar	Building Construction	Standard Pub. Dist. Delhi
3	Dr. B. C. Punmia	Building Construction	Laxmi Pub. New Delhi
4	S.P.Arora/S.P.Bindra	Building Construction	Dhanpat Rai & Sons, Delhi

(CS303) AUTOCAD

1. RATIONALE:

The market driven economy demands frequent changes in product design to suit the customer needs.With the introduction of computers the task of incorporating frequent changes as per requirement is becoming simpler. This course has been introduced at Diploma level to develop the skills in student so that they can generate various digital drawing s as required using various CAD software.

1. Teaching and Examination Scheme

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
CS303 AUTOCAD	L	T	P	C	TH	TM	TW	PR/OR	100
	0	-	4	4	-	-	50	50	

Minimum passing % : 40%

2. COURSE CONTENTS: Teaching hours

1. Introduction and CAD Preliminaries. 2 hours
    - Computer aided drafting concept.
    - Hardware and various CAD software available.
    - Components of a CAD software window such as Titlebar, Standard toolbar, Menu bar, Object properties toolbar, draw tool bar, Modify toolbar, Cursor cross hair, Command window, status bar, Drawing area,UCS icon.
    - File features: New file, Saving the file, Opening an existing drawing file, Creating Templates, Import and Export of file, Quit.
    - Setting up new drawing : Units, Limits, Grid, Snap.
    - Undoing and Redoing action.

2. Drawing using CAD software: 10 hours
    - Drawing basic objects : Point, Line, Circle, Arc, Ellipse, Parabolas, polygon, Rectangle, Multiline, Doughnut, Drawing with precision, Drawing construction

lines and rays, Calculating distance and angle, Use of measure, Divide, Inquiry commands, redraws and Regenerating screen display.

- Methods of specifying points, Absolute coordinates, Relative Cartesian, and Polar coordinates.
- Using Object snap: Endpoint, midpoint, Intersection, Centre Point, Quadrant point, Nearest Perpendicular, Apparent Intersection, etc.

3. Edit/modify features and viewing drawings. 10 hours
    - Object Selection : selection set with its options like Pick box, Window, Crossing, Previous, Last drawing, etc.
    - Editing Commands like : Zoom all, Zoom Previous, Zoom Extents, Zoom window, Zoom real time, Zoom Dynamic, Zoom Pan.
    - Modify commands: Erase, Copy, Mirror, Offset, Array, Move, Scale, Stretch, Lengthen, Trim, Extend, rotate, break, join, chamfer, fillet.

4. Organising Drawing: 6 hours
    - Concepts of layers: creating layers, naming layers. making layers ON/OFF, freeze-thaw layers, lock/unlock layers, setting the properties of layers like colour, line type, line weight.
    - Concept of blocks : Creating, inserting, redefining and exploding blocks.
    - Concept of Hatch: Selecting hatch pattern, Hatch styles, Hatch Orientation, associative hatch, Boundary hatch, Hatching Object.
    - Polylines: Drawing polylines, editing polylines, drawing spline curves, editing splines.

5. Dimensioning and Tolerancing: 8 hours
    - Dimensioning : Types of dimensioning, Linear, Horizontal, Vertical, Aligned, rotated, Baseline, continuous, diameter, radius, angular dimension, Leader.
    - Dimension scale variable,adding geometric tolerances
    - Editing dimensions
    - Single line text,Multiline text.
    - Text styles: selecting font, size, arrows, alignment, etc.

6. 3D-features: 2 hours
    - Right hand rule/local global co-ordinate system.
    - Specifying 3D coordinates
    - Using UCS
    - Defining user coordinate system using UCS command with its options.
    - Viewing in 3D

7. Isometric Drawing: 10 hours
    - Settings for isometric drawing, isometric Snap mode, switching between isometric planes, isocircles, simple isometric drawings.

8. Solid Modeling: 12 hours
    - Concept of solid modeling
    - Creating predefined solid primitives such as box, cone, cylinder, sphere, torus, wedge.
    - Constructing a region, creating an extruded solid, creating a revolved solid.
    - Creating composite solids using union, intersection and interface commands.

9. Model space, Paper space, viewports and layouts: 2 hours
    - Concept of model space and paper space.
    - Creating viewports in model space and creating floating viewport in paper space.
    - Shifting from model space to paper space and vice versa.

10. Printing/ Plotting drawing.: 2 hours
    - Standard sizes of sheet.
    - Selecting various plotting parameters such as paper size, paper units, drawing orientation, plot scale, plot offset, plot area, print preview.

3. PRACTICALS:

1. Drafting of common template for all the following assignments with Institute logo and standard title block.
2. Five problems on different geometrical shapes.
3. Dimensioning of above figures.
4. Three problems with polar and rectangular arrays.
5. Three problems on 2D entity generation, which involve the use of layers and blocks.
6. Two problems on orthographic views for various Engineering drawing objects covering dimensioning, text, etc.
7. Two problem on isometric drawing of Engineering drawing object.
8. Create at least two solid models, which cover all the features available in solid modeling.
9. Drafting project:
   a) Civil Engg. & Architectural Engineering: Plan, elevation and section of a single story residential building.
   b) Electrical & Electronics Engg.: Electrical layout of components like bulbs, fan, A.C., T.V. point, telephone point, etc. for a single story house.
   c) Mechanical Engg.: Industrial components such as machines, automobiles , jigs and fixtures with dimensioning, tolerancing ,text, title block, etc.
   d) Shipbuilding Engg.: Body plan of a ship.
   e) Mining Engg.: Plan and section of an opencast mine benches, Plan and section of an underground mine.

4. LEARNING RESOURCES:

1. AutoCAD for Engineering drawing made easy – P. Nageshwar Rao- Tata McGraw Hill.
2. Mastering AutoCAD – George Omura- BPB Publication.
3. AutoCAD 2004 – Sham Tickoo- Galgotia Publications, New Delhi.
4. AutoCAD 2000 – Devid Frey- BPB Publication.
5. An Introduction to AutoCAD 2000 – A. Yarwood- Longman publication.
6. Using AutoCAD 2000 – Ron House – Prentice Hall.
7. Latest AutoCAD Manual – Autodesk Inc. – Autocad Inc.
8. CATIA V6 Essentials by Jones & Bartlett learning.

9. Inside Catia by Paul Carman, Paul Tigwell.
10. CATIA Tutorials by Nader G. Zamani.
11. ProE/Creoelements or any equivalent reference/text books.

GN203 ENVIRONMENTAL STUDIES

1. RATIONALE

Due to various developmental activities carried out by man, our environment is continuously being abused and getting degraded. The air we breathe, water we drink, food we eat, land we live on, all are getting spoiled day by day. The purity of our environment is of prime importance for survival of human race on the earth. Man should not go for developmental activities at the cost of environment. This subject has been introduced in the Diploma Programme to bring about awareness towards the environmental purity amongst the students.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
GN203 Environmental Studies	L	T	P	C	TH	TM	TW	PR/OR	100
	3	-	-	3	75	25	-	-	

Minimum passing %: Theory 40% ***Duration of Theory Paper: 3 Hrs.***

3. DETAILED COURSE CONTENT

Unit 1 Multidisciplinary Nature Of Environmental Studies.

Definition, scope and importance. Need for public awareness.

Unit 2 Natural Resources

Renewable and nonrenewable resources. Natural resources and associated problems.

- Forest resources: Use and overexploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- Water resources: Use and over-utilization of surface and ground water, floods, droughts, conflicts over water, dams- benefits and problems.
- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Case studies.
- Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer & pesticide problems, water logging, salinity, case studies.

- Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
- Land resources: Land as a source, land degradation, man induced land slides, soil erosion and desertification.

Role of an individual in conservation natural resources. Equitable use of resources for sustainable life styles.

Unit 3 Ecosystems.

Concept of an ecosystem. Structure and function of an ecosystem. Producers, Consumers and Decomposers. Energy flow in the ecosystem. Ecological succession. Food chains. Food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of following ecosystems: (a) Forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) Aquatic ecosystems (Ponds, streams, lakes, rivers, oceans, and estuaries).

Unit 4. Biodiversity And Its Conservation.

Introduction – Definition: genetic, species and ecosystem diversity.

Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, national and local levels. India as a mega-diversity nation. Hot spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wild life, man-wild life conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Unit 5. Environmental Pollution.

Definition. Causes, effects and control measures of: Air pollution, water pollution, soil pollution, marine pollution, noise pollution, Thermal pollution, Nuclear hazards. Solid waste management: Causes, effects and control measures of urban and industrial wastes. Role of individual in prevention of pollution. Pollution case studies. Disaster management: flood, earthquakes, cyclone and landslides.

Unit 6. Social Issues And The Environment.

From unsustainable to sustainable development. Urban problems related to energy. Water conservation rainwater harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns; case studies. Environmental ethics: Issues and possible solutions. Climatic change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust; case studies. Wasteland reclamation. Consumerism and waste products. Environmental protection act. Air (Prevention and control of pollution) Act. Water (Prevention and control of pollution) Act. Wildlife protection Act. Forest conservation Act. Issues involved in enforcement of environmental legislation. Public awareness.

Unit 7. Human Population And The Environment. Population growth, variation amongst nations. Population explosion – Family welfare programme. Environment and human health. Human rights. Value education. HIV / AIDS. Women and child welfare. Role of Information technology in environment and human health. Case studies.
Unit 8. Field Work. Visit local area to document environment assets – river / forest / grassland / hill / mountain. Visit to a local polluted site – urban / rural / industrial / agricultural. Study of common plants, insects, birds. Study of simple ecosystems – ponds, river, hill slopes, etc. (field work equal to 6 lecture hours).

4. SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Topic	Teaching Hours	Marks
1)	Multidisciplinary Nature Of Environmental Studies.	01	03
2)	Natural Resources.	10	12
3)	Ecosystems.	06	08
4)	Biodiversity And Its Conservation.	06	09
5)	Environmental Pollution.	08	12
6)	Social Issues And The Environment.	07	12
7)	Human Population And The Environment.	04	09
8)	Field Work.	06	10
		48	75

5. MANDATORY ACTIVITIES

In addition to the class room instruction, visits should be arranged in any 2 of the following areas:

1. Visit to NIO or Science Centre.
2. Visit to Selaulim/ Anjunem Dam.
3. Visit to study ecosystem (Pond, Stream, River, and Forest).
4. Visit to show Hill cuttings, mining areas.
5. Visit to show Rain water harvesting project / Vermicomposting plant / Watershed management project. (Krishi Vigyan Kendra – Old Goa)
6. Visit to water treatment/ waste water treatment plant.

6. SUGGESTED VIDEOS

In addition to the class room instruction, video films on environment may be shown.

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	Erach Bharucha	Textbook of Environmental Studies for Undergraduate courses	University Press
2	P. Meenakshi	Elements of Environmental Science and Engineering	Prentice Hall of India (PHI)
3	S. Deswal & A. Deswal	A Basic Course in Environmental Studies.	Dhanpat Rai & Co.
4	Pandya and Camy	Environmental Engineering	Tata McGraw Hill
5	Asthana D.K. and Asthana Meera	Environmental Problems and Solutions.	S. Chand & Co
6	Centre for Environmental education	Video Film	Thaltej Tekra, Ahme
7	Dr. S.K. Dhameja	Environmental Studies	

Semester - III

Course code	Name of Course	TEACHING SCHEME				EXAMINATION SCHEME				Total marks
		L	T	P	C	Theory Marks		Practical Marks		
						TH	TM	PR/OR	TW	
AE301	Architectural Drawing-III			8	8			50	100	150
AE302	Graphics-III			6	6			50	50	100
AE303	Buidling Construction-III	2		4	6	75	25		50	150
AE304	History of Architecture	4			4	75	25		25	125
AE305	Computer Graphics-I			4	4			50	50	100
AE306	Building Services-I	4	-		4	75	25		25	125
Total					**32**					**750**

AE301 ARCHITECTURAL DRAWING III

1. RATIONALE

After successful completion of semester II syllabus, wherein the student has developed a self-confidence to plan a small single- unit structure, the curriculum for Semester III is aimed to train the student to compose forms, spaces and circulation patterns to be able to develop a multi-unit as well as a Ground + 1 structure .

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme		
					TW	Pr	Total Marks
AE301 Architectural drawing III	L	T	P	C	100	50	150
	-	-	8	8	-		

Minimum passing Percentage 40%
TW shall consists of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

Shall be skilled in

- Development of any given conceptual sketch by incorporating required spaces with appropriate circulation patterns.
- Develop parking lots.

4. DETAILED COURSE CONTENT

UNIT 1:
CIRCULATION PATTERN AND SPACE

1.i. Introduction to Circulation in architecture
1.ii. Types of Circulation patterns: horizontal, vertical, multi-storey, miscellaneous
1.iii. Arrangement of various types of Spaces about the circulation patterns studied at 1.ii.
1iv. Requirements of parking space and circulation

UNIT 2:
MASSING IN ARCHITECTURE

2. i. Importance of massing.
2.ii. Types and Derivatives: viz. Right angled system, the spherical system, the diagonal system, etc.

UNIT 3
DEVELOPMENT OF A GROUND +1 STRUCTURE

3. i. To develop a Ground + 1 structure on the given site.
e.g. Bungalow, etc. (between 150- 250 m2)

3.ii. To learn design procedure (site analysis, case studies/ book review, requirements, zoning, single line sketch(Site plan, Floor plans, section , elevation , block model), Sketch Development , Final Drawings (with rendering and finished model)

Note: Principles of Composition studied in Unit II of Architectural drawing II and theory in Unit I & II shall be applied in the Assignment.

UNIT 4
DEVELOPMENT OF A GROUND LEVEL MULTIUNIT STRUCTURE

4.i. To develop a Ground level Multi-unit structure.
e.g. Primary health centre, Panchayat Ghar, Day care centre for children, Old age home, Primary school, etc.
Floor area between 600-1000 m2

4.ii To learn design procedure (site analysis, requirements, zoning, single line sketch(Site plan with parking scheme, Floor Plans, section , elevation , block model), Sketch Development , Final Design (with rendering and finished model)

Note: Principles of Composition studied in Unit II of Architectural drawing II and theory in Unit I & II shall be applied in the Assignment.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam (Practical)
1	CIRCULATION PATTERN AND SPACE	16	12	6
2	MASSING IN ARCHITECTURE	16	12	6
3	PLANNING A GROUND +1 STRUCTURE	40	32	16
4	PLANNING A GROUND LEVEL MULTIUNIT STRUCTURE	56	44	22
	Total	128	100	50

6. SUGGESTED ACTIVITIES(assignments)

UNIT 1:

a. To conduct a case study of an existing building/ **book review**, identify space and circulation patterns
b. To study parking lot (sizes, layouts) up to minimum 25 cars.

UNIT 2:

a. Assignments based on theory.
b. Developing Massing on given plans
(Prepare study models, views, etc to appropriate scale)

UNIT 3:

a. To conduct a case study of an existing G+1 structure and study its massing.
b. To Develop a G+1 structure. eg. Bungalow
(Site plan, floor plan, sections and elevations, model)

UNIT 4:

a. To conduct a case study of an existing Multi-unit structure.
b. To develop a multi-unit structure.
(Site plan, floor plan, sections and elevations, model)

Note: mode of submission of all Assignments to be decided by the concerned teacher; as per the scope of the Project

7. SUGGESTED LEARNING RESOURCES

S.No.	Author/publications	Title of Books
1	D.K. Ching	Forms and spaces in Architecture
2	V.S. Pramar	Fundamentals of Architecture
3		Neuferts Data- Building Types
4		Time Saver Standards- Building types

AE302 GRAPHICS -III

1. RATIONALE:

In this Curriculum the student is introduced to the principles of drawing shades and shadows and a further advancement into 3D drawings by the study of perspective projections. Also rendering knowledge will be imparted to the student.

2. TEACHING AND EXAMINATION SCHEME:

Course Code & Course Title	Periods/ Week(In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
AE302-GRAPHICS -III	L	T	P	C	TH	TM	PR/OR	TW	
	-	-	06	06	-	-	50	50	100

Minimum passing 40%

TW shall consists of prescribed number of sheets and shall be progressively assessed

3. COMPETENCIES TO BE DEVELOPED THROUGH THIS COURSE;

The students shall be skilled in

- Prepare Sciagraphy drawings of buildings
- Preparing One-Point perspective and Two-point perspective views
- Render drawings in Pen and Ink technique.
- Render drawings in colour medium technique

4. DETAILED COURSE CONTENT;

UNIT 1: **SCIAGRAPHY** • Introduction to study of shades and shadows. • Sciagraphy of line frames planes, primary solids and composite solids. • Sciagraphy of building components like steps, arches, roofs, niches, etc.
UNIT 2: **PERSPECTIVE PROJECTIONS** • One point perspective view of: Vertical and horizontal planes. Solids. Interior details of various rooms like kitchen, bedrooms, etc. • Two point perspective view of 1. Horizontal and vertical planes.

2. Simple and composite solids, 3. Building Components, 4. Single building and group of buildings. • Perspective drawing with Sciagraphy.
UNIT 3: **RENDERING TECHNIQUES IN PEN AND INK**
UNIT 4: **RENDERING TECHNIQUES IN COLOUR MEDIUM** Watercolours, poster colours, photographic colours

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS .

Unit No.	Topic	Teaching Hours	Marks Distribution for term work TW	Marks Distribution for End Semester Exam (Practical)
1	SCIAGRAPHY	28	15	15
2	PERSPECTIVE PROJECTIONS	28	15	15
3	RENDERING TECHNIQUES IN PEN AND INK	20	10	10
4	RENDERING TECHNIQUES IN COLOUR MEDIUM	20	10	10
	Total	**96**	50	50

6. SUGGESTED ACTIVITIES:

Method of Teaching:

- Models to be made of different geometrical froms and the sciagraphy of these forms shall be demonstrated with the help of focus lights.
- Sciagraphy of different objects in various positions with respect to principle planes shall be projected on the screen with the help of an OHP.
- Sketching of existing structural components shall be done to understand their shadows for different solar angles.

- Sketching of existing building blocks from different positions shall be done for the better understanding of principles of standing point & eye level of perspective drawing.
- Use of pen and ink of different pen point thickness (eg. 0.1,0.2,0.4,0.6, etc) in creating different thumbnail size textures in straight and curved lines, on tracing and opaque sheet
- Render a perspective drawing and a plan in pen and ink
- Render copies of a perspective drawing and plan in different mediums

Assessed for Term work:

- At least 6 full imperial sheets are to be done on Unit-1 .
- At least 6 full imperial sheets are to be done on Unit-2 .
- At least 2 full imperial sheets are to be done on Unit-3.
- At least 2 full imperial sheets are to be done on Unit-4.

7. SUGGESTED LEARNING RESOURCES;

S.No.	Author	Title of Books	Publication
1	N.D.Bhatt/V.M.Panchal	Engineering Drawing	R.C.Patel Charotar Book Stall., Anand
2	N.D. Bhatt	Elementary Engineering Drawing	R.C.Patel Charotar Book Stall., Anand
3	Shah/Kali/Patki	Building Drawing	Tata McGraw Hill Pub. Co, Bombay
4.	P.S. Gill	Engineering Drawing	
5.	N.D. Bhatt	Elementary Engineering Drawing	
6.	Albert O. Halse	Architectural Rendering	
7.	Philip Crowe	Architectural Rendering	
8.		Pen and Ink	

AE303 Building Construction III

1. RATIONALE

This subject shall expose the student to details and constructional techniques of various building components of a multiunit and multilevel structures upto G+1.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme			
					TH	TM	TW	Total Marks
AE303 Building Construction III	L	T	P	C	75	25	50	150
	2	-	4	6		-		

Minimum passing Percentage 40%
TW shall consist of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The course content shall enable the students to

- Prepare detail drawings of Doors and Windows, and Timber roof
- Design and draw Staircase for a G+ 1 Structure.
- Supervise construction of R.C.C. Structure upto G+1

4. DETAILED COURSE CONTENT

UNIT 1: SHALLOW FOUNDATIONS

a. Types of shallow foundations
(Spread foundation, strip foundation, combined, strap or cantilever footing, stepped, trapezoidal, grillage, eccentrically loaded, raft-types, etc.)
b. Construction of shallow foundations
    i. Setting out of Foundation trenches
    ii. Shoring

UNIT 2: R.C.C. IN SUPERSTRUCTURE

a. R.C.C. components (Columns, beams, slab, staircase, lintels, etc)
b. Formwork- centering, shuttering and scaffolding , Terminology, Checking Horizontal and vertical alignment
c. Reinforcement details ,cover requirement
d. Concreting- Proportioning, Mixing, Placing, compaction, Curing
e. Constructional joints, expansion joint

UNIT 3: STAIRCASE

a. Introduction, technical terms, requirements of a good staircase and dimensions, classification based on shape ,material and function, Spanning of Staircases
b. Details of Timber staircase, Steel Staircase, Stone staircase, etc.

UNIT 4: DOORS AND WINDOWS:

a. Construction drawings of simple doors and windows/ ventilators in timber and metal
b. Timber joinery.
c. Fixing of grillwork

UNIT 5: TIMBER ROOF

a. Components of a timber roof for single roof, double or purlin roof, triple membered or framed or trussed roofs(king- post, queen-post, composite , mansard, truncated, bow string, composite, scissors etc)
b. Detailing of simple roof trusses.
c. Typical construction sequence for a traditional roof- eg. Fixing of truss to wall plate.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS .

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1	Shallow Foundations	16	8	12
2	R.C.C. in Superstructure	18	10	15
3	Staircase	18	10	15
4	Doors and Windows	26	12	18
5	Timber Roof	18	10	15
	Total	**96**	**50**	**75**

6. SUGGESTED ACTIVITIES(Practicals)

Note: All assignments to be related to a multi- unit and multi-level G+1 structure

UNIT 1:

- Site Visit
- Drawings of different types of shallow foundations. *(1 A1 size sheet)*

UNIT 2:

- Visit to a construction site upto G+1.
- Report based on the Site Visit. (containing sketches, photographs, information) A4 Size booklet/ A1 size sheet.

UNIT 3:

- Site Visit
- Drawings on different types of Staircases and their detailing *(2 nos. A1 size sheets)*

UNIT 4:

- Site Visit
- Construction drawings of simple doors and windows/ ventilators in timber and metal

(2 nos. A1 size sheets)

UNIT 5:

- Site Visit
- Details of various roof trusses and its components (*2 nos. A1 size sheets)*

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1.	Sushil Kumar	Building Construction	Standard Pub. Dist. Delhi
2.	Dr. B.C. Punima	Building Construction	Laxmi Pub. New Delhi
3.	S.C. Rangwala	Building Construction	Charotar Publishing House Pvt. Ltd.
4.	S.P. Arora/ S.P. Bindra	Building Construction	Dhanpat Rai & Sons, Delhi

AE304 History of Architecture

1. RATIONALE

Architecture presents record of civilization through the built form. Any built form is influenced by many factors such as culture, social, economics, religion, politics, climate etc. This subject is required to reveal to the students of architecture; the development of architecture from prehistoric age to the modern age. It will encourage student's logical thinking ability & observational skills.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme			
					TH	TM	TW	Total Marks
AE304 History of Architecture	L	T	P	C	75	25	25	125
	4	-	-	4		-		

Minimum passing Percentage 40%
TW shall consist of prescribed number of assignments and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

Students shall be able to

- Identify the various historical styles of architecture
- Prepare measured drawings of historical buildings and its elements.
- Identify and apply constructional techniques and details of historical buildings.
- Assist a Conservation Architect on restoration projects

4. DETAILED COURSE CONTENT

Unit 1: IMPORTANCE AND SCOPE OF HISTORY OF ARCHITECTURE

- Importance of learning history: inspiration, architecture as a historical record.
- Development of architecture: evolution, timeline, factors influencing architecture (location, culture, resources).
- Understanding terms in architectural styles: pre-historic, historic, western, Indian, Rock cut Architecture, , vernacular, renaissance, post renaissance, Indo- Portuguese(with reference to Goa.), Contemporary, post modern etc

UNIT 2: WESTERN ARCHITECTURE

- Influencing factors (Viz. geographical location, culture, climate, resources)
- Identification of Characteristic features
- Important Examples from
  a. Egyptian Architecture—eg: Mastabas, Pyramids
  b. Mesopotamian- Ziggurats
  c. Greek –Orders, Parthenon
  d. Roman- Orders,Pantheon, Colosseum
  e. Renaissance Architecture- St. Peter's Basilica, St. Paul's Cathedral

UNIT 3: INDIAN ARCHITECTURE

- Influencing factors (Viz. geographical location, culture, climate, resources)
- Identification of Characteristic features
- Important Examples from
  a. Indus Valley Civilization (Residential and town planning)
  b. Vedic Architecture (Residential and town planning) eg. Vedic village
  c. Buddhist Architecture(Chaitya, Vihar, Stupa, stambha, order, Hinayana architecture, Mahayan architecture, development of Chaitya arch),
  e.g. Ajanta , Ellora, Karli, Stupa at Sanchi, Ashok pillar

UNIT 4: TEMPLE ARCHITECTURE IN INDIA

- Characteristic features (orders, shikhara, plans, elevation),
- Typical examples in
  a. North Indian Style- Orrisan temple, Konark temple, lingaraj temple, khajuraho temple
  b. Central Indian Style- Chalukyan pillar, Hoysaleshwar temple
  c. South Indian Style: (Development of various styles) - eg. (Madurai temple, Shore temple, Brihadeshwara, Dravidian order, Gopuram)

UNIT 5: ISLAMIC ARCHITECTURE IN INDIA

- **Types of structures (**Mosque , tombs, palaces)
- Characteristic features (Domes-types, Arches- types, minar, jalli ,etc)., influences and development ,Regional expressions,
- Examples from
  a. Imperial style: Qutub minar, Qutub mosque, Alai darwaza
  b. Provincial style: Golgumbaz at Bijapur , Jami masjid at ahmedabad
  c. Moghul style: Fatehpur sikri , Taj mahal, mughal gardens

UNIT 6 : MODERN ARCHITECTURE

Principles and works of Architects

- WESTERN : Frank Lloyd Wright- Falling waters, Le Corbusier- The High Court, the secretariat, Chandigarh, John Utzon- Sydney Opera house, etc
- INDIAN: Charles Correa- Kanchenjunga Apartments, Bombay, Balkrishna Doshi- Center for Environment Planning and Technology(CEPT), Ahmedabad, etc

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1.	IMPORTANCE AND SCOPE OF HISTORY OF ARCHITECTURE	4	Refer to suggested activities below	6
2.	WESTERN ARCHITECTURE	21		27
3.	INDIAN ARCHITECTURE	7		9
4.	TEMPLE ARCHITECTURE IN INDIA	12		15
5.	ISLAMIC ARCHITECTURE IN INDIA	12		9
6.	MODERN ARCHITECTURE	8		9
	Total	**64**	**25**	**75**

6. SUGGESTED ACTIVITIES (Term work)

SR. NO.	ACTIVITY	MARKS
A.	A. Site visit to historical sites (e.g. Religious buildings, forts, houses of Goa) Student is expected to • Take photographs • Maintain a sketchbook (for column designs, openings, features, etc of historical structures.) • Identify various elements, materials, influences etc. • Submit term work as class presentation, Report/ sheets as per requirement	15

B.	Maintain a Sketch book of examples of buildings as stated under respective units (Minimum 10 sketches required)	10

7.SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	G.K. Hiraskar	The great ages of World Architecture	Dhanpat Rai Publications (P) Ltd.
2	Sir Banister Fletcher	A History of Architecture	CBS Publisher and Distributors
3	Percy Brown	History of Architecture-Buddhist & Hindu	
4	Percy Brown	History of Architecture-Islamic	

AE305 Computer Graphics-I

1. RATIONALE

This subject shall enable the student to understand the 3D features of Auto CAD to make basic 3D models of simple 2D drawings, create 3D objects and simple components like columns, windows, doors, furniture, etc

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme		
					PR	TW	Total Marks
AE305 Computer Graphics-I	L	T	P	C	50	50	100
	-	-	4	4	-	-	

Minimum passing Percentage 40%

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The course content shall enable the students to create

- 3 D models(Wireframe, surface and solid models) of objects and components
- Rendered images of the above in different views with materials applied and lighting.
- Prepare drawing files for getting hard copies from printers and plotters.

4. DETAILED COURSE CONTENT

UNIT 1: SURFACE MODELLING USING SURFACES

- Surface types like Ruled, Tabulated, Revolved, Edge, 3D Faces and 3D objects.
- Region modelling,
- Solid modelling concepts

UNIT 2:
DRAWING OBJECTS IN 3- DIMENTIONAL SPACE

- Visual styles: Creating 3-D wire-frame, 3-D hidden, 3- D shaded models
- Object modeling by modifying various UCS types,
- Orbiting 3-Dimensional objects in space, using 3-D viewpoint to view these objects

from different angles. Multiple views of 3-D model.
- Revolution, extrusion,
- Rotating, mirroring arraying
- Creation of composite models using Boolean operations : such as union, substraction and intersection,
- Solid modifiers: Chamfering, filleting and slicing
- Setting up elevation and thickness.

UNIT 3:
RENDERING OF 3-D MODELS

- Introduction to Computerized rendering in AutoCAD
- Adding lights: point light, spot light, distant light.
- Applying materials: Defining materials, attaching materials to objects, importing and exporting materials.
- Using background, scenes, fog and landscape
- Saving and redisplaying images in various formats.
- Using raster images.

UNIT 4:
3-D MODELLING OF SIMPLE 3-D OBJECTS

- Model the given simple 3-D exercises using the commands learnt in UNIT 1 and UNIT 2 (at least 10 exercises)

UNIT 5:
3-D MODELLING OF SIMPLE COMPONENTS

- Model the given simple 3-D Components using the commands learnt in Unit 1 and Unit 2
- Render the 3D models as learnt in Unit 3, with application of lights, materials, and creating saved images of the same in different angles.

UNIT 6:
PREPARING DRAWING FILES FOR GETTING HARD COPIES.

- Inquiry commands :List, area and mass properties, Solid materials properties,
- Model space and paper space.
- Adding a title block and border,
- Creating floating viewports.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS &MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for Practical Exam
1.	SURFACE MODELLING USING SURFACES	4	2	2
2.	DRAWING OBJECTS IN 3-DIMENTIONAL SPACE	12	9	9
3.	RENDERING OF 3-D MODELS	8	6	6
4.	3-D MODELLING OF SIMPLE 3-D OBJECTS	18	15	15
5.	3-D MODELLING OF SIMPLE COMPONENTS	18	15	15
6.	PREPARING DRAWING FILES FOR GETTING HARD COPIES	4	3	3
	Total	**64**	**50**	**50**

6. SUGGESTED ACTIVITIES(Practicals)

- Exercise/ Practical conducted on the completion of every chapter.
- Development of three dimensional object, rendering

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1.	P. Nageshwar Rao	Autocad for Engineering drawing made easy	Tata McGraw Hill
2.	George Omura	Mastering Autocad	BPB Publication
3.	Sham Tickoo	AutoCAD 2004	Galgotia Publications, new Delhi
4.	Devid Frey	AutoCAD 2000	BPB Publication
5.	A. Yarwood	An introduction to Auto CAD 2000	Longman Publication
6.	Ron House	Using Auto CAD 2000	Prentice Hall
7.	AutoCAD Inc.	Latest Auto CAD manual	Autodesk Inc.
8.	Jones & Bartlett learning	CATIA V6 Essentials	

9.	Paul Carman, Paul Tigwell.	Inside CATIA	
10.	Nader G. Zamani.	CATIA tutorials	
11.		ProE/ Creoelements or any equivalent reference/ textbooks.	
12.		Autocad 2008 Help	

(AE 306) BUILDING SERVICES -I

1. RATIONALE

This curriculum is aimed at imparting to the students; knowledge about the working of plumbing, sanitary and drainage system and electrical scheme in a building.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme			
					TH	TM	TW	Total Marks
AE 306	L	T	P	C	75	25	25	125
Building Services-I	4	-	-	4		-		

Minimum passing Percentage 40%
TW shall consist of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The students shall be able to produce drawings on

- The plumbing layout showing the water supply and sanitary system
- Drainage system
- Electrical layout

4. DETAILED COURSE CONTENT

UNIT 1. WATER SUPPLY

- Pipes and fittings, Materials, size and classification stopcocks, bib caps, push taps, overflow pipes
- House water supply, source of water supply, Catchments areas, reservoirs and their locations, overhead water storage tanks and tank covers.
- Connection of taps to sanitary fittings.

- Inspection and maintenance, site visits.
- Local bylaws and Indian Standards: layout of water supply to be prepared on the given building plan in addition to other details.

UNIT 2 :DRAINAGE

- Introduction to sanitation, its importance and basic approach.
- Sanitary Layout from drainage point of view, Consideration of location of sanitary unit in a house or building of the planning stage.
- Drainage system for a house, Sewers, Materials , Workmanship - Details of Construction, Gradients
- Local byelaws and Public Health Requirements, maintenance , Rain water disposal and roof drain, Fittings
- Planning and Layout of sanitary fittings of Surgeons, Lavatory basins, Bidet connection to waste pipes and vents closet Urinals. Intrasepting trap/ Disconnecting chamber, testing of drains
- Construction working of Septic tank and Soak pit

UNIT 3.ELECTRICAL SERVICES.

- Electrical fittings & fixtures.
- Methods of electrification viz open wiring, conduct Wiring, concealed wiring.
- Electrical layout of building with symbolic denotation.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1	WATER SUPPLY	24	10	30
2	DRAINAGE	24	10	30
3	ELECTRICAL SERVICES	16	5	15
	Total	64	25	75

6. SUGGESTED ACTIVITIES (assignments)

Note: Appropriate site visits shall be conducted for a practical understanding of pipe laying, wiring and various sanitary and electrical fixtures.

UNIT 1:

a. 1 sheet on valves and fittings used

UNIT 2:

a. 1 sheet on sanitary fittings & fixtures

b. 1 sheet on storm water drainage layout of a building & the surrounding site

c. Drainage layout of sanitary sewage of the building with septic tank & soak pit details.

d. 1 Sheet on details of internal plumbing layout of a toilet showing all required sanitary fixtures.

UNIT 3:

a. 1 sheet on electrical layout of a building uses the necessary symbolic denotations.

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books
1	Guruchanan Singh	Water supply & Sanitary Engineering Vol.1 & II
2	Rangwala	Water supply & Sanitary Engineering
3	G.S. Birdie J.S. Birdie.	Water supply & Sanitary Engineering
4	P. Hall.	Plumbing
1	S.K. Hussain.	Water supply and sanitary Engineering
2	Dhogal	basic Electrical Engineering
7	B.D. Aron	Electrical wiring Estimating & costing

Semester - IV									
Course code	**Name of Course**	**TEACHING SCHEME**				**EXAMINATION SCHEME**			**Total marks**
		L	**T**	**P**	**C**	**Theory Marks**		**Practical Marks**	
						TH	**TM**	**PR/OR**	**TW**
AE401	Architectural Drawing -IV			8	8			50	100	150
AE402	Building Construction-IV	2		4	6	75	25		50	150
AE403	Building Services-II	3		1	4	75	25		25	125
AE404	Computer Graphics-II			4	4			50	50	100
AE405	Theory of structures	4			4	75	25		25	125
AE406	Surveying			4	4			50	50	100
Total		**9**		**21**	**30**	**300**		**450**		**750**

AE401 Architectural Drawing IV

1. RATIONALE

The curriculum aims at training the students in developing a sketch plan for a multi-storied building by application of building bylaws and building services. Also, the students will be trained to develop site layouts for plot development, complexes, cluster designs, landscapes, etc.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme		
					TW	Pr	Total Marks
AE401 Architectural drawing IV	L	T	P	C	100	50	150
	-	-	8	8	-		

Minimum passing Percentage 40%
TW shall consist of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

Shall be skilled in

- Preparation of computerized set of drawings
- Calculating areas, F.A.R. coverage, etc.
- Application of byelaws to buildings
- Planning service cores
- Prepare site layouts

4. DETAILED COURSE CONTENT

UNIT 1:
BUILDING REGULATIONS AND BYELAWS

1.i Importance and scope
1.ii Terminology
1.iii Introduction to Zoning Regulations.
1.iv Minimum size of rooms , staircases and corridors, calculation of building heights, Permissible coverage, Permissible Floor Area Ratio, duct sizes, Road widening, effective plot area, setbacks, Distance between two buildings, etc
1.v Regulations regarding open spaces, roads, frontage, means of access, parking, etc.

UNIT2:

SITE PLANNING

2.i Introduction to Site Development

2.ii Elements of Site planning: Circulation-pedestrian and vehicular, parking lots, soft and hard landscaping, services, requirement of Open spaces, development on sloping sites, etc

2.iii Elements of Landscaping: Pavements, lawns, water bodies, sit-outs, trees.

2.iv To develop site layout around given buildings like Institutional Campus, housing complex, Exhibition pavilions, cultural centers, etc.

Note: the Project at 2.iv. emphasis is on detail site planning and does not include design of the buildings.

UNIT 3:

MULTI-STORIED BUILDING

3.i Introduction to Multi-storied building: definition, types: high-rise, mid-rise, structural systems, Multi-storied circulation pattern, Aesthetic components-massing, use of cladding materials,

3.ii Service cores: lifts, staircase, toilet blocks, emergency escapes and various arrangements of these elements, concept of service floor

3.iii Provision of Basement: purpose, ventilation, access, heights.

3.iv To design a mid-rise building on a given site, in accordance to the building code rules and regulations. The design should also consider planning of the service cores, emergency escapes and parking lots.
eg. Commercial, residential, institutional, cultural, etc.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1.	BUILDING REGULATIONS AND BYELAWS	10	10	5
2.	SITE PLANNING	30	32	16
3.	MULTI-STORIED BUILDING	56	58	29
	Total	96	100	50

6. SUGGESTED ACTIVITIES (assignments)

UNIT 1: BUILDING REGULATIONS AND BYELAWS

- The student is required to prepare a A4 size booklet with assignments (written regulations, calculations, area diagrams, etc.) as given.

UNIT 2: SITE PLANNING

- Site visit to study parking layouts and landscape layout. Work to be presented on *1A 1 size Sheet- 1 no.*
- Project work on a given site. includes site visit & preparation of layout (site plan, site sections, site elevations, details, with rendering. Area statement, model, etc.)

UNIT 3: MULTI-STORIED BUILDING

- Case studies of mid-rise buildings
- Project work on a given site. Includes site visit & preparation of scheme (site plan, floor plans, sections, elevations, with rendering. Area statement, models, etc.

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books
1.	D.K. Ching	Forms and spaces in Architecture
2.	V.S. Pramar	Fundamentals of Architecture
3.		Neuferts Data- Building Types
4.		Time Saver Standards- Building types
5.	Government Printing Press	The Goa (Regulation of Land Development and Building Construction) Act, 2008. and The Goa Land Development and Building Construction Regulations 2010

(AE402) Building Construction IV

1. RATIONALE

This subject shall enable the student to study the constructional details of a slightly complex nature in this curriculum.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme			
					TH	TM	TW	Total Marks
AE402 Building Construction IV	L	T	P	C	75	25	50	150
	2	-	4	6		-		

Minimum passing Percentage 40%
TW shall consist of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The course content shall enable the students to

- Prepare drawings of steel structure details used in buildings.
- Supervise procedure of applying various kinds of wall finishes and laying flooring materials.
- Prepare drawings of timber floors.

4. DETAILED COURSE CONTENT

UNIT 1: STEEL STRUCTURE

a. Introduction to steel structural system- principles, framing, spanning, etc.
b. Extruded Structural steel sections: channel, angle, I- section, tubular, Plate, Tee-section, box section.
c. Steel Components: Composite section, Stanchions, compression members, stanchion base , trusses (open truss, north light, bowstring, arched, tubular steel)
d. Fabrication procedure : Cutting, bending(Introduction to welding, riveting, bolting)
e. Typical Details of steel component joinery and simple truss detailing

UNIT 2: DAMPPROOFING

a. Introduction, importance
b. Causes of dampness, effects, methods of damp proofing, materials used for damp proofing course(flexible sheet materials, semi- rigid materials, rigid materials), DPC treatment in buildings(foundations, basement, floors, external walls, flat roof, pitched roof, parapet walls), types of DPC (membrane, integral, surface, cavity walls, guniting, pressure grouting), Cavity walls, Position of DPC.

UNIT 3: WATERPROOFING

a. Waterproofing techniques for toilets, bathrooms, sunk, overhead water tank, underground sumps, terraces, overhangs, etc.

UNIT 4: WALL FINISHES

a. Plastering
   i. Introduction, Advantages, Requirements, terminology used in plastering. Internal, External surfaces
   ii. Types of mortars for plasters-lime, cement , stucco, gypsum, tools used for plastering, preparation of surfaces, types of plaster finishes, special materials used in plasters, number of coats, methods-plumb, drip mould for water, moldings, cornices
b. Pointing- Types, methods
c. Painting- Preparation of surfaces (Internal, External surfaces for old and new buildings) for different paints , whitewashing, colourwashing, etc.
d. Cladding: Method of fixing stone, tiles, dado etc.

UNIT 5: UPPER FLOORS

a. Introduction, types
b. Timber floors (single joists, double, triple)
c. Other methods of construction of Upper Floors: Reinforced brick floors, beam – slab flooring, flat slab flooring, ribbed or hollow tiled flooring, filler, joist floors, Jack arch (brick and cement concrete)
d. Laying of flooring materials eg. stone, tiles, various boards(cement, timber, etc)

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1.	STEEL STRUCTURE	36	20	30
2.	DAMPPROOFING AND	12	6	9
3.	WATERPROOFING	12	6	9
4.	WALL FINISHES	12	6	9
5.	UPPER FLOORS	24	12	18
	Total	**96**	**50**	**75**

6. SUGGESTED ACTIVITIES(Practicals)

Note: All assignments to be related to a single unit structure

UNIT 1: 1 sheet of Extruded Structural steel sections and its Components *(A1 Size)*
1 sheet of G+1 Structure in Steel.*(A1 Size)*
1 sheet of steel truss detailing *(A1 Size)*

UNIT 2: 1 sheet of D.P.C. treatment in buildings *(A1 size sheet)*

UNIT 3: 1 sheet of waterproofing *details in buildings (A1 size sheet)*

UNIT 3: A4 size report on Wall finishes

UNIT 4: 1 sheet on timber floor for upper floors. *(A1 size sheet)*
1 sheet on other methods of construction of Upper floors. *(A1 size sheet)*

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1.	Sushil Kumar	Building Construction	Standard Pub. Dist. Delhi
2.	Dr. B.C. Punima	Building Construction	Laxmi Pub. New Delhi
3.	S.C. Rangwala	Building Construction	Charotar Publishing House Pvt. Ltd.
4.	S.P. Arora/ S.P. Bindra	Building Construction	Dhanpat Rai & Sons, Delhi

(AE403) BUILDING SERVICES -II

1. RATIONALE

This curriculum teaches the student the more advanced services related to the building industry viz Air conditioning acoustics & fire protection

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme			
					TH	TM	TW	Total Marks
(AE 403) Building Services-II	L	T	P	C	75	25	25	125
	3	-	1	4		-		

Minimum passing Percentage 40%
TW shall consist of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The students shall be able to produce drawings on

- Layout of Air Conditioning System
- Constructional details of Thermal Insulation, sound insulation, acoustical design, and fire protection of buildings.

4. DETAILED COURSE CONTENT

UNIT 1
VENTILATION & AIR CONDITIONING

- Ventilation Definition & Necessity Factors affecting ventilation, systems of ventilation, Natural , Mechanical (supply, exhaust air conditioning)
- General considerations in natural ventilations
- Air conditioning-Definition & purpose.
- Principles of air conditioning, classifications according to purpose, Basic refrigeration cycle , Humidification & Dehumidification Systems of air conditioning (depending upon location of a/c unit) Components of a/c system including air distribution system

UNIT 2

THERMAL INSULATION

- Definition objective & advantages.
- Definition of related terms (conceptual)
- General principles of thermal insulation.
- Constructional technique used in insulation of roof exposed walls, doors, windows and floors, foundations.
- Types of insulating materials with examples of each.

UNIT 3

ACOUSTICS

- Definition.
- Characteristics of audible sound.
- Acoustical defects.
- Requirements & conditions of good acoustics.
- General principles of acoustical design.
- Classification of acoustical materials with examples of each.

UNIT 4

SOUND INSULATION

- Definition & purpose. Noise-types & transmission, general consideration for noise control.
- Constructional techniques used in insulation of walls, floors, windows, doors sanitary fittings & machinery.

UNIT 5

FIRE PROTECTION

- Important consideration in fire protection of buildings
- Fire resisting properties of common building materials.
- Constructional techniques used for fire resistant of building fire safety devices.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1	VENTILATION & AIR CONDITIONING	16	5	15
2	THERMAL INSULATION	12	5	15
3	ACOUSTICS	12	5	15
4	SOUND INSULATION	12	5	15
5	FIRE PROTECTION	12	5	15
	Total	64	25	75

6. SUGGESTED ACTIVITIES(Practicals)

The term work shall be based on above syllabus

UNIT 1: 1-Sheet on layout of Air Conditioning System

UNIT 2: 1-Sheet on Thermal Insulation of various building components

---

UNIT 3: 1- Sheet on various arrangements & Constructional details used in acoustical design of buildings.

UNIT 4: 1- Sheet on various arrangements & Constructional details used in sound insulation of buildings.

Unit 5: 1- Sheet on various arrangements for fire protection of buildings.

---

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	Sushil Kumar	Building Construction	Standard Pub. Dist. Delhi
2	Dr. B.C. Punima	Building Construction	Laxmi Pub. New Delhi
3	S.C. Rangwala	Building Construction	Charotar Publishing House Pvt. Ltd.
4	S.P. Arora/ S.P. Bindra	Building Construction	Dhanpat Rai & Sons, Delhi

(AE404) Computer Graphics-II

1. RATIONALE

This subject shall enable the student to develop complex 3- D models like, detailed building components, mid-rise buildings, architectural monuments etc, and derive rendered images in different views.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme		
					PR	TW	Total Marks
AE404 Computer Graphics-II	L	T	P	C	50	50	100
	-	-	4	4	-	-	

Minimum passing Percentage 40%

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The course content shall enable the students to create

- Complex mid-rise building 3D models
- Architectural monuments with its details
- Rendered images of the abovein different views with materials applied and lighting.

4. DETAILED COURSE CONTENT

UNIT 1:

MANIPULATE INDIVIDUAL SOLIDS AND SURFACES

- Extrusion of closed polyline, extrusion along path, taper angle for extrusion, Press or Pull Bounded Areas,Polysolids, Swept Solids and Surfaces, Lofted Solids and Surfaces, Revolved Solids and Surfaces, A Circle Swept Along a 3D Path
- Solid editing: Extrude, Move face, offset face, delete faces, rotate faces, taper faces, copy faces, colour faces, copy edges, colour edges, separate, imprint, shell
- 3-D align, 3 D polyline
- Select and Modify 3D Sub objects, Move a Face and an Edge on a 3D Solid
- Create Sections and 2D Drawings from 3D Models:*commandsectionplane,flatshot*

UNIT 2:

ADVANCED RENDERING

- **Lighting:** Adjusting Lighting intensity, shadow, light colour, Control the Display of Lights, Control light placement, Adjust light properties
- **Materials and Textures:** Modify Materials, Using Maps for Added Realism
- **Define a 3D View with a Camera:** Overview of Cameras, Create a Camera, Change Camera Properties
- **Render 3D Objects for Realism:** Overview of Rendering, Control the Rendering Environment, Save and Redisplay Rendered Images

UNIT 3:

3-D MODELLING OF A COMPLEX MID-RISE BUILDING

- Develop a 3-D model of a mid-rise building with its supporting structure (floors, columns, etc), designed architectural building envelope (aesthetic components, curtain wall, windows) and roof.
- Application of materials, colours, textures, etc. on different components.
- Lighting :different types of lighting in different views , with shadows.
- Rendered images saved in jpeg format.

UNIT 4:

3-D MODELLING OF ARCHITECTURAL MONUMENTS

- Develop a 3-D model of an Architectural monument , with its façade detailing.
- Application of materials, colours, textures, etc. on different components.
- Lighting : different types of lighting in different views , with shadows.
- Rendered images saved in jpeg format.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS &MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for Practical Exam
1.	MANIPULATE INDIVIDUAL SOLIDS AND SURFACES	6	5	5
2.	ADVANCED RENDERING	6	5	5
3.	3-D MODELLING OF A COMPLEX MID-RISE BUILDING	26	20	20
4.	3-D MODELLING OF ARCHITECTURAL MONUMENTS	26	20	20
	Total	**64**	**50**	**50**

6. SUGGESTED ACTIVITIES(Practicals)

- Exercise/ Practical conducted on the completion of every chapter.
- Development of 3- dimensional mid-risebuilding , etc.
- Development of 3- dimensional Architectural monument, etc

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1.	P. Nageshwar Rao	Autocad for Engineering drawing made easy	Tata McGraw Hill
2.	George Omura	Mastering Autocad	BPB Publication
3.	Sham Tickoo	AutoCAD 2004	Galgotia Publications, new Delhi
4.	Devid Frey	AutoCAD 2000	BPB Publication
5.	B. Yarwood	An introduction to Auto CAD 2000	Longman Publication
6.	Ron House	Using Auto CAD 2000	Prentice Hall
7.	AutoCAD Inc.	Latest Auto CAD manual	Autodesk Inc.
8.	Jones & Bartlett learning	CATIA V6 Essentias	
9.	Paul Carman, Paul Tigwell.	Inside CATIA	
10.	Nader G. Zamani.	CATIA tutorials	
11.		ProE/ Creoelements or any equivalent reference/ textbooks.	
12.		Autocad 2008 Help	

(AE405) THEORY OF STRUCTURES

1. RATIONALE

In this curriculum the students will be first introduced the basic understanding of the behavior of a structure with respect to the different structural systems, Forces and reactions. The student should also be able to understand the philosophy behind the design and execution of different structural components like slabs, beams, columns e.t.c the causes of distress to the buildings and prevention of the same.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits		Examination Scheme		
					TH	TM	TW	Total Marks
AE 405 (THEORY OF STRUCTURES)	L	T	P	C	75	25	25	125
	4	-		4		-		

Minimum passing Percentage 40%
TW shall consist of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The students shall be able to

- Understand various types of structures , its elements and the forces acting upon them
- Understand the properties of various structural materials
- Supervise the rehabilitation and repair work of structures

4. DETAILED COURSE CONTENT

UNIT 1
FORCE AND EQUILIBRIUM

1.1. Definition of mass, weight , force, characteristics of a force and its units.
1.1.1. Effects of forces on a body- External, Internal.
1.1.2. Classification of forces-Concentrated, distributed over an area, distributed over a volume, U.D.L. Uniformly varying load,. , Principles of transmissibility of forces
1.2. Types of Force system with examples ,
1.3. Resolution of forces, composition of forces ,resultant of a force system Equilibrant . Method of calculating resultant of force system by analytical method like

Law of Parallelogram of forces and resolution method Numerical problems for two forces by Parallelogram of forces and more than two forces by resolution method.

1.4. Moment of a Force with examples.

1.5. Definition of Couple and its characteristics

UNIT 2

INTRODUCTION TO STRUCTURAL MATERIALS

2.1. Properties of structural materials like various grades of concrete , Various types of steel.

2.2. Permissible stresses, measurement of materials in concrete, water cement ratio, Tests on concrete and steel, concrete mix design types and factors affecting concrete mix design.

UNIT 3

INTRODUCTION OF STRUCTURES

3.1. History of Structures-historical background
Types of Structures –Solid, Skeleton and surface function.
Types of forces and their effects on the behavior of structure and factors affecting them. Compression, tension, bending and torsion ,deflections and crack width.

3.2 Basic structural elements, their arrangements and behavior.
Various structural systems and their behavior.

3.3 Load bearing structures. Terminology, materials, design considerations, structural design,
general requirements,

3.4 Special considerations in earthquake zones. Seismic effects on buildings, importance of architectural features and structural shapes,

3.5. Guidelines for approximate design of non-load bearing wall.
Post beam type of system.

3.6 Rigid frame type and large spanning type.

3.7. Difference between short and long column, One way and two way slabs,

3.8 Brief concept of working stress and limit state method of design.

3.9 Brief introduction to space truss type of system.

3.9.1. Study of elements of masonry structure for e.g. Corbelling, arches, vaults and domes.

UNIT 4

CENTER OF GRAVITY

4.1 Definition of Centre of gravity and Centroid, standard expressions for centroid for various shapes of sections

4.2. Determination of Centroid of simple section like tee section,L-section and C-section and combination of other shapes.

UNIT 5

BENDING MOMENTS AND SHEAR FORCE

1.1. Types of beams with different end conditions.

1.2. Types of loads. Simple problems of finding reactions of beam.

1.3. Concepts of transverse loading in producing bending moments and shear force.simple problems of drawing SFD and BMD for simply supported beams , cantilever beams carrying point loads and UDLs for full span

1.4. Criteria of sections from point of view of B.M. & S.F. in simply supported beams, Cantilevers , continuous beams, fixed beams(only qualitative)

1.5. Stresses produced in cross section of beam due to B.M. & S.F, physical concept of torsion and stresses produced due to bending in structures(only qualitative).

UNIT 6

REHABILITATION/REPAIRS OF STRUCTURES

1.1. Causes and prevention of cracks in buildings.

1.2. Classification of cracks-structural and non structural.

1.3. Types of internal stresses in building components-tensile, Compressive, shear method of distinguishing between tensile and shear Cracks.

1.4. Principle causes and occurrence of cracks in buildings- moisture, changes, thermal movements, elastic deformations, creep, chemical reactions, foundation movement and settlement of soil vegetation.

1.5. Methods of prevention of cracks in structures, choice of materials, specification, architectural design of building. structural design, foundation design, construction practice and techniques.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for Termwork	Marks Distribution for End Semester Exam
1	**FORCE AND EQUILIBRIUM**	12	5	15
2	**INTRODUCTION TO STRUCTURAL MATERIALS**	10	3	9
3	**INTRODUCTION OF STRUCTURES**	12	4	12
4	**CENTER OF GRAVITY**	6	3	9
5	**BENDING MOMENTS AND SHEAR FORCE**	12	5	15
6	**REHABILITATION/REPAIRS OF STRUCTURES**	12	5	15
	Total	**64**	**25**	**75**

INSTRUCTION:

1. **Very little mathematics to be used while presenting the concepts of structures to the students of Architecture.**
2. **Structural Concepts to be presented either with the help of models on motion pictures or charts.**
3. **Frequent site visits should be arranged for better understanding of the subject matter.**

c. SUGGESTED ACTIVITIES

1) **Demonstration of structural design software's.**
   a) **Plane frame analysis.**
   b) **Space frame analysis.**
2) **Demonstration of use of Finite element Analysis.**
3) **Site visit to Concrete Laboratory.**
4) **Site visit to construction/ industry site.**

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	**R.S. Khurmi**	**Applied Mechanics**	
2	**Roger Bull**	**Structures**	
3		**National building Codes of India**	
		IS 456,2000	
4		**Handbook on causes and prevention of cracks in buildings.**	
5	**Sushil kumar**	**Building construction**	

(AE406) SURVEYING

1. RATIONALE

In this curriculum the students are introduced to surveying and leveling so as to equip them well to handle site layout and other construction works.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme		
					PR	TW	Total Marks
AE 406 (SURVEYING	L	T	P	C	50	50	100
		-	4	4	-		

Minimum passing Percentage 40%
TW shall consist of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The students shall be able to

- Study and prepare the various drawings like toposheets, indexmap, contour map, Level page, etc.
- Prepare detailed survey plan with ground features
- Prepare contour plan.

4. DETAILED COURSE CONTENT

UNIT 1
INTRODUCTION

- Definition of Surveying. Objects of Surveying, Uses of Surveying.
- _Classification of Surveying. Overall Principles of Surveying

UNIT 2

LINEAR MEASUREMENT:

- Study and use of instruments like metallic tape and steel tape, Instruments used for ranging such as ranging rod, arrows, pegs, flags etc
- Measuring distances on horizontal and sloping ground by methods of stepping,. Obstacles during measuring distances and procedure of overcoming them,
- Surveying with linear measurements by triangulation-establishment of base line, check line and the line and taking offsets such as perpendicular, oblique, long and short offsets for different objects, procedures of entering field observations in conventional sign and symbols, .
- Setting out perpendicular for a base line by different methods of plotting out
- Survey work and finding the area.

UNIT 3

COMPASS SURVEYING

- Definition of traverse . Types of traversing, study and use of prismatic compass. Temporary adjustments.
- Definition of Meridian, Bearings, magnetic meridian and magnetic bearings, force bearings, back bearings. Designation of magnetic bearings i.e. whole circles bearing(WCB) and Quadrennial bearings(QB) .
- Conversion of WCB to reduced bearing and vice versa.
- Calculation of included angles from given bearings.
- Definition of local attraction.

UNIT 4

COMPUTATION OF AREAS BY PLAIMETER:

- Study and use of planimeter, Zero circle of a planimeter and its area.
- Method of using planimeter and finding area of irregular fields.

UNIT 5

LEVELLING

- Definition of leveling: Terms used in leveling, Types of leveling instruments such as Dumpy level Tilting level and automatic level, theodolite.
- Bench mark, Definition, Types of benchmark.
- Study and use of Telescopic leveling staff.
- Temporary adjustments of Tilting, Dumpy level and automatic level. 1. Different axes of the instrument and their relationship.
- Types of leveling. Simple leveling, Compound/differential leveling, longitudinal or profile leveling, cross-sectional leveling.
- Systems of reduction of levels-Examples.
- Sources of errors in leveling, 1. Precautions.

UNIT 6
CONTOURING

- Definition of contours. 1. Contour interval, horizontal equivalent.
- Uses of contours for architects.
- Characteristics of contours.
- Methods of contour. Direct and indirect method.
- Definitions of intermediary----------

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours		Marks Distribution for term work	Marks Distribution for Practical Exam
		L	P		
1.	**INTRODUCTION**	2	-	2	2
2.	**LINEAR MEASUREMENT**	8	8	12	12
3.	**COMPASS SURVEYING**	4	6	8	8
4.	**COMPUTATION OF AREAS BY PLAIMETER**	4	6	8	8
5.	**LEVELLING**	6	10	12	12
6.	**CONTOURING**	4	6	8	8
	Total	**64**		**50**	**50**

6. SUGGESTED ACTIVITIES

PRACTICALS:

1. Study of 30m chain/tape and practice on measuring distances between two points on a plain ground with margin
2. Practice on overcoming obstacles in chaining/measuring.
3. Chain and cross staff survey and measuring of areas.
4. Study and use of plane table with accessories.
5. Study and use of prismatic compass-observing forbearing, back bearing and calculation of inclined angles.
6. Study and use of Dumpy level and telescopic levelelling staff.
7. Temporary adjustments of a leveling instrument and practice on simple and compound leveling.

8. Practice on profile leveling and reduction of levels.
9. Contouring by direct and indirect method.
10. Study and use of Theodolite.
11. Temporary adjustment of theodolite.
12. Study and use of planimeter and practice on measurement of areas.

TERM WORK:

1. Minimum of 10 practical's will be conducted on all the above topics.
2. Chain and cross staff survey of minimum 5 sided area.
3. Profile leveling and cross sectioning wit h Dumpy level with a base of line of 40cm and cross-section of 5cm interval with 5cm on either side.
4. Indirect contouring over an area of 30m(approx) or more at convenient intervals depending upon the nature of the ground.

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	Kanetkar & Kulkarni Vol.1 & II	Surveying and Levelling	
2	Davis and Foote	Surveying	
3	Punmia	Surveying and Leveling	
4	Hussain and Nagraj	Surveying and Leveling	

SEMESTER V

COURSE CODE	NAME OF COURSE	TEACHING SCHEME				EXAMINATION SCHEME				TOTAL MARKS
		L	T	P	C	THEORY MARKS		PRACTICAL MARKS		
						TH	TM	PR/OR	TW	
AE501	Architectural Drawing-V	-	-	8	8	-	-	50	100	150
AE502	Building Construction-V	2	-	4	6	75	25	-	25	125
AE 503	Estimation & Costing	2	-	2	4	75	25	-	25	125
AE504	Theory of Structures-II	-	-	2	2	-	-	25	25	50
AE505	Professional Practice	4	-	-	4	75	25	-	-	100
AE506	Town Planning	4	-	-	4	75	25	-	-	100
E1	Elective	-	-	4	4	-	-	50	50	100
Total		**12**	**-**	**20**	**32**	**400**		**350**		**750**

Elective – 1:

AE511 – Site Management

AE512 – Building Services Management

AE513 – Landscape

CS503 – 3D Printing

SEMESTER VI

Course code	**Name of Course**	**EXAMINATION SCHEME**				**Total**
		TW		**PR/OR**		
		Daily Dairy	**Progressive Assessment**	**Training Report**	**Report Assessment & Seminar/Viva**	
AE601	Architectural Training	**50**	**50**	**50**	**50**	**Grade**

FOR INDUSTRIAL TRAINING OF VTH & VIIITH SEMESTER :

1. Grades will be awarded based on marks scored as follows:
    a. 80% and above Marks – Grade 'A'
    b. 60% to 79% Marks – Grade 'B'
    c. 40% to 59% Marks – Grade 'C'
    d. Marks below 40% - Grade 'D'

2. TW and PR/OR shall be separate Heads of passing. Student has to secure minimum Grade 'C' for passing.

3. Student with Grade D, under the Head TW, shall be declared T.N.G. and a student whose term is granted but obtains Grade D, under the Head PR/OR, shall be declared Failed/ATKT.

SEMESTER V

(AE501) Architectural Drawing V

1. RATIONALE

The curriculum aims at training the students to prepare technical drawings like Submission Drawing which deals with drawings required to be prepared as per building byelaws required to be submitted for permission to the Planning Departments. Also, the students shall be trained at preparing Working Drawings; which will deal with setting a building on a site, drawings at every phase of construction and detail drawings.

This knowledge will be essential to be applied by the students during their Architectural Training period of Semester VI.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
AE501 Architectural Drawing V	L	T	P	C	TH	TM	PR/OR	TW	150
	-	-	08	08	-	-	50	100	

Minimum passing Percentage 40%
TW shall consists of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

This course shall enable the students to:

- Prepare submission drawings
- Prepare working drawings.
- Preparation of computerized technical drawings

4. DETAILED COURSE CONTENT

UNIT 1:

SUBMISSION DRAWING OF A LOW –RISE G+ 1 STRUCTURE

- Submission Drawing to be done as per the Departmental requirements and byelaws
- To be drafted on computer drafting software eg: Autocad with proper application of line weights and line types, drawn to scale

UNIT 2:

WORKING DRAWINGS OF BUILDING STRUCTURES

- These drawings are to be made according to the set of conventions, which include particular views (floor plan, section, etc), sheet sizes, unit of measurement and scales, annotation and cross referencing.
- The project allotted shall be limited to the extent of Sem IV Architectural Drawing Projects.
- The drawings shall include the following.

a) Setting out plan *(scale 1:50)*
b) Centerline plan *(scale 1:50)*
c) Floor plans *(scale 1:50)*
d) Sections through staircase, toilet and lifts *(scale 1:50)*
e) Elevations *(scale 1:50)*
f) Details to include
   i) Toilet layout *(scale 1:20)*
   ii) Plumbing layout(water supply and sanitary) *(scale 1:20)*
   iii) Kitchen Platform *(scale 1:20)*
   iv) Electrical layout*(scale 1:20)*
   v) Grill/ Gate *(scale 1:5)*
   vi) Compound wall*(scale 1:20)*
   vii) Door & Window/ ventilator schedule*(scale 1:20)*
   viii) Staircase*(scale 1:20)*
   ix) Balusters/ Railing *(scale 1:5)*
   x) False ceiling , Built-up furniture if any

**Note: The number of Floor plans, Sections, Elevations and scope of Details to be based on the type of Project allotted.*

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1	SUBMISSION DRAWING OF A LOW –RISE G+ 1 STRUCTURE	28	20	10
2	WORKING DRAWINGS OF BUILDING STRUCTURES	100	80	40
	Total	128	100	50

6. SUGGESTED ACTIVITIES (assignments)

UNIT 1: SUBMISSION DRAWING OF A LOW –RISE G+ 1 STRUCTURE

- The student is required to prepare a computerized A1 size submission drawings of the given project on the given site.

UNIT 2: WORKING DRAWINGS OF BUILDING STRUCTURES

- The student is required to prepare a computerized A1 size working drawing set of the given project on the given site.
  (No. of sheets as per project requirement)

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books
1		Neuferts Data- Building Types
2		Time Saver Standards- Building types
3		Handbook of Byelaws and regulations of local governing bodies/ authorities

(AE502) Building Construction V

1. RATIONALE

This subject shall enable the student to study the advanced building construction techniques and detailing involved in a case study of a mid- rise multicell structure.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
AE502 Building Construction V	L	T	P	C	TH	TM	PR/OR	TW	125
	02	-	04	06	75	25	-	25	

Minimum passing Percentage 40%
TW shall consist of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The course content shall enable the students to:

- Prepare advanced detail drawings of foundations of a mid-rise building
- Detail building facades, eg. Curtain wall
- Prepare the civil work drawings required for assembling a lift block.

4. DETAILED COURSE CONTENT

UNIT 1: ADVANCED DEEP FOUNDATIONS

- Piles- classification- based on functions and materials- concrete(pre-cast, cast in, pre-stressed) , composite, steel, sheets, , screw piles, disc piles, under-ream piles, timber piles, pile driving methods
- Basement, introduction, requirements, methods of excavation and construction

UNIT 2: PARTITION WALL

- Introduction, different types, Classification- internal, external
- Internal partition walls- load bearing and non-load bearing
- Load- bearing timber framed wall details
- Composite wall detailing in stone and brick, reinforced brick ,etc
- Types based on materials:, eg. Brick, clay, hollow block, cement concrete blocks, glass blocks, glass sheet, metal lath, asbestos sheet, G.I. sheets, Plaster slabs, wood wool slab, timber stud partition, strawboard, etc.
- Detailing at junction of various components between different materials
- Curtain wall: introduction, types, Methods of construction, detailing

UNIT 3: LIFTS

- Introduction, Advantages, Requirements Types of lifts- regular , panoramic, goods, hospital, etc.
- Civil works(lift shaft, lift pit, machine room sizes, clearances, heights, etc)

UNIT 4: PREFAB CONSTRUCTION

- Introduction to Precast, prefab, prestressed. Requirements, Advantages,
- Construction details and technique.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1	ADVANCED DEEP FOUNDATIONS	38	10	30
2	PARTITION WALL	28	7	21
3	LIFTS	22	6	18
4	PREFAB CONSTRUCTION	08	2	6
	Total	**96**	**25**	**75**

6. SUGGESTED ACTIVITIES(Practicals)

Note: All assignments to be related to a mid-rise multi-cell structure, like a commercial complex, etc.

UNIT 1: 1 sheet of Advanced deep foundation,

eg. Types of Pile foundation *(A1 size sheet)*

1 sheet of basement *(A1 size sheet)*

UNIT 2: 1 sheet on different types of internal partitions and its constructional detailing.*(A1 size sheet)*

1 sheet on different types of external partitions (eg. Curtain wall) and its constructional detailing. *(A1 size sheet)*

UNIT 3: A4 size report on case studies of lift, types and civil works.

UNIT 4: 1 sheet on prefab construction and its constructional details

(A1 size sheet)

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1.	Sushil Kumar	Building Construction	Standard Pub. Dist. Delhi
2.	Dr. B.C. Punima	Building Construction	Laxmi Pub. New Delhi
3.	S.C. Rangwala	Building Construction	Charotar Publishing House Pvt. Ltd.
4.	S.P. Arora/ S.P. Bindra	Building Construction	Dhanpat Rai & Sons, Delhi

(AE503) ESTIMATION AND COSTING

1. RATIONALE

The aim of this subject is to train the students to assist the architect in preparing a detail estimates and checking of bills and tenders.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
AE503 ESTIMATION AND COSTING	L	T	P	C	TH	TM	PR/OR	TW	125
	02	-	02	04	75	25	-	25	

Minimum passing Percentage 40%
TW shall consists of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

This course shall enable the students to understand:

- The purpose of estimation and costing and different methods adopted
- Units of measurement for various items of work and preparation of measurement and abstract sheet
- Purpose of rate analysis and methods of rate analysis for various Civil engineering works.

4. DETAILED COURSE CONTENT

UNIT 1: INTRODUCTION:

a) General Introduction.
b) Definition of the term Estimation and costing, purpose of estimation
c) Various types of estimates.
   i. Plinth Areas
   ii. Carpet area
   iii. Cubic content
   iv. Item wise estimate.

.

UNIT 2: ITEM WISE ESTIMATE:

a. Different item of works and their specifications
b. Units of measurement for different items of works as per IS 1200
c. Use of measurement sheet and abstract sheet, Schedule of rates.
d. Estimate of sanitation
e. Estimate of Electrical Installations.

UNIT 3: BILLING:

a. Calculating quantities of works executed on site using different method of measurements,
b. Preparing bills using different measurement sheets and abstract sheets.

UNIT 4: RATE ANALYSIS:

a. Factors affecting rates of items.
b. Preparing rate analysis of following items of civil work
   (i) Cement concrete work, (ii) R.C.C. work, (iii) plastering, (iv) Brickwork and (v) painting.
c. Rate analysis for sanitary and water - supplies works.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1	INTRODUCTION	08	02	06
2	ITEM WISE ESTIMATE	20	08	32
3	BILLING	24	09	25
4	RATE ANALYSIS	12	06	12
	Total	**64**	**25**	**75**

6. SUGGESTED ACTIVITIES (assignments)

- Site Visits shall be conducted to make the students aware of the methods of billing and estimation.
- Preparing estimate of a bungalow using methods of estimation
- Preparing estimate of a commercial /residential type of building using item-wise estimate and their specifications
- Preparing bills of various items by taking measurements on site.
- Rate analysis of different items:
  i. Cement concrete work
  ii. R.C.C. work in beam, slab
  iii. Plastering
  iv. I st class brickwork in superstructure
  v. Half brick wall
  vi. Painting

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books
1	R.N. Dutta	Estimating and Costing in Civil Engineering
2	S.C. Rangwala	Estimation and Costing
3	B.N. Datta	Estimation and Costing- Theory and Costing
4	M. Chakraborti	Estimation, Costing and Specification in Civil Engineering
5	S.P. Mahajan	Civil Estimation and Costing
6	V.K. Majgaonkar	Quantity surveying and Costing
7	George and Gupta	A.T.B. of Electrical Estimating and Costing
8	S.L. Uppal	Electrical Wiring Estimation and Costing (B.E. Engg.V-II)
9	S.P. Bansal	Questions and Answers on Electrical Estimation and Costing

(AE504) THEORY OF STRUCTURES -II

1. RATIONALE

In this curriculum the student will be first introduced to the philosophy behind the design and execution of different structural components like slab, beams,

columns, etc

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
(AE504) THEORY OF STRUCTURES II	L	T	P	C	TH	TM	PR/OR	TW	50
	-	-	02	02	-	-	25	25	

Minimum passing Percentage 40%
TW shall consists of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

This course shall enable the students to understand:

- Understand detailing of steel in R.C.C. structures like slabs, beams, columns, footings and staircases
- Steel structures details and application of P.S.C. structures
- Reading structural drawings at site.

4. DETAILED COURSE CONTENT

UNIT 1: INTRODUCTION TO STRUCTURAL R.C.C AND STEEL DESIGN

a. The different grades of steel, the standard codes used for RCC and steel design, permissible stresses in compression, tension, bending and shear.
b. Different types of loads considered for R.C.C. and steel design
c. Different methods of design in R.C.C. structures.

UNIT 2:

R.C.C. STRUCTURAL DESIGN AND DETAILINGS:

a. Principles of design of . R C.C. structures. Concepts of bonds, basics of over reinforced, under reinforced sections.
b. Study of foundation systems, design of simple isolated footing, Structural detailing of combined footing, raft footing, pile foundation
c. Study details of reinforcements in different types of column sections. Types of slabs-load calculation(brief idea), Detailing of one-way and two-way slabs keeping in view different end conditions, bending and curtailing of bars.
d. Study of reinforcement details of different types of stairs, like dog legged, Balanced, Cantilever, folded type, geometric stairs.
e. Study details of different types of beam sections, like singly reinforced beams, Doubly reinforced beams.

UNIT 3:

P.S.C. AND STEEL STRUCTURES

a. Study of various types of P.S.C. Structures, and applications
b. Study of details of various steel structures like trusses, beams, girders, columns with various connections of components (Basics only)
c. Various types of connections in steel structures
d. Slab base, gusseted base and supporting columns

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1	INTRODUCTION TO STRUCTURAL R.C.C AND STEEL DESIGN	04	04	02
2	R.C.C. STRUCTURAL DESIGN AND DETAILINGS	20	16	18
3	P.S.C. AND STEEL STRUCTURES	08	05	05
	Total	32	25	25

6. SUGGESTED ACTIVITIES (assignments)

a) Detailed sketch on Columns and footings

b) Detailed sketch on Slabs and beams

c) Staircase details

d) Detailed sketch on base plate connection, beam- column connection and roof truss in steel structure.

e) In order to impart knowledge, two site visits are arranged, to show the reinforcement details, and other relevant construction aspects, and a brief report will be prepared.

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books
1	A.K. Jain	Limit State design
2		Handbook on concrete reinforcement and detailing
3	S.U. Pillai	Reinforced Concrete Design
4	Krishana Raju	Prestressed concrete
5	Dr. K. R. Arrora	Soil Mechanics

(AE505) PROFESSIONAL PRACTICE

1. RATIONALE

The profession of Architecture is distinct with the role of various professionals and authorities within the framework of applicable rules and regulations. The student is exposed to these processes so as to become confident in the Architectural practice and field work.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
(AE505) PROFESSIONAL PRACTICE	L	T	P	C	TH	TM	PR/OR	TW	100
	04	-	-	04	75	25	-	-	

Minimum passing Percentage 40%
TW shall consists of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

This course shall enable the students to :

- Understand the scope of works and duties of all stakeholders in an Architectural project and the Authorities to be dealt with.
- Understanding zoning types and all related building rules and regulations as well as building codes.
- Understanding valuation with respect to building construction, Architectural competitions and its guidelines, introduction to Tendering, Contracts and Arbitration
- Understanding the working of an Architectural office and the Managerial skills required for planning and managing resources like human, infrastructure and finance.

4. DETAILED COURSE CONTENT

UNIT 1: DUTIES AND LIABILITIES IN PROFESSION:

a. Meaning of Profession, Council of architecture, Indian Institute of Architects, code of conduct.
b. Duties and responsibilities of Client, architect, Architectural Assistant and Contractor, and scope of work between them.
c. Safety and Health requirements of workers on construction site.

UNIT 2: PROCESS OF SUBMISSION TO VARIOUS DEPARTMENTS:

a. Zoning: conditions for each zone, special zones-conservation, CRZ, historical structures/sites
b. Approval process to various departments for Technical clearance, Building licenses,
c. Requirements of a submission file: Drawings with colour codes, questionnaires, forms, etc.
d. National building code
e. Additional service planning: garbage disposal requirements, Sanitary planning regulations for buildings, water harvesting facilities, Fire fighting provisions, regulations for lifts, etc.

UNIT 3: ARCHITECTURAL COMPETITIONS

a. Architectural competitions, purpose, Advantages, Types, Competition process guidelines, Assessors, copyrights.

UNIT 4: VALUATION & ARBITRATION

a. Definition of Valuation, importance of valuation. Terms- value, Price, cost, market value

b. Definition of Arbitration, purpose of Arbitration.

UNIT 5: TENDERS AND CONTRACTS

a. Tenders, Invitation to Tenders, Classification of Tenders, Advantages and disadvantages of each type, earnest money, security deposit, retention amount, defect liability period, essential characteristics of tender notice, Tender documents, Opening of Tender.
b. Definition of Contract, Classification of building Contracts, Characteristics and Advantages of each type, act of God, Liquidated damages, unliquidated damages, discharge of contract, Completion Certificate

UNIT 6: MANAGEMENT

a. Architect's office structure, responsibilities and duties in various positions, factors responsible for mismanagement, qualities of a good Manager- Leadership, communication, Planning, Motivation, etc.
b. Stages of Project handling- Planning, approval, tendering, site works and Occupancy, scope of works of each stage.
c. Scheduling and monitoring of construction project with introduction of bar chart, advantages of Scheduling.
d. Preparations of site layout indicating details of materials labour equipment amenities and site structures.
e. Supervision
quality control: w.r.t material, testing on site, quality control of workmanship.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for End Semester Exam
1	DUTIES AND LIABILITIES IN PROFESSION	12	15
2	PROCESS OF SUBMISSION TO VARIOUS DEPARTMENTS	20	19
3	ARCHITECTURAL COMPETITIONS	6	8
4	VALUATION AND ARBITRATION	4	6
5	TENDERS AND CONTRACTS	10	12
6	MANAGEMENT	12	15
	Total	64	75

6. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books
1	Roshan Nanavati	Professional Practice
2		Handbook of Byelaws and regulations of local governing bodies/ authorities
3		National Building code
4	Dr. B.C. Punmia	Building Construction
5	Dr. H.D. Pasrija Arora and Singh	Estimation, Costing and Valuation

(AE506) TOWN PLANNING

1. RATIONALE

The aim of this subject is to acquaint the students with the Town & Country planning office as well as the Planning and Development Authority offices. This shall help the students in future to assist architects related to planning, or work as planning assistants in the Town planning office. Also, before preparing the submission plan; the students will understand its land use and sub-division.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
AE506 Town Planning	L	T	P	C	TH	TM	PR/OR	TW	100
	04	-	-	04	75	25	-	-	

Minimum passing Percentage 40%
TW shall consists of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

This course shall enable the students to understand:

- The planning aspects related to landuse plan
- Transportation related to planning.
- Environmental impact related to planning with respect to open spaces and water bodies.

4. DETAILED COURSE CONTENT

UNIT 1: TOWN PLANNING AIMS, OBJECTS AND FUNCTION

UNIT 2: ORIGIN OF TOWNS

a. Development of cities from village to metropolis
b. Factors affecting the birth and growth of towns
c. Types of cities, Methods of growth of towns

UNIT 3: PROBLEMS OF PRESENT TOWNS AND VILLAGES:

a. Towns before industrial revolutions and towns after industrial revolutions effect of industrialization of towns
b. Major problems of present towns, ribbon development slums, etc.
c. Major problems of present villages

UNIT 4:DEVELOPMENT OF COMMUNICATION

a. Importance of communication and transport facilities
b. Evolution of the transport system
c. Road patterns or systems
d. Traffic & its problems and solutions segregation of traffic and its methods
e. Road crossings and junctions

UNIT 5: MODERN TOWN PLANNING

a. Various stages of planning
b. Town planning & planning team, master plan of one of the town like Chandigarh, Gandhinagar, etc.
c. Study of various solution of expanding towns
   i) Neighbourhood planning and its principals
   ii) Land use
   iii) Suburban development rural belts and open spaces
   iv) Satellite town and Garden city
   v) Slum Clearance
   vi) Remodelling of villages & planning of Housing
   vii) Planning of housing society, educational campus, Medical & Health Campus. Industries Township shopping & Commercial centre.
d. Developmental control.

UNIT 6:TOWN PLANNING SCHEMES

a. Various planning regulations
b. Implementation of town scheme
c. Importance of town planning

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for End Semester Exam
1	TOWN PLANNING AIMS, OBJECTS AND FUNCTION	4	5
2	ORIGIN OF TOWNS	8	10
3	PROBLEMS OF PRESENT TOWNS AND VILLAGES	12	15
4	DEVELOPMENT OF COMMUNICATION	12	15
5	MODERN TOWN PLANNING	20	20
6	TOWNPLANNING SCHEMES	8	10
	Total	64	75

6. SUGGESTED LEARNING RESOURCES

Sr.No.	Author	Title of Books
1	V.K. Bhadasgaonkar	Handbook of town planning
2	S.C. Rangawala	Town Planning
3	Fredric Gibberd	Urban Pattern
4	Lohmann	Principal of city planning
5	S.C. Oak	A handbook of town planning

(AE511) SITE MANAGEMENT

1. RATIONALE

This curriculum shall enable the students to gain knowledge about various aspects and the processes involved in site and building management. This will provide help to students during their Architectural training in VIth semester for site inspection whenever sent by the Architect. It would also benefit students who in future would opt to be site supervisors.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
	L	T	P	C	TH	TM	PR/OR	TW	
(AE511) SITE MANAGEMENT	-	-	4	4	-	-	50	50	100

Minimum passing Percentage 40%
TW shall consist of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The course content shall enable the students to :

- Supervise site processes and building construction
- Suggest work sequence and management
- Judge quality control of material and workmanship.

4. DETAILED COURSE CONTENT

UNIT 1: PROJECT PLANNING

- Aspects of project planning and design- setting production targets, scheduling resource planning, sequence of construction process, selection of construction methods

UNIT 2 : FUNCTIONS OF SITE STAFF

- Supervision- instructions to laborers, determination of the course of work , Monitoring the specifications; for quality control
- organization of support activities
- Control of production and management of personnel, preparation of camp
- Provision of tools and materials

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1	PROJECT PLANNING	28	20	20
2	FUNCTIONS OF SITE STAFF	36	30	30
	Total	**64**	**50**	**50**

6. SUGGESTED ACTIVITIES(Practicals)

UNIT 1: Prepare an A4 size report on a case study project.

UNIT 2: Prepare an A4 size report on a case study project.

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	Transportation Staff and Consultants Basil Coukis Principal Coordinator and Contributor	LABOUR BASED CONSTRUCTION PROGRAMS A Practical Guide for Planning and Management	A world bank publication

(AE512) BUILDING SERVICES MANAGEMENT

1. RATIONALE

This curriculum is aimed at providing knowledge about the practical aspects of installation and management of building services like water supply and electrical installations on the site. This shall provide them with a detailed insight while supervising the installation of these services in building sites.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
	L	T	P	C	TH	TM	PR/OR	TW	
(AE512) BUILDING SERVICES MANAGEMENT	-	-	4	4	-	-	50	50	100

Minimum passing Percentage 40%
TW shall consist of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The course content shall enable the students to

- Suggest placement of these components on site
- Supervise installation of water supply and plumbing in building
- Supervise placement of electrical installation in buildings

4. DETAILED COURSE CONTENT

UNIT 1: WATER SUPPLY AND PLUMBING INSTALLATION

- Estimating the quantity of water for different usages per person, eg. Flushing, etc
- Water supply arrangements in buildings and its components
- Points to be observed in making water supply arrangements for a multi-storied building
- Installation of pipes- wall, concealed.
- Hot water supply
- Storage requirements

UNIT 2: ELECTRICAL INSTALLATION

- Introduction terminology – Voltage, Current, Power.
- General rules for lighting.
- Electrical Distribution System: Power Requirement, Incoming Power source voltage, Transformers, Meter, wiring , Power sub-circuit
- Electrical Layout Design: Compliance to local building codes, Residential, commercial
- Distribution circuits- lighting load sub-circuit- lighting, socket, outlets and fixed apparatus.
- Placement of meter, main-switches, cut-offs , separate common area lights eg. staircase lights
- Necessity of earthing and its installation in buildings
- Physical marking of layout in all walls and slab of site ,precautions to be observed on site
- Laying of underground supply lines, laying conduits in concrete slab and beam reinforcement, fixing of fan hooks, conduit box position in slab reinforcement for main supply to consumer units
- Supervision of installation of concealed wiring, cleat wiring in wall – switchboard position

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1	WATER SUPPLY AND PLUMBING INSTALLATION	32	25	25
2	ELECTRICAL INSTALLATION	32	25	25
	Total	**64**	**50**	**50**

6. SUGGESTED ACTIVITIES(Practical)

UNIT 1: A3 size Report on Case studies of water supply and plumbing layout for Multistoried Residential buildings, commercial buildings, institutional buildings, etc.

UNIT 2: A3 size Report on Case studies of electrical layout for Multistoried Residential buildings, commercial buildings, institutional buildings, etc.

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	S.M. Patil	Building services	Standard pub. Dist. Delhi
2	Anwani	Basic wireman	Dhanpat Rai and Co.
3		Environmental Engineering	Technical Teacher's Training Institute (Madras)

(AE513) LANDSCAPE

1. RATIONALE

This curriculum shall enable the students to gain knowledge about various aspects of landscape design. This will inculcate in students the ability to produce detailed drawings during their Architectural training in VIth semester.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
	L	T	P	C	TH	TM	PR/OR	TW	
(AE513) LANDSCAPE	-	-	4	4	-	-	50	50	100

Minimum passing Percentage 40%
TW shall consist of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The course content shall enable the students to

- Understand holistic site planning.
- Produce detailed landscape drawings
- Enhance rendering techniques in colour

4. DETAILED COURSE CONTENT

UNIT 1: INTRODUCTION TO LANDSCAPE ARCHITECTURE

- Historical landscape designs; Mughal gardens, Japanese zen gardens
- Theory of Landscape Design
- Types: Public spaces , courtyards, gardens, traffic islands, parks, play areas, squares, plazas
- Usage: residential, commercial, industrial areas
- Drawing of landscape elements:

UNIT 2 : HARD AND SOFT LANDSCAPE • Components of hard landscape : Paving, walkways, driveways, pavilions, decks, steps, ramps, patio • soft landscape : lawn, trees, shrubs, water bodies , earth mounds • Landscape sections and detailing.
UNIT 3: ELEMENTS OF LANDSCAPE ARCHITECTURE • Vegetation : • Land form : contoured, surface drainage • Water bodies: pools, water features • Installations: pergola, screen walls, canopies, outdoor furniture, inbuilt seats ,Street furniture, gazebo • Vehicular: movement, parking spaces, drop-off points • Infrastructure: plumbing, electrical: light fixtures • Material usage and constructional techniques.
UNIT 4:SITE ANALYSIS AND PLANNING • Site analysis : topographical, drainage, flora, soil conditions, microclimate , existing structures, requirements. • Site planning: zoning, elements and principles of design, aesthetic composition

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1	INTRODUCTION TO LANDSCAPE ARCHITECTURE	04	0	0
2	HARD AND SOFT LANDSCAPE	25	20	20
3	ELEMENTS OF LANDSCAPE ARCHITECTURE	25	20	20
4	SITE ANALYSIS AND PLANNING	10	10	10
	Total	**64**	**50**	**50**

6. SUGGESTED ACTIVITIES(Practicals)

UNIT 2: 1 A4 size report on case studies

1 A1 size sheet on Project given

UNIT 3: 1 A4 size report on case studies

1 A1 size sheet on Project given

UNIT 4: 1 A1 size sheet on colour rendered landscape layout plan

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication
1	Michael Littlewood	Landscape detailing Volume 2 Surfaces	CBS Publishers and Distributers
2	Roger Sweetinburgh	Small garden planner	Chancellor Press
3	Herb Gustafson	The Art of Japanese Gardens	Sterling Publishing Co., Inc.New York
4	Rahoul B. Singh	Gardens of Delight	Lustre Press
5	James B. Root	Fundamentals of Landscaping and Site Planning	The AVI Publishing Company, Inc. Westport, Connecticut
6	Geoffrey and Susan Jellicoe	The Landscape of Man	Thames and Hudson

CS503 – 3D PRINTING															
Teaching Schedule Per Week			TW		PR/OR							Total			
Lectures	Practical	Credits													
-	4	4	50		50							100			
Pre-requisite		Source	USERS	1	2	3	4	5	6	7	10	11	12	13	14
Nil				15	16	20	21	23	24	28	29	34	35	36	

Rationale: 3D Printing is a new technology when compared to traditional manufacturing processes and the purpose of this course is to give students a head start. The course is designed to be an introduction to the technology while at the same time explaining the concepts involved in designing parts and assemblies for manufacture by 3D printing. Traditional design concepts fall short when it comes to 3D printing and knowledge of these concepts will add significant value to students as they get ready to face the challenges of the real world.

COURSE CONTENTS	Hrs	Mks
1. INTRODUCTION TO 3D PRINTING	2	3
Introduction to 3D Printing – what is it, how it works. History of 3D Printing – who invented it and when. Processes – different 3D Printing processes available today. Application – use of 3D Printing, today and tomorrow. Course summary – what will be taught during this course?		
2. FUNDAMENTALS, PROCESSES & MATERIALS	3	7
Basic requirements – list of basic requirements for successful 3D Printing. Processes – 3D Printing Processes in brief – FDM, EBM, SLS, SLA, etc. Materials – list of materials used and available – PLA, ABS, Metal Alloys, Ceramic powders, etc. Possibilities and Limitations. FDM – detailed knowledge of FDM process.		
3. INTRODUCTION TO FDM 3D PRINTER	2	4
FDM 3D Printer – process, specifications, how to use. 3D Printer in action – print bundled models to get the first experience of the FDM 3D Printer in action. Do's and don'ts – things to be kept in mind while designing for/printing on FDM 3D Printer. Rafts & Supports – their use and how to avoid them.		
4. EFFICIENT 3D PRINTING	2	3
Brief introduction to 1.Orientation – meaning and purpose, 2.Clearance – meaning and use, 3.Wall thickness – meaning, purpose & importance, 4.Accuracy/inaccuracy – understand and take advantage of it, 5.Movable Parts – meaning and how to achieve them, 6.Assemblies – definition and how to build them.		
5. ORIENTATION	3	4
Definition. Orientation and Successful Printing. Avoid rafts & supports using appropriate orientation. Orientation for defect free printing. Experiments with Orientation.		
6. CLEARANCE	5	5
Definition. Effects of lack of clearance with different processes and different materials. Clearance for FDM 3D Printer and its materials. Clearance while modelling. Knowledge of Clearance and its benefits. Experiments with Clearance.		
7. WALL THICKNESS	5	8
Definition. Its importance in 3D Printing. How does it differ from process to process and material to material? Effects of having 'thinner' walls than the required		

minimum wall thickness. Experiments with wall thickness.

8. ACCURACY/INACCURACY	7	11
Definition – accuracy in terms of different processes and materials. Accuracy of objects printed on FDM 3D Printer. Adjustments necessary in the Model to compensate the inaccuracies. Experiments with Accuracy/Inaccuracy.		
9. MOVABLE PARTS	10	16
Definition – what are Movable Parts and how to design them? How to achieve this on a FDM 3D Printer with the help of 'orientation', 'clearance', 'wall thickness', 'accuracy', etc. discussed earlier. Precautions – things to keep in mind while designing movable parts. Experiments with Movable Parts.		
10. ASSEMBLIES	12	16
Definition. How to create them. Exercise – design fully functional assemblies. Experiments with Assemblies.		
11. PRINTABILITY	8	13
Definition – overall printability of a given model and how it's determined. Do's and don'ts. Design error free models. How to diagnose and fix errors. Experiments with Printability.		
12. 3D PRINTING TODAY	3	5
3D Printing and its growth till date. Current application of 3D Printing in Prototyping, Jewelry, Industrial Design, Architecture, Engineering and construction, Automotive, Aerospace, Dental and Medical Industries, Education, etc. Impact of 3D Printing. Factors that affect 3D Printing today e.g. Lack of knowledge, cost, availability, etc.		
13. FUTURE OF 3D PRINTING	2	5
How fast is it growing. Predictions from the experts about its future. Possibilities – new processes, materials, new applications, etc.		
Total	64	100

PRACTICALS

1. Print for the first time using bundled creations.
2. Model and print objects to demonstrate negative and positive effects of Orientation.
3. Model and print objects with accurate clearance.
4. Experiment with minimum wall thickness by modelling and printing objects with different wall thickness.
5. Experiment with accuracy of the prints and model objects that will be physically accurate after printing.
6. Design Movable parts and print them in one piece.
7. Create assemblies - either printed as one piece or assembled later or combination of both.

REFERENCE

ANALYTICAL TABLE OF CONTENTS

VI SEMESTER

(AE601) ARCHITECTURAL TRAINING

1. RATIONALE

This semester will be utilized for integration and co-ordination of knowledge of various technical subjects studied during Semester I to V for the purpose of learning and applications in the professional field. This can be achieved by working in the office of an Architect.

2. TEACHING AND EXAMINATION SCHEME

Course code	Name of Course	EXAMINATION SCHEME				Total
		TW		PR/OR		
		Daily Dairy	Progressive Assessment	Training Report	Report Assessment & Seminar/Viva	
AE601	Architectural Training	50	50	50	50	Grade

Minimum passing Percentage 40%
TW shall consist of prescribed number of sheets and shall be progressively assessed.

3. COMPETENCY TO BE DEVELOPED THROUGH THIS COURSE

The course content shall enable the students to:

- Apply the knowledge gained in the previous semesters
- Gain practical experience in office
- Gain experience through site work

4. DETAILED COURSE CONTENT

UNIT 1: INDUCTION PROGRAM

- Induction program will be conducted in the institute to prepare the students for undergoing training in the private offices.

UNIT 2 :TRAINING IN ARCHITECT'S OFFICE/ ENGINEER'S OFFICE/ PLANNING FIRMS

- The assessment of the students should be done periodically. The expert supervisor should do this assessment from the industry, in consultation with the inspecting faculty member from the institution. The evaluation is based on the performance of the student during the relevant period. Different factors such as quality and quantity work accomplished, knowledge, creativity, dependability, leadership, personal development, etc will be on the basis of evaluation.

**Note: Offices to be approved by the Department of Architectural Engineering before the students are placed.*

UNIT 3: COMPLETION OF PORTFOLIO

- Portfolio assessment: On basis of the Portfolio the student will be assessed in a viva conducted by two examiners, one from the industry and one from the institution.

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS.

Unit No.	Topic	Teaching Hours	Marks Distribution for term work	Marks Distribution for End Semester Exam
1	INDUCTION PROGRAM	16 Weeks (Includes 04 hrs. for Unit 1)	-	-
2	TRAINING IN ARCHITECT'S OFFICE/ ENGINEER'S OFFICE/ PLANNING FIRMS		100	-
3	COMPLETION OF PORTFOLIO		-	100
	Total	**16 weeks**	**100**	**100**

6. SUGGESTED ACTIVITIES(Practicals)

- Assessment of progress in Industry (by the expert in the industry/office in consultation with the inspection authority of the institution, based on the average of minimum 3 assessments)
- Portfolio assessment and viva (assessed by one internal from the institution and one external examiner from the industry with the exhibition of drawings in the presence of the whole class/batch.)
- Portfolio assessment can include the reports of the site/ field activity or client/ consultant interactions handled during the training in a standard format countersigned by the Architect's office in-charge of the trainee.

7. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books
1		Handbook of Byelaws and regulations of local governing bodies/ authorities

Assessment of Training Report be based on Knowledge, Presentation, Quality of contents and Sketches.

Note:

1. For Industrial training Grades will be awarded based on marks scored as follows:

   80% and above Marks – Grade 'A'

   60% to 79% Marks – Grade 'B'

   40% to 59% Marks – Grade 'C'

   Marks below 40% - Grade 'D'

2. TW and PR/OR shall be separate heads of passing. Student has to secure minimum Grade 'C' for passing.

(GN602) MATHEMATICS FOR ARCHITECTURE

1. RATIONALE

There are variable and constant concepts in the engineering phenomena and problems, which need to understand, analyze and predict their behaviour. Mathematics is used to understand, analyse and find solutions. There are some standard principles and formulae, which should be understood by students and apply as per needs of situations in real life.

2. TEACHING AND EXAMINATION SCHEME

Course Code & Course Title	Periods/ Week (In Hours)			Total Credits	Examination Scheme				
					Theory Marks		Practical Marks		Total Marks
(GN602)	L	T	P	C	TH	TM	TW	PR/OR	
Mathematics for Architecture	1	1	-	2	-	-	100	-	GRADE

Minimum passing % : Theory 40%

Legends:

***L**-Lecture; **T** - Tutorial; **P** - Practical; **C**- Credit; **TH**- End Semester Theory; **TM** – Test Marks:*

***PR/OR** - End Semester Practical / Oral Examinations; **TW**- Term Work*

3. DETAILED COURSE CONTENTS

Unit 1 Co-ordinate Geometry/ Analytic Geometry;

Purposes/Applications of Co-ordinate Geometry. Coordinate systems. *Straight Line*- Distance between two points. Internal & external division of a line. Area of triangle. Slope of line. Angle between two lines. Various forms of equation of line-parallel to axis, point-slope form, slope intercept form, two point form, intercepts form & normal form. General equation of line. Distance of a point from a line. - Equations of circle, Equations of tangent & normal to circle.

Unit 2 Trigonometry

Trigonometry: Trigonometric functions, addition and subtraction formulae, formulae involving multiple and submultiples angles, inverse trigonometric functions and their properties.

Unit 3 Statistics: Measure of dispersion,: mean deviation, variance and standard deviation for grouped data. .
Unit 4 Matrices: Concepts of m x n ($m \leq 3$, $n \leq 3$) real matrices, operations of addition, scalar multiplication and multiplication of matrices. Transpose of a matrix. Determinant of a square matrix. Properties of determinants (statement only). Minor, cofactor and adjoint of a matrix. Nonsingular matrix. Inverse of a matrix. Finding area of a triangle. Solutions of system of linear equations. (Not more than 3 variables).
Unit 5 Algebra: Definition of A.P and G.P, general term, summation of first end terms of series summation of n, n^2 and n^3. Arithmetic and Geometric series, A.M, G.M. and their relation; Infinite G.P. series and its sum.
Unit 6 Logarithms: Definition, general properties, and change of base.
Unit 7 : Introduction to Calculus: Concept of Function and Limits(No problems) Derivatives of standard functions. Derivatives of composite function, implicit functions and parametric function. Definition of integration: Indefinite integral of standard functions, Integration by parts.

4. SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Topic	Teaching Hours/ Semester	Marks
11	**Co-ordinate Geometry**	**08**	**20**
12	**Trigonometry**	**05**	**15**
13	**Statistics:**	**02**	**12**
14	**Matrices:**	**05**	**15**
15	**Algebra**	**03**	**10**
16	**Logarithm**	**01**	**08**
17	**Introduction to Calculus**	**08**	**20**
TOTAL		**32**	**100**

5. SUGGESTED ASSIGNMENTS

Unit No.	Topic	No of Assignments
1	**Co-ordinate Geometry/ Analytic Geometry**	**02**
2	**Trigonometry**	**02**
3	**Statistics:**	**01**
4	**Matrices:**	**01**
5	**Algebra**	**01**
6	**Logarithm**	**01**
7	**Introduction to Calculus**	**02**

6. SUGGESTED LEARNING RESOURCES

S.No.	Author	Title of Books	Publication & Year
1.	Deshpande S.P.,	Mathematics for Polytechnics	Griha Prakashan, Pune, 1996 or latest
2.	Grewal B.S;	Engineering Mathematics	Khanna Pub., New Delhi1995 or latest

****