Department of Architecture
College of Engineering, Andhra University, Visakhapatnam
Bachelor of Architecture
5-year Undergraduate Degree Course
(With Effective from **2020-2021** Admitted Batch and onwards)

SCHEME OF SYLLABUS

Note: Induction Training: In the first year three weeks of the course, an induction training program is mandatory before the start of formal classes, to orient the students towards architectural aptitude, education and career.

1/5 B.ARCH 1st SEMESTER

Code	Category	Course Title	Hours per week			IA	EE/EJ	Total Marks	Credits	Exam (Hrs.)
			L	S	W					
ARC1101	**PC**	Basic Design & Visual Arts	2	5	-	50	50	100	8	5 Hrs.
ARC1102	**PC**	Architectural Drawing & Graphics-I	1	4	-	50	50	100	6	5 Hrs.
ARC1103	**PC**	Introduction to Architecture, Art & Culture	3	-	-	30	70	100	3	3 Hrs.
ARC1104	**BS &AE**	Building Materials & Construction-I	2	3	-	50	50	100	5	3 Hrs.
ARC1105	**BS &AE**	Structural Mechanics-I	3	-	-	30	70	100	3	3Hrs.
ARC1106	**BS &AE**	Survey & Site Studies	1	-	3	50	50	100	3	VV
ARC1107	**SEC**	English (Life Skill Courses)	3	-	-	30	70	100	2	3Hrs.
		Sub-Total	**15**	**12**	**3**	**290**	**410**	**700**	**30**	

1/5 B.ARCH 2nd SEMESTER

Code	Category	Course Title	Hours per week			IA	EE/EJ	Total Marks	Credits	Exam (Hrs.)
			L	S	W					
ARC1201	**PC**	Architectural Design-I	2	5	-	50	50	100	9	5 Hrs
ARC1202	**PC**	Architectural Drawing & Graphics-II	1	4	-	50	50	100	6	5 Hrs
ARC1203	**PC**	History of Architecture – I	3	-	-	30	70	100	3	3 Hrs.
ARC1204	**PC**	Carpentry and Model Making Workshop	--	-	3	50	50	100	2	VV
ARC1205	**BS&AE**	Building Materials- & Construction-II	2	3	-	50	50	100	5	3 Hrs.
ARC1206	**BS &AE**	Structural Mechanics-II	3	-	-	30	70	100	3	3 Hrs.
ARC1207	**SEC**	English Language Lab (Life Skill Courses)	--	--	2	50	50	100	2	VV
		Sub-Total	**11**	**12**	**5**	**310**	**390**	**700**	**30**	

L- Lectures	**S- Studio**	**W-Workshop**
EE/EJ : End Exam / External Jury	**IA: Internal Assessment**	**VV: Viva-Voce**

Category	Credits
PC – Professional Core	37
BS&AE – Basic Sciences and Applied Engg.	19
Skill Enhancement Courses / Life Skill Courses	4
Mandatory AICTE Non Credit Course	0
Total Credits of 1st Year	**60**

2/5 B.ARCH 1st SEMESTER										
Code	**Category**	**Course Title**	**Hours per week**			**IA**	**EE/EJ**	**Total Marks**	**Credits**	**Exam (Hrs.)**
			L	**S**	**W**					
ARC2101	**PC**	Architecture Design-II	2	6	-	50	50	100	10	10 Hrs.
ARC2102	**PC**	History of Architecture-II	3	-	-	30	70	100	3	3Hrs.
ARC2103	**BS&AE**	Building Materials & Construction-III	2	3	-	50	50	100	5	3Hrs
ARC2104	**BS&AE**	Building Services-I (Water supply & Sanitary Engg.)	3	-	-	30	70	100	3	3Hrs.
ARC2105	**BS&AE**	Climatology-I	3	-	-	30	70	100	3	3Hrs.
ARC2106	**BS&AE**	Structural Mechanics-III	3	-	-	30	70	100	3	3Hrs.
ARC2107	**SEC**	Computer Applications-I (Skill advanced course)	1	--	2	50	50	100	3	VV
ARC2108	**MC**	Professional Ethics & Universal Human Values Ethics	2	--	--	00	100	100	0	Internal Examiner
ARC2109	**MC**	NCC, NSS, NSO	--	--	2	--	--	--	0	
		Sub-Total	**19**	**9**	**4**	**270**	**530**	**800**	**30**	

2/5 B.ARCH 2nd SEMESTER										
Code	**Category**	**Course Title**	**Hours per week**			**IA**	**EE/EJ**	**Total Marks**	**Credits**	**Exam (Hrs.)**
			L	**S**	**W**					
ARC2201	**PC**	Architectural Design-III	2	6	-	50	50	100	10	10 Hrs
ARC2202	**PC**	History of Architecture-III	3	-	-	30	70	100	3	3 Hrs
ARC2203	**BS&AE**	Building Materials & Construction-IV	2	3	-	50	50	100	5	3 Hrs.
ARC2204	**BS&AE**	Building Services-II (Acoustics)	3	-	-	30	70	100	3	3 Hrs.
ARC2205	**BS&AE**	Climatology-II	3	-	-	30	70	100	3	3 Hrs.
ARC2206	**BS&AE**	Design of Structures-I	3	-	-	30	70	100	3	3 Hrs.
ARC2207	**BS &AE**	Environmental Science for Architecture	3	-	-	30	70	100	3	3 Hrs.
		Sub-Total	**19**	**9**	**--**	**250**	**450**	**700**	**30**	

Summer Internship 8 weeks / Community Service Project

Summer Internship 8 weeks: Every student must complete a **mandatory** 8-week Summer Internship at any local Architectural firm (Chief Architect of the firm shall have at least 2 years of professional experience) during the summer vacation, and the completion certificate along with portfolio must be submitted in the department at the beginning of the 3rd year of the 1st Semester for oral presentation by the student and evaluation through the departmental committee for awarding a credit.

L- Lectures	**S- Studio**	**W-Workshop**
EE/EJ : End Exam / External Jury	**A: Internal Assessment**	**VV: Viva-Voce**

Category	**Credits**
PC – Professional Core	26
BS&AE – Basic Sciences and Applied Engg.	31
Skill Enhancement Courses / Skill advanced course*	3
Mandatory AICTE Non-Credit Course	0
Total Credits of 2nd Year	**60**

3/5 B.ARCH 1st SEMESTER										
Code	**Category**	**Course Title**	**Hours per week**			**IA**	**EE/EJ**	**Total Marks**	**Credits**	**Exam (Hrs.)**
			L	**S**	**W**					
ARC3101	**PC**	Architecture Design-IV	2	6	-	50	50	100	10	VV
ARC3102	**PC**	Human Settlements & Town Planning	3	-	-	30	70	100	3	3Hrs.
ARC3103	**PC**	^^Landscape Design & Site Planning	3	-	-	30	70	100	3	3Hrs.
ARC3104	**BS&AE**	Building Materials & Construction-V	2	3	-	50	50	100	5	3 Hrs.
ARC3105	**BS&AE**	Building Services-III (Electrical and HVAC Services)	3	-	-	30	70	100	3	3 Hrs.
ARC3106	**BS&AE**	Design of Structures- II	3	-	-	30	70	100	3	3Hrs.
ARC3107	***OE-I**	*Open Elective-I	3	--	--	30	70	100	2	3Hrs.
ARC3108	**PAECC**	Summer **Internship-I** 8 Weeks (Mandatory) after second year (to be evaluated during V semester) / Community Service Project.				50	50	100	1	VV
		Sub-Total	**19**	**9**	**--**	**300**	**500**	**800**	**30**	

***Open Electives** - Student shall choose an open Elective from the list of courses offered by the department in such a manner that he/she has not studied the same course in any form during the Programme. (Or) The student may be allowed (with prior permission from HoD) to select course (Minimum of 8 Weeks) from NPTEL/ SWAYAM platform other than the basic courses of the programme and submission of pass certificate at the end of the semester is mandatory for completion of the semester.

^^**Community Service Project** like botanical survey and documentation should be an integral part of the Landscape Design as an assignment.

3/5 B. ARCH 2nd SEMESTER										
Code	**Category**	**Course Title**	**Hours per week**			**IA**	**EE/EJ**	**Total Marks**	**Credits**	**Exam (Hrs.)**
			L	**S**	**W**					
ARC3201	**PC**	Architectural Design-V	2	6	-	50	50	100	10	VV
ARC3202	**PC**	Working Drawings-I	2	3	-	50	50	100	5	VV
ARC3203	**PC**	Specification, Estimation & Costing	3	-	-	30	70	100	3	3Hrs.
ARC3204	**BS&AE**	Building Repairs and Maintenance Services	3	--		30	70	100	3	3Hrs
ARC3205	**BS&AE**	Design of Structures- III	3	-	-	30	70	100	3	3Hrs.
ARC3206	**SEC**	Computer Applications-II (Skill advanced course)	1	--	2	50	50	100	3	VV
ARC3207	***OE-II**	*Open Elective-II	3	--	--	30	70	100	2	3Hrs.
		Sub-Total	**17**	**9**	**2**	**270**	**430**	**700**	**29**	**--**

Summer Internship 8 weeks: Every student must complete a **mandatory** 8-week Summer Internship at any local architectural firm (chief architect of the firm shall have at least 4 years of professional experience) during the summer vacation, and the completion certificate along with portfolio must be submitted in the department at the beginning of the 4th year of the 1st Semester for oral presentation by the student and evaluation through the departmental committee.

***Open Electives** - Student shall choose an open Elective from the list of courses offered by the department in such a manner that he/she has not studied the same course in any form during the Programme. (Or) The student may be allowed (with prior permission from HoD) to select course (Minimum of 8 Weeks) from NPTEL/ SWAYAM platform other than the basic courses of the programme and submission of pass certificate at the end of the semester is mandatory for completion of the semester

Category	Credits
PC – Professional Core	34
BS&AE – Basic Sciences and Applied Engg.	17
Skill Enhancement Courses / Skill advanced course*	3
Open Elective Course	4
Professional ability Enhancement Compulsory Course	1
Mandatory AICTE Non-Credit Course	0
Total Credits of 3rd Year	**59**

4/5 B. ARCH 1st SEMESTER										
Code	**Category**	**Course Title**	**Hours per week**			**IA**	**EE/EJ**	**Total Marks**	**Credits**	**Exam (Hrs.)**
			L	**S**	**W**					
ARC4101	**PC**	*Architecture Design-VI	2	6	--	50	50	100	10	VV
ARC4102	**PC**	Working Drawings-II	2	3	--	50	50	100	5	VV
ARC4103	**PC**	Urban Design	3	--	--	30	70	100	3	3 Hrs.
ARC4104	**BS&AE**	Building Services-IV (Advanced Services)	3	--	--	30	70	100	3	3 Hrs.
ARC4105	**BS&AE**	Structures Design Project	3	--	--	50	50	100	3	VV
ARC4106	**PE**	**Professional Elective-I**	3	--	--	30	70	100	3	3Hrs.
ARC4107	**SEC**	Soft Skills (Skill advanced course)	2		-	50	50	100	2	VV
ARC4108	**PAECC**	Summer **Internship-II** 8 Weeks (Mandatory) after second year (to be evaluated during V semester) / Community Service Project.				50	50	100	1	VV
		Sub-Total	**18**	**9**	**--**	**340**	**460**	**800**	**30**	**--**
***Community Service Project** should be an integral part of the Architecture Design-VI Major Design Project.										

4/5 B. ARCH 2nd SEMESTER										
Code	**Category**	**Course Title**	**Hours per week**			**IA**	**EE/EJ**	**Total Marks**	**Credits**	**Exam (Hrs.)**
			L	**S**	**W**					
ARC4201	**PAECC**	Practical Training	--	--	--	50	50	100	25	VV
		Sub-Total	**--**	**--**	**--**	**50**	**50**	**100**	**25**	**--**

Note: 24 weeks of Practical Training in an Architectural Firm
Every student must complete a **mandatory** 24 weeks Internship at any architectural firm (Chief Architect of the firm shall have at least 6 years of professional experience- from the date of availing the CoA No.)

Note: Before commencement of 5th Year 1st semester, all students should submit Two Dissertation/ Architectural Design Thesis Topics of their interest and get it approved by the Head and the Coordinator.

Category	Credits
PC – Professional Core	18
BS&AE – Basic Sciences and Applied Engg.	6
Skill Enhancement Courses / Skill advanced course*	2
Professional Elective Course	3
Professional ability Enhancement Compulsory Course / Job Oriented Course	26
Total Credits of 4th Year	**55**

5/5 B. ARCH 1st SEMESTER										
Code	**Category**	**Course Title**	**Hours per week**			**IA**	**EE/EJ**	**Total Marks**	**Credits**	**Exam (Hrs.)**
			L	**S**	**W**					
ARC5101	**PC**	Architecture Design-VII	2	8	--	50	50	100	10	VV
ARC5102	**PAECC**	Project Management	3	--	--	30	70	100	3	3 Hrs.
ARC5103	**PAECC**	Architectural Dissertation	--	--	6	50	50	100	6	VV
ARC5104	**PE**	**Professional Elective-II**	3	--	--	30	70	100	3	3Hrs
ARC5105	**PE**	**Professional Elective-III**	3	--	--	30	70	100	3	3Hrs
ARC5106	**PE**	**Professional Elective-IV**	3	--	--	30	70	100	3	3Hrs
ARC5107	**PE**	**Professional Elective-V**	3	--	--	30	70	100	3	3Hrs
ARC5108	***OE-III**	* **HSS Electives**	3	--	--	30	70	100	2	3Hrs
		Sub-Total	**20**	**8**	**6**	**280**	**520**	**800**	**33**	**--**
***Open Electives - HSS Electives**										

5/5 B. ARCH 2nd SEMESTER										
Code	**Category**	**Course Title**	**Hours per week**			**IA**	**EE/EJ**	**Total Marks**	**Credits**	**Exam (Hrs.)**
			L	**S**	**W**					
ARC5201	**PC**	Architecture Design Thesis	3	18	--	50	50	100	20	VV
ARC5202	**PAECC**	Professional Practice & Legislation	3	--	--	30	70	100	3	3Hrs
		Sub-Total	**3**	**18**	**6**	**100**	**100**	**200**	**23**	**--**

Category	**Credits**
PC – Professional Core	30
Professional Elective Course	12
Professional ability Enhancement Compulsory Course / Job Oriented Course	12
Open Elective Course	2
Total Credits of 5th Year	**56**

S.No	**Category**	**Code**	**No. of Credits**	**% of Credits**	**Suggested Breakup % Credits by CoA, 2020 Guidelines**
1	Professional Core	PC	145	50	50
2	Basic Sciences and Applied Engineering	BS&AE	73	25.20	20
3	Professional Elective	PE	15	5.20	10
4	Open Elective	OE	6	1.80	5
5	Professional ability Enhancement Compulsory Course	PAECC	39	13.50	10
6	Skill Enhancement Courses / Life Skill Courses / Skill Advanced Courses / Skill Oriented Courses	SEC	12	4.30	5
		Total	**290**	**100**	**100**

S.No	Category	No. of Courses offered in the Whole Program
1	Open Electives	3 Nos. (Other than Basic courses in the Programme)
2	Professional Electives	5 Nos.
3	Life Skill Courses / Skill Oriented Courses	2 Nos.
4	Skill advanced Courses	3 Nos.
5	Summer Internship 8 weeks Each (Mandatory Internships)	2 Nos. (Total 4 Months)
6	Practical Training Internship - 24 weeks (Mandatory Internship)	1 No. (6 Months Duration)
7	Skill Enhancement Courses	1 Nos.
8	Community Service Project	2 Nos.
9	Environmental Science for Architecture	1 No.
10	Mandatory AICTE Non- Credit Courses	4 Nos.

PROFESSIONAL ELECTIVES

PE-1	a) Architectural Conservation b) Green Buildings & Rating Systems, ECBC & Bldg. bye-laws
PE-2	c) Disaster Resistant Buildings and Management d) Appropriate Building Technologies
PE-3	e) Interior Design f) Theory of Design
PE-4	g) Bio-Climatic Architecture h) Sustainable Cities and Communities
PE-5	i) Glass Architecture and Design j) Advanced Structures

OPEN ELECTIVES

OE-1	a) Sustainable Architecture b) Barrier free Architecture c) Theory of Environmental Planning
OE-2	d) Environmental Impact Assessment e) Remote Sensing & GIS f) Rural Planning and Development
OE-3	HSS ELECTIVES g) Organizational Behavior h) Industrial Management and Entrepreneurship

Vision: Our goal is to empower students with the education and practical skills necessary to excel as professionals in architecture. We are committed to nurturing their sensitivity and responsibility towards the surrounding environment and society, guiding them in creating sustainable structures and spaces.

Mission: We are dedicated to fostering our students' creative talents, combining cutting-edge scientific knowledge with innovative design principles. Our focus is on crafting a built environment that is in harmony with its local context, enhancing human experience and societal value.

Program Educational Objectives (PEOs)

The curriculum of the Bachelor of Architecture programme is specifically intended to equip graduates with the necessary aptitude and expertise.

PEO1: To prepare graduates who will be successful professionals in the field of architecture, exhibiting creativity, critical thinking, and analytical skills to develop sustainable and innovative architectural solutions.

PEO2: To develop professionals who are committed to lifelong learning and continuous improvement, engaging in advanced studies, research opportunities, and other professional initiatives.

PEO3: To nurture responsible architects who understand the ethical, cultural, and environmental implications of their work, contributing positively to society's well-being and the global community.

PEO4: To foster collaborative skills, leadership qualities, and effective communication abilities among graduates, enabling them to work successfully in diverse teams and multidisciplinary environments.

PEO1: To prepare graduates who will be successful professionals in the field of architecture, exhibiting creativity, critical thinking, and analytical skills to develop sustainable and innovative architectural solutions.

Program Outcomes (POs):

PO1: Ability to apply knowledge of mathematics, science, and architecture.

PO2: Ability to design and conduct experiments, as well as analyze and interpret data.

PO3: Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

PO4: Ability to function on multidisciplinary teams.

PO5: Ability to identify, formulate, and solve architectural problems.

PO6: Understanding of professional and ethical responsibility.

PO7: Ability to communicate effectively.

PO8: Broad education necessary to understand the impact of architectural solutions in a global, economic, environmental, and societal context.

PO9: Recognition of the need for, and an ability to engage in lifelong learning.

PO10: Knowledge of contemporary issues.

PO11: Ability to use techniques, skills, and modern architectural tools necessary for architectural practice.

PO12: Ability to incorporate considerations of the environmental and sustainability challenges in design.

Program Specific Outcomes (PSOs):

PSO1: Proficiency in developing comprehensive architectural projects that integrate cultural, behavioural, technological, and aesthetic aspects.

PSO2: Understanding of the art, history, and methodologies of architectural design and the ability to analyze and incorporate relevant precedents into architectural practice.

PSO3: Ability to apply the principles of sustainable design to create resilient and environmentally responsible projects.

PSO4: Skill in architectural drawing, model-making, design software, and other forms of visual communication to clearly convey architectural concepts and designs.

SYLLABUS

Induction Training

Students entering an institution have diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose.

In this context, in the beginning of the first semester a three-week long induction program is proposed for the students. Regular classes would start after the completion of the induction program. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature. Introduction of faculty members, discussion with faculty members, visits to various spaces in the department/school, such as climatology lab, computer center, material museum, construction yard, students' works exhibition, etc. The Induction Program is also used to rectify some critical lacuna, like deficiency in comprehension of English language by many students. The following are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program

Physical Activity

This would involve a daily routine of physical activity with games and sports. It would start with all students coming to the field for light physical exercise or yoga in the morning. There would also be games in the evening or at other suitable times according to the local climate. These would help develop team work. Each student should pick one game and learn it for three weeks. There could also be gardening or other suitably designed activity where labour yields fruits from nature.

Creative Arts

Every student would choose one skill related to the arts whether visual arts or performing arts. Examples are painting, sculpture, pottery, music, dance etc. The student would pursue it every day for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, flow into architectural design later.

Universal Human Values

It gets the student to explore oneself and allows one to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting staff in the hostel and department, be sensitive to others, etc. Need for character building has been underlined earlier. A module in Universal Human Values provides the base. Methodology of teaching this content is extremely important. It must not be through do's and don'ts, but by getting students to explore and think and by engaging them in a dialogue. It is best learnt through group discussions and real life activities rather than lecturing. The role of group discussions, however, with clarity of thought of the teachers cannot be over emphasized. It is essential for giving exposure, guiding thoughts, and realizing values. The teachers must be from within the institute and also from outside of the Institute. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It is to open thinking towards the self.

Universal Human Values discussions and activities could even continue for rest of the semester, and not stop with the induction program.

Besides drawing the attention of the student to larger issues of life, it would build relationships between teachers and students which last for their entire 5-year stay and possibly beyond.

Lectures by Eminent People

Lectures by eminent people, say, once a week would give the students exposure to people who are socially active or are in public life. They could be from any field well known for their integrity.

Visits to Local Area

A couple of visits to the landmarks of the city, or a hospital or orphanage could be organized. This would familiarize the students with their city as well as expose them to the world of under privileged.

Familiarization

The students should be told about different methods of teaching and learning being used in the institute and how it is different as compared to school education or coaching. They should also be shown the laboratories, workshops & other facilities and also be introduced to the faculty, administrative staff etc. and whom they should approach for a specific need or issue. They should be told about what becoming an architect means and the importance of the role of architect in society, and in nation building.

FIRST SEMESTER

ARC1101
BASIC DESIGN AND VISUAL ARTS

Course Objective:

- Basic Design provides the framework for understanding design as a new language by sensitizing students to the conceptual, visual and perceptual issues involved in the design process.
- The Course provides with knowledge of the principles of design and design elements.
- Exercises complement the lectures and ensure that the students learn to develop a series of compositions in two and three dimensions.

CONTENTS

(Freehand drawing)

Introduction to fundamentals of drawings and its practice. Free hand line sketching and drawing of natural and man-made scenes. Study of shades and shadows. Object drawing, simple, natural and geometric forms. Outdoor Sketching of Historic or new built up structures of Architectural importance using different mediums.

(Elements of Design)

Introduction to design: Meaning of design, importance of design. Fundamental elements of design and their definitions-point, line, shape, form, space, texture, colour. Study historic examples.

(Principles of design)

Introduction to the principles of design – Axis , Symmetry , Balance, Contrast, Focus, Emphasis, Hierarchy, Rhythm, Harmony, Datum, Unity, Scale & Proportion, etc. Study of Historic Examples. Application of the Principles in compositions.

(Colour)

Colour theory, colour wheel, primary, secondary, tertiary colours, colour schemes, colour value & intensity.

(Principles of Perception)

Proximity, Similarity, Closure (Gestalt type). Optical illusion

(Form and space)

Understanding properties of form, Articulation and Transformation of form – additive, subtractive and dimensional transformations. Form defining space.

(Visual arts)

Present day trends in visual arts and architecture.

Note:

Sketches and Models to understand basic design principles, elements and their expressive qualities. Creative Exercises of 2D to 3D compositions. Exercise related to positive and negative spaces; Mural, ideogram, 3D Abstract models

Course Outcome:

- Knowledge and Comprehension: Students will be able to identify and describe the fundamental elements of design such as point, line, shape, form, space, texture, and colour, and provide historical examples of each.
- Application: Students will be able to apply the principles of design, such as Axis, Symmetry, Balance, and Contrast, in creating unique compositions and architectural sketches. They will also be adept at using various mediums for outdoor sketching of structures with architectural significance.
- Analysis: Students will be able to analyze various forms and spaces to understand their defining properties and the transformations they undergo, whether additive, subtractive, or dimensional. They'll also evaluate the impact of these forms in defining spaces.
- Synthesis: Students will be capable of integrating their understanding of colour theory, the colour wheel, and different colour schemes to create harmonious designs. They will also be proficient in merging principles from different design areas for comprehensive project outcomes.
- Evaluation: Students will critically assess present-day trends in visual arts and architecture, comparing and contrasting them with historical movements and styles. They will also evaluate designs based on principles of perception, including proximity, similarity, and optical illusions.
- Creation: Students will demonstrate the ability to create freehand drawings and sketches, capturing natural and man-made scenes, and effectively employing shades and shadows. Their drawings will reflect a deep understanding of both natural and geometric forms.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for 20M, and 30 Marks for continuous assessment (portfolio) i.e. total marks of (20M+30M)=50M.

TEXT BOOKS:

1) Form Space & Order by Francis, D.K.Ching

REFERENCES:

1) Principles of two dimensional designs by Wong Wucius –
2) Designer s Guide to Colour by Ikuyoshi Shibikawa and Yumi Takahashi –
3) Elements of architecture by Von Mesis
4) Architectural Composition by Robkrier –
5) Design & Form by Johannes Itten
6) Architecture Drafting & Design by Donald E. Helper, Paul I. Wallach –
7) The Decorative Design of Frank Lloyd Wright by David A. Hanks
8) Principles of Design in Architecture by K.W.Smithies
9) Drawing for 3 – dimensional design by Alan pipes

ARC1102
ARCHITECTURAL DRAWING & GRAPHICS –l

Course Objective:

- The course introduces students to fundamental techniques of architectural drawing and develops the appropriate skills for representation.

CONTENTS

(Introduction to Drawing)

Introduction to drawing equipment, familiarization, use and handling. Drawing sheet sizes, layouts and composition. Simple exercises in drafting, line types, line weights; dimensioning. Lettering Styles: Roman and Gothic style lettering; freehand lettering, title panels and legends.

(Simple Geometrical Construction)

Constructing simple and complex geometrical shapes involving various drafting technique drawing regular shapes; Special methods of drawing regular polygons; Regular polygons inscribed in a Circle.

(Projections and section of Solids)

Solids of revolution, solids in simple position, Axis perpendicular to a plane, axis parallel to both planes, axis inclined to both planes etc. Section planes, true shape of section, Sections of Prisms, Pyramids, Cylinders, Cones, Spheres etc.

(Advanced geometry)

Intersection of surfaces: Line of intersection, intersection of prism and prism, cylinder and cylinder, cylinder and prism, cone and cylinder, cone and prism, cone and cone, sphere and cylinder or prism. Orthographic Projections-Representation of 3D elements in Plan and Elevations, Study of isometric, axonometric and oblique views, Ionic volute (by Gibbs Rule), Entasis of column, intersection of solids &

(Architectural Symbols)

Representation of building elements, openings, materials, furniture and accessories; human postures; vegetation; vehicles; terminology and abbreviations used in architectural representation.

(Measuring and Drawing to Scale)

Scales and construction of scales, scaled drawings of simple objects, furniture, rooms, doors and windows etc., in plan, elevation and section. Reduction and enlargement of drawings.

Course Outcome:

- Proficiency in Drafting Techniques: Students will demonstrate proficiency in the use of drawing equipment, handling drawing sheets, and applying drafting techniques to create accurate and well-composed architectural drawings.
- Geometric Shape Construction: Students will be able to construct simple and complex geometrical shapes using various drafting methods, including regular polygons and circles, providing a foundation for architectural design.

- Understanding Projections and Sections: Students will develop the skills to create projections and sections of solids, including solids of revolution, and understand section planes, true shapes of sections, and their application to architectural drawings.
- Mastery of Advanced Geometry: Students will learn advanced geometric concepts, such as intersection of surfaces, and apply them to architectural elements like columns, intersecting solids, and complex geometric forms, ensuring precision in architectural design.
- Architectural Symbolism: Students will gain the ability to represent building elements, materials, furniture, and various architectural symbols accurately in their drawings, enhancing their ability to communicate architectural designs effectively.
- Scaling and Measurement Skills: Students will learn how to create scaled drawings of objects, furniture, rooms, doors, and windows in plan, elevation, and section. They will also acquire skills for reducing or enlarging architectural drawings while maintaining accuracy and proportion.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for 20M, and 30 Marks for continuous assessment (portfolio) i.e. total marks of (20M+30M)=50M

TEXT BOOKS:

1) "Engineering Drawing" – Plane and Solid Geometry by N.D.Bhat, V.M.Panchal
2) A text book of Geometrical Drawing by P.S.gill
3) Architectural Graphics by Francis D K Ching

REFERENCES:

1) "Geometrical drawing for Art students" by Moris.I.H.
2) Hand book of Architectural & Civil Drafting by Nelson J.A
3) Architectural Drafting: Structure & Environment by JohnD.Bies –.
4) – Graphic Science & Design by Thoms. E. French.
5) – Geometry of Construction by T.B.Nichols and Normal keep.
6) Building Drawing by Shah:.
7) Drawing architecture by Paul Hagarth
8) Drawings by architects by Claudius Conli
9) Pencil techniques in modern design by Alkin, Urbelleth and Lione

ARC1103
INTRODUCTION TO ARCHITECTURE, ART & CULTURE

Course Objective:

The course creates awareness about fundamental ideas, methodologies and terminologies in art and architecture in different parts of the world, shedding light on what meanings they communicated, and how they are important to our contemporary society.

CONTENTS

(Art and Architecture)

Introduction to Art, Culture, Society, Civilization and Architecture.

(Shelter Forms)

Earlier attempts of man for shelter and shelter forms since the prehistoric period with reference to culture, climate, technology and material.

(Architecture Movements)

Understanding the relationships of art, culture and architecture at different time such as: art, arts & crafts movement etc., and periods in the world history.

(Indian Architecture)

Introduction to Indian Art and Architecture.

(Western Architecture)

Introduction to Western Art and Architecture.

(Ornamentation)

Study of ornament in Architectural Design, different types of ornamentation in buildings and study of historic examples.

Course Outcome:

- Understanding of Fundamental Concepts: By the end of the course, students will have a solid grasp of fundamental concepts in art, culture, society, civilization, and architecture, enabling them to appreciate and analyze the interconnections between these elements in diverse cultural contexts.
- Historical Awareness: Students will develop an awareness of the evolution of shelter forms throughout history, with an emphasis on how culture, climate, technology, and materials have influenced architectural design and construction.
- Art and Architecture Movements: Students will gain insight into various art and architecture movements, such as the Arts and Crafts Movement, and will be able to analyze how these movements have shaped architectural styles and philosophies across different historical periods worldwide.
- Indian Architectural Heritage: After studying Indian art and architecture, students will be able to recognize and appreciate the distinctive features of Indian architectural heritage, and understand its significance in the context of global architectural history.
- Western Architectural Traditions: Students will be introduced to Western art and architecture, and will be able to identify and explain the key features, styles, and influences in Western architectural traditions, with an emphasis on their global impact.
- Ornamentation in Architectural Design: Students will gain a comprehensive understanding of ornamentation in architectural design, recognizing different types of ornamentation in buildings and studying historic examples. They will be able to analyze how ornamentation reflects cultural values and aesthetics.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment i.e. total marks will be (20M+10M)=30M.

TEXT BOOKS:

1) G. K. Hiraskar- The Great Ages of World Architecture.

REFERENCES:

1) Indian Art a Concise History by Craven, C. Roy.
2) , Pattern Language, by Christopher Alexander New York: Oxford University Press.
3) Redefining Designing: From to Experience byThomas Mitchell.
4) A history of architecture by Sir Banister Fletcher
5) Introduction to architecture by Stephen Gardner.
6) A chronology of western architecture by Doreen Yarwood.
7) The great ages of architecture by Bodo Lichy.
8) World architecture – an illustrated history by Trewin Copplistone and others

ARC1104
BUILDING MATERIALS & CONSTRUCTION-I

Course Objective:

- The objective of the subject is to enable students to understand the building materials and basic structural systems, their properties and applications, and
- Their intrinsic relationship to structural systems and environmental performance.
- Application of Basic Building Materials in simple situations

CONTENTS

(BUILDING MATERIALS)

Study of basic building materials like brick, stone, cement, lime, sand and mortar with respect to their classification, composition and general idea about their chemical properties, physical properties, structural strength, aesthetic qualities, manufacturing processes. Introduction to building materials as described in Indian architectural texts. Emphasis should be on developing understanding about making choice of appropriate building materials in a given situation.

(BRICK CONSTRUCTION)

Elementary construction methods explaining basic principles of load bearing structures. Types of bricks, bats and closers etc. English and Flemish brick bonds, stopped ends, quoins, piers, junctions, jambs for various thicknesses. Jointing, pointing and copings.

(STONE WALLS)

Stone masonry, dressing of stones. Types of rubble masonry walls like Random Rubble, Coursed Rubble, Ashlar, etc., stone coping, jointing and pointing.

(FOUNDATION AND PLINTH)

Need for foundations, preliminary design criteria. Details of brick and stone footings for load bearing walls of various thicknesses. Plinth filling details, Damp Proof Course, timbering to trenches.

(ARCHES AND CORBELLING)

Concept of span and its application in creating openings in masonry walls with lintels and arches. Structural difference in the behaviour of lintel and arches. Elementary principles of arch construction, terminology and types of lintels, corbelling and arches with their materials for construction.

Course Outcome:

- Understanding of Structural Systems: Students will demonstrate a comprehensive understanding of the basic principles of load-bearing and framed structures, including their design, load distribution, and the role of various structural components.
- Mastery of Mortar Composition and Application: Students will be proficient in selecting appropriate mortars, preparing mortar mixtures, and applying them effectively in various construction contexts. They will also be able to assess the quality of sand and mortar through relevant tests.
- Expertise in Brickwork: Students will showcase expertise in brickwork, encompassing the knowledge of different types of bricks, their properties, and applications. They will be capable of executing various brick bonds and constructing structural elements like footings, foundations, and walls with precision.
- Proficiency in Stone Masonry: Students will acquire the skills to classify, select, and work with various types of stones, including granite, laterite, quartzite, marble, and slates. They will also demonstrate the ability to carry out quarrying, dressing, and finishing of building stones.
- Competence in Lintels and Arches: Students will demonstrate competence in designing and constructing lintels using wood, stone, and brick. They will also be proficient in understanding, designing, and building different types of arches, such as segmental, semicircular, elliptical, and three-centered arches.
- Application of Building Materials and Techniques: Students will apply their knowledge of building materials and construction techniques to practical scenarios, ensuring the use of appropriate materials, methods, and structural elements. They will be able to analyze construction problems and make informed decisions for effective building practices.

TEXT BOOKS:

1) W.B. Mc Kay, Building Construction Volume 1 to 4
2) R. Barry, Building Construction Volume 1 to 5
3) Francis Ching D.K., Building Construction Illustrated
4) S.K. Sharma, Civil Engineering construction Materials
5) Sushil Kumar, Building Construction

ARC1105
STRUCTURAL MECHANICS-I

Course Objective:

- To study the equilibrium of rigid bodies in static equilibrium and type of forces induced in the members of a truss. Study of basic types of internal forces (stresses) acting in a body and the elastic properties of a material.
- Calculate the cross-sectional properties of standard and built-up shapes.

CONTENTS

(INTRODUCTION TO STATICS AND FORCES)

Introduction to Statics, Basic Concepts, Scalars and Vectors, Units, Force Systems, External and Internal Effects, Principle Of Transmissibility, Action and Reaction, Free body diagram, Force Classification, Concurrent Forces: Rectangular Components, Moment of a force, Varignon's Theorem. Parallel forces in a plane: Couple, Force-Couple Systems, Transformation of couple; Resolution of force into force and couple. Resultants of Parallel and Concurrent force systems in a Plane.

(EQUILIBRIUM OF GENERAL CASE OF FORCES IN A PLANE)

Composition of Forces in A Plane, Resultant and Line of Action, Equilibrium of Forces in A Plane, Categories of Equilibrium, Two and Three Force Members. Plane Trusses: Introduction, Types of Plane Trusses, Method of Joints, Internal and External Redundancy, Method of Sections.

(CENTRE OF GRAVITY AND MOMENT OF INERTIA)

Centroids and Centre of Gravity: Centre of gravity of parallel forces in a plane, Centroid and Centre of Gravity of composite bodies, Theorems of Pappus (or Guldinus), Moment of Inertia-Definition, Parallel Axis Theorem, Second Moments of Areas by integration, Moment of Inertia of composite bodies, Polar moment of inertia and Section modulus.

(STRESSES AND STRAINS)

Simple stresses and strains, elasticity, stress, strain, property of elasticity, Hooke's Law, Stress-Strain diagram for mild steel, types of stresses, elastic limit, modulus of elasticity, Stresses due to change in temperature, Elastic constants, linear strain, lateral strain, Poisson's ratio, volumetric strain, relation between Young's Modulus, modulus of Rigidity, and Bulk modulus.

(TORSION OF SHAFTS)

Torsion of solid and hollow circular shafts – introduction to the basic equation $\frac{T}{J} = \frac{f_s}{R} = \frac{G\theta}{l}$. Derivation and Application of the basic equation, Power transmitted.

(SHEAR FORCE AND BENDING MOMENT)

Beams: Types of beams, Types of supports, Types of loads, Shear force and bending moment, Sign convention, Shear force and bending moment diagrams for

simply supported beam, cantilever beam and overhanging beams for various loads, Relation between intensity of loading, shear force and bending moment at a section.

Course Outcome:

- Understand the fundamental principles of statics, forces, and equilibrium, enabling the analysis of structures and force systems.
- Apply the concept of centroids and the center of gravity to determine the balance and stability of various structural configurations.
- Analyze simple stresses and strains, demonstrating knowledge of material behavior under load, including Hooke's Law and stress-strain diagrams.
- Evaluate the torsional behavior of solid and hollow circular shafts and their applications in engineering.
- Interpret shear force and bending moment diagrams for different beam types, supports, and loads, aiding in structural analysis and design.
- Apply knowledge of structural mechanics to solve real-world engineering problems and make informed design decisions for architectural applications.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment i.e. total marks will be (20M+10M) = 30M.

TEXT BOOKS:

6) Analysis of Structures - Analysis, Design and Details of Structures (Vol.1) by V.N. Vazirani and M.M. Ratwani
7) Engineering Mechanics by S.P.Timoshenko & D.H.Young
8) Mechanics of solids by S.S. Bhavikatti

REFERENCES:

1) Elements of strength of materials by S.P.Timoshenko & D.H.Young
2) Applied Mechanics by S.Ramamrutham.

ARC1106
SURVEY & SITE STUDIES

Course Objective:

- To develop the knowledge and skills related to surveying and understand working principles of survey instruments and types of errors, obstacles encountered in field and calculations.

CONTENTS

(Basic principles and chain surveying)

Definitions, scales and symbols, sources of error in surveying and theory of probability, measurement of distance, instruments used, ranging of survey lines, chaining a line with examples, chaining on sloping ground, errors in chaining, tape corrections, chain surveying principles, off-sets, field notes, instruments, obstacles in chaining. Plotting chain survey with practical examples.

(Plane table surveying)

Plane table surveying: Introduction-Advantages, Accessories-Working operations such as fixing the table to tripod, leveling-centering-orientation by back-sighting. Methods of plane tabling-Plane table traversing- two point and three point problems, Errors in plane tabling, exercise in preparation of base map of small areas.

(Compass Survey)

Introduction to compass survey, Definitions of Bearing, Designation of bearing – Whole circle bearing(W.C.B) & Reduced bearing(R.B), Conversion of bearings from one systems to the other, Calculation of angles for bearings and vice versa, Magnetic compass, Prismatic compass, Magnetic dip, Temporary and permanent adjustments of compass, Magnetic Declination, Local attraction, Precautions in using compass, Errors in compass survey.

(Levelling)

Introduction, instruments used, Definition of Back Sight(BS), Intermediate Sight(IS), Fore Sight(FS), Height of Instrument(HI), Turning Point(TP), Booking and reduction of levels, classification of levelling, Uses and adjustments of dumpy level, Temporary and permanent adjustments of a dumpy level, Differential levelling, Profile leveling, Longitudinal section (L.S), Cross section leveling (C.S), Reciprocal levelling. Height of Instrument methods, Rise and fall method, Checks, Problems in leveling, Errors in levelling. Contouring: Definitions, Contour Interval, Characteristics of contours, and methods of locating contours-Direct and indirect methods-interpolation of contours-Contour Gradient-Uses of contour maps.

(Theodolite and Traverse Surveying)

Theodolite, types of theodolites, temporary adjustments, measurements of horizontal angle, method of repetition, method of reiteration, uses of theodolites, errors in theodolite or permanent adjustments of a theodolite, trigonometric levelling, elevation of top of the tower in same plane and different plane. Methods of traversing, checks in closed and open traverse, plotting methods of traverse Survey-Closing error-Balancing the traverse.

(Automated surveying (introduction only)

Introduction to Modern surveying and mapping technologies such as total Station, Photogrammetric surveying, Aerial photogrammetry, Digital maps, Digital elevation modelling (DEM), GIS, GPS, etc. Their advantages and dis-advantages, errors and limitations. Introduction to the use of total station, G.P.S through demonstrations only.

Site studies:

Site studies: Plot, site, land and regions, size, shape of sites.

Analysis of accessibility: topography, climate, landforms, surface drainage, soil, water bodies and vegetation.

Field Work:

1. Finding the distance between two points and area using chain.
2. Preparation of base map of small area and finding the area using Plane table surveying or Chain surveying
3. Profile leveling
4. Longitudinal and cross section leveling.
5. Closed traverse using Compass surveying or Theodolite.
6. Height of remote point using Theodolite.
7. Preparing Contour map of small area.

Course Outcome:

- Foundational Knowledge: Students will gain a strong understanding of the basic principles of surveying, including the measurement of distance, instruments used, sources of error, and the theory of probability.
- Practical Surveying Skills: Students will be able to perform chain surveys, considering factors like chaining on sloping ground, tape corrections, off-sets, and dealing with obstacles. They will also have the ability to create accurate field notes and plot chain surveys.
- Proficiency in Plane Table Surveying: Students will be proficient in plane table surveying, including leveling, orientation, and methods of plane tabling. They will be able to prepare base maps of small areas.
- Compass Surveying Competence: Students will be capable of using magnetic and prismatic compasses, calculating angles, and dealing with magnetic declination, local attraction, and errors in compass surveying.
- Traverse Surveying and Levelling Skills: Students will acquire skills in chain and compass traversing, along with the ability to plot traverse surveys, close errors, and balance traverses. They will also be proficient in leveling techniques, booking and reduction of levels, and contouring.
- Understanding of Modern Surveying Technologies: Students will gain insight into automated surveying technologies, including the use of digital surveying tools like total stations and GPS. They will understand how to integrate these technologies into surveying practices effectively.

Note: Field book and record should to be submitted at the end of the semester.

Assessment:

Continuous assessment will be conducted for all the field studies mentioned in the syllabi for 50 Marks as internal. Student has to submit Field book and record for external viva-voce. The student should attend a practical Exam and Viva-voce conducted by external examiner.

TEXT BOOKS:

1) Surveying –Vol.-I by B.C. Punmia, Laxmi Publishers.
2) Surveying –Vol.-II by B.C. Punmia, Laxmi Publishers.
3) Text book of Surveying by C. Venkatramaiah, Universitie

ARC1107
ENGLISH

Course Objectives

- To make students understand the explicit and implicit meanings of a text/topic;
- To give exposure to new words and phrases, and aid to use them in different contexts;
- To apply relevant writing formats to draft essays, letters, emails and presentations; and
- To adapt oneself to a given situation and develop a functional approach to finding solutions: adaptability and problem solving.

Course Outcomes:

- Students will be able to analyse a given text and discover the various aspects related to language and literature;
- Learn the various language structures, parts of speech and figures of speech;
- Develop one's reading and writing abilities for enhanced communication; and
- Learn to apply the topics in real-life situations for creative and critical use.

CONTENTS

On the conduct of life: William Hazlitt
Life skills: Values and Ethics
If: Rudyard Kipling

The Brook: Alfred Tennyson
Life skills: Self-Improvement
How I Became a Public Speaker: George Bernard Shaw

The Death Trap: Saki
Life skills: Time Management
On saving Time: Seneca

Chindu Yellama
Life skills: Innovation
Muhammad Yunus

Politics and the English Language: George Orwell
Life skills: Motivation
Dancer with a White Parasol: Ranjana Dave

Grammar:

Prepositions – Articles – Noun-Pronoun Agreement, Subject-Verb Agreement – Misplaced Modifiers – Clichés, Redundancies.

Vocabulary:

Introduction to Word Formation – Root Words from other Languages – Prefixes and Suffixes – Synonyms, Antonyms – Common Abbreviations

Writing:

Clauses and Sentences – Punctuation – Principals of Good Writing – Essay Writing – Writing a Summary

Writing: Essay Writing

Life skills: Innovation

Muhammad Yunus

Prescribed Textbook: *Language and Life: A Skills Approach* Board of Editors, Orient Black Swan Publishers, India. 2018.

TEXTBOOK:

1. *Language and Life: A Skills Approach* Board of Editors, Orient Blackswan Publishers, India. 2018.

REFERENCES:

1) Practical English Usage, Michael Swan. OUP. 1995.
2) Remedial English Grammar, F.T. Wood. Macmillan.2007
3) On Writing Well, William Zinsser. Harper Resource Book. 2001
4) Study Writing, Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5) Communication Skills, Sanjay Kumar and PushpLata. Oxford University Press. 2011.
6) Exercises in Spoken English, Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

SECOND SEMESTER

ARC1201
ARCHITECTURAL DESIGN-I

Course objectives:

- To study and preparation of measured drawings and design of single unit spaces with emphasis on form including the furniture layout, circulation, clearances, lighting and ventilation, etc.

CONTENTS

Organisation of form and space: Spatial relationship and spatial organisation

Circulation: Path space relationship, elements and form of circulation

Proportion and scale: golden section, classical orders, modular, anthropometry, Understanding of human and visual scale. Understanding of basic human functions and their implications for space requirements; Minimum and optimum areas for various functions, User data-Bubble and circulation diagrams.

The list of suggested topics to be covered as design problems including preparation of measured drawings and design of single unit spaces with emphasis on form

Detailed study of spaces such as living, dining, bedrooms, kitchen, toilet, etc. including the furniture layout, circulation, clearances, lighting and ventilation, etc.

Application in the design of simple household and street furniture At least two design problems Examples such as Design of Bus shelter/ Milk booth, /Security cabin/ATM centre/ Internet centre/ Gateway

Course Outcome:

- Understanding Spatial Organization Students will demonstrate an understanding of spatial relationships and organization, applying principles of form and space in architectural design, and showcasing their ability to create well-structured spaces.
- Efficient Circulation Design Students will design spaces with an emphasis on circulation, illustrating the relationship between path space and elements in a manner that ensures functionality and user-friendly navigation.
- Mastery of Proportion and Scale Through an in-depth study of concepts like the golden section, classical orders, modular design, and anthropometry, students will exhibit the skill to apply these principles effectively, ensuring harmony and balance in architectural design.
- Human-Centric Design Students will showcase an understanding of human scale, basic human functions, and their implications on space requirements, leading to the development of spaces that cater to the comfort and needs of the users.
- Furniture and Space Integration Through detailed study and design, students will demonstrate their ability to integrate furniture layout,

circulation, clearances, lighting, and ventilation in spaces like living areas, bedrooms, and kitchens, optimizing functionality and aesthetics.

- Application in Real-World Design Students will apply their knowledge to design practical and functional household and street furniture, developing solutions for real-world challenges such as bus shelters, milk booths, security cabins, ATM centers, and internet centers, while considering user needs and contextual relevance.

Assessment:

Continuous assessment will be conducted for major (30M) and minor (20M) design problems i.e. total marks of (30M+20M) =50M

REFERENCES:

1) Time Savers Standards by Joseph De Chiara & John Callender, McGraw-Hill International Edition
2) Architect's Data by Ernst Neufert, 3rd edition
3) Architects Handbook: Ready Reckoner by Charanjit Shah, Galgotia Publishing Company.
4) Architecture: Form Space & order by Francis D. K. Ching, John Wiley & Sons

ARC1202
ARCHITECTURAL DRAWING & GRAPHICS –II

Course Objective:

- The course introduces students to fundamental techniques of architectural documentation and develops the appropriate skills for visual representation by Perspective, sciography and rendering techniques.

CONTENTS

(Perspective)

Introduction to Perspective in one point or parallel perspective, two point or angular perspective, introduction to three-point perspective of different geometrical form, built forms.

(Sciography)

Introduction to Sciography in the study of shade and shadows, points, lines, surfaces, geometrical solids of various forms and groups of forms leading to advanced examples of shades and shadows on buildings or parts of buildings.

(Rendering)

Introduction to the rules of composition and perspective in architectural rendering, color study, values, tones and general approach to rendering. Various colour schemes, water colour and poster colour rendering, pencil rendering and monochrome and wash rendering etc. treatment of sky, clouds, landscape

elements, human figures, foreground and surroundings, shadow projections in renderings

(Architectural Documentation)

Detailed measured drawing and documentation of any interesting building – preparation of maps, plans, elevations, sections, views etc.

Course Outcome:

- Perspective Mastery: Students will demonstrate a comprehensive understanding of one, two, and three-point perspectives, enabling them to create accurate representations of various geometric and built forms.
- Sciography Proficiency: Learners will acquire the skills to analyze and depict shade and shadows on points, lines, surfaces, and complex geometrical solids, culminating in advanced shading techniques for architectural elements.
- Rendering Expertise: Students will develop proficiency in architectural rendering, including composition, perspective, color schemes, and various rendering techniques such as watercolor, poster color, and pencil rendering.
- Artistic Creativity: Through the course, students will harness their artistic talents to effectively depict natural elements like skies, clouds, landscapes, human figures, and architectural surroundings in architectural renderings.
- Architectural Documentation Skills: Participants will gain the ability to produce detailed measured drawings and comprehensive documentation for intriguing buildings, including maps, plans, elevations, sections, and views.
- Aesthetic Sensibility: This course will nurture students' aesthetic sensibilities, allowing them to apply artistic principles in their architectural drawings, elevating the quality and visual appeal of their work.

Assessment

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for 20M, and 30 Marks for continuous assessment (portfolio) i.e. total marks of (20M+30M)=50M

TEXT BOOKS:

1) "Engineering Drawing" – Plane and Solid Geometry by N.D.Bhat, V.M.Panchal.
2) Architectural Graphics by Francis D K Ching.

REFERENCES:

1) Perspective – space and design by Lance Bowen Bellings.
2) "Geometrical drawing for Art students". byMoris.I.H.
3) Hand book of Architectural & Civil Drafting by Nelson J.A.
4) A text book of Geometrical Drawing by P.S.gill
5) Architectural Drafting: Structure & Environment by JohnD.Bies.
6) Graphic Science & Design by Thoms. E. French.
7) Geometry of Construction by T.B.Nichols and Normal keep.
8) Building Drawing by Shah.
9) Drawing architecture by Paul Hagarth
10) Drawings by architects by Claudius Conli
11) Perspective by H. Pranchlay
12) Pencil techniques in modern design by Alkin, Urbelleth and Lione

ARC1203
HISTORY OF ARCHITECTURE-I

Course Objectives:

- To study development of building forms, ornamentation, structural solutions, construction methods, plans and building facade, organization in relation to aesthetic/ religious/social philosophy and environmental factors in history. The study should focus only on the general trends.

CONTENTS

(The Ancient Civilizations)

Architectural development in the ancient civilizations in Egypt and Mesopotamia, study of pyramids, temples, mastabas, ziggurats, etc.

(Classical Period)

Architecture in the classic Greek and roman periods, temples, agoras gateways, circuses, amphitheatres, basilicas, etc.

(Early Christianity)

Architecture in the early Christian, Byzantine.

(The Age of Church Building)

Romanesque, gothic periods in Europe and rest of the world excluding Asia.

Course Outcome:

- **Understanding Ancient Architectural Concepts**: Students will comprehend the architectural principles and structures of ancient civilizations, including Egypt and Mesopotamia, such as pyramids, temples, mastabas, and ziggurats.
- **Appreciating Classical Greek and Roman Architecture**: Learners will gain an appreciation for the architectural achievements of the classical Greek and Roman periods, including temples, agoras, gateways, circuses, amphitheatres, and basilicas.
- **Exploring Early Christian and Byzantine Architecture**: Students will delve into the architectural styles of Early Christianity and Byzantine periods, studying the evolution of church design and aesthetics.
- **Analyzing Romanesque and Gothic Architecture**: Participants will analyze the Romanesque and Gothic architectural styles, understanding their distinctive features and contributions to the built environment in Europe and beyond.
- **Cultural and Historical Context**: Learners will connect architectural developments to the broader historical and cultural context, gaining insights into how architecture reflects the values and beliefs of societies.
- **Critical Thinking and Communication Skills**: Students will develop critical thinking and communication skills through the analysis and presentation of architectural history, fostering a deeper understanding of the built environment's evolution.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment i.e. total marks will be (20M+10M)=30M.

TEXT BOOKS:

A History of Architecture by Sir Banister Fletcher, CBS; 20 edition (2002)

REFERENCES:

1) World architecture – an illustrated history by Trewin Copplistone and others
2) Introduction to architecture by Stephen Gardner.
3) A chronology of western architecture by Doreen Yarwood
4) The great ages of architecture by BodoLichy
5) Meaning in western architecture by Christian Noberg Schulz

ARC1204
CARPENTRY AND MODEL MAKING WORKSHOP

Course Objective:

- To Train the students in basic skills of carpentry work and to develop ability to appreciate the three dimensional.
- To prepare the students for better eye- mind- hand coordination and equip them with various model making techniques.

CONTENTS

(BUILDING MODELS AND CARPENTRY)

Introduction to model making and its need. Role of scale-models in design. Essentials of model making such as understanding of various tools and machines employed. Survey of various materials available for model making such as papers, mount boards, wood, plastics, films, plaster of Paris, acrylic, Styrofoam, wax, metals, glass, etc. and exploring their potential in model-making.

Introduction to the use of different types of tools and different types of joints used in carpentry, Joinery details which are commonly used in timber construction.

Course Outcome:

- Understand Model Making Essentials: Gain a comprehensive understanding of tools, materials, and machines used in model making, enabling effective realization of design concepts.
- Harness Material Potential: Explore a wide range of materials, from wood to plastics, to creatively execute architectural models, demonstrating material versatility.

- Master Carpentry Techniques: Acquire proficiency in carpentry and joinery, mastering techniques commonly used in timber construction for precise architectural detailing.
- Develop Model-Making Skills: Cultivate hands-on skills to construct intricate architectural scale models, translating design ideas into tangible forms with precision and creativity.
- Foster Design Appreciation: Appreciate the pivotal role of scale models in design, enhancing the ability to effectively communicate and visualize architectural concepts.
- Ensure Model-Making Safety: Prioritize safety and ethical considerations when using tools and machinery, creating a safe and responsible workshop environment for all participants.

Assessment

Three carpentry joinery models (Maximum 25 Marks) and two three dimensional building blocks models for 25M, total marks of (25M+25M) =50M

REFERENCES:

1) Criss. B. Mills, Designing with Models
2) Wenninger, Spherical Models
3) John W. Mills, The Technique of Sculpture
4) Carpentry and Joinery by Peter Brett · 2005, Nelson Thornes publishers

ARC1205
BUILDING MATERIALS & CONSTRUCTION-II

Course Objective:

- The objective of the subject is to enable students to understand aspects of materials and construction components/elements for building envelop and interiors.

CONTENTS

(Timber as Building Material)

Timber as a building material, its physical properties and uses, defects, seasoning, decay and preservation. Industrial timbers such as ply wood, hard board, block board, particle board, etc. with their properties and uses. Introduction to timber as described in Indian architectural treatises.

(Metals and man-made Building Materials)

Use of Iron in building industry such as pig iron, wrought iron and cast iron their properties and uses. Steel as building material, its definition, properties, Manufacture, casting, heat treatment, mechanical treatment process of steel, market forms of steel, corrosion ant treatment.

Aluminium and aluminium alloys their manufacturing, properties, durability, and uses. Study of aluminium products and other non-ferrous metals such as copper, lead, zinc etc. Study of protection to non-ferrous metals and products such as anodizing, powder coating, painting, chromium plating, varnishing, melamine treatments, etc.

Paints and surface finishes their composition, properties and methods of application of different types of paints such as oil, synthetic enamels, acrylic and other plastic emulsions and formulations, interior and exterior grade paints. Cement based paints.

(Timber joinery)

Carpentry and joinery: Terms defined, mitring, ploughing, grooving, rebating, veneering, various forms of joints in wood work, such as lengthening joints, bearing joints, halving, dovetailing, housing, notching, tusk and tenon, etc. Jamb-casing. Timber joints as described in Indian architectural treatises.

(Doors)

Types of doors based on operation such as swing door, revolving door, sliding door, sliding-folding door. Details of Wooden Doors their definition of terms, types of doors such as ledged, ledged and braced, panelled, flush doors, glazed doors etc. Hinged, single and double shutters. Z section doors, pressed steel and box section doors. Rolling shutters, collapsible gates. Complete aluminium swing, Sliding, sliding folding, and revolving doors. PVC / UPC Doors.

(Windows)

Types of windows based operation and location – fixed window, Casement window, Sliding window, pivoted window, louvered window, bay window, clerestory window, corner window –gable and dormer window, etc. Details of Timber windows and ventilators such as ordinary casement, top and bottom hung, pivoted and sliding sash with fixtures, locks, hinges, fastenings, etc. Z section window, pressed steel and box section windows. Aluminium casement and sliding windows. PVC / UPC windows.

Course Outcome:

- Demonstrate a comprehensive understanding of timber as a building material, including its properties, uses, defects, and preservation techniques, as described in Indian architectural treatises.
- Evaluate the use of various metals in the building industry, such as iron, steel, aluminum, and non-ferrous metals, considering their properties and applications.
- Analyze the composition and application methods of different paints and surface finishes, including cement-based paints, for interior and exterior use.
- Master the principles of timber joinery, including various woodwork joints and their application, as per Indian architectural treatises.
- Describe the different types of doors and windows used in building design, considering their operation, materials, and architectural details.
- Implement knowledge of materials and construction techniques in architectural design, ensuring compatibility with environmental, structural, and aesthetic considerations.

Assessment

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for 20M, and 30 Marks for continuous assessment (portfolio) i.e. total marks of (20M+30M)=50M

TEXT BOOKS:

6) W.B. Mc Kay, Building Construction Volume 1 to 4
7) R. Barry, Building Construction Volume 1 to 5
8) Francis ChingD.K., Building construction illustrated
9) S.K. Sharma, Civil Engineering construction Materials
10) Sushil Kumar, Building Construction

ARC1206
STRUCTURAL MECHANICS-II

Course Objective:

- To study the bending, shear stress distribution and combined stresses in beams for different symmetrical and unsymmetrical sections.
- The relation between slope, deflection and curvature and deflection of statically determinant beams for different loadings. Analysis of statically in determinant beams and Three-Hinged arches.

CONTENTS

(THEORY OF SIMPLE BENDING)

Theory of simple bending; $\frac{M}{I} = \frac{f}{y} = \frac{E}{R}$, application of flexural formula.

(BENDING STRESSES IN BEAMS)

Bending and Shearing stresses distribution in beams for different sections. Combined stresses (direct and bending stresses) of symmetrical and unsymmetrical sections-beams only.

(DEFLECTION OF BEAMS)

Deflection of beams (with supports at the same level): Relation between slope, deflection and curvature, Deflection of cantilever beam and simply supported beam with uniformly distributed load and point loads only using double integration method and moment area method.

(PROPPED CANTILEVER BEAMS)

Propped cantilever beams (with supports at the same level): Shear Force and Bending Moment diagrams of propped cantilever beams with uniformly distributed load and point loads only.

(ANALYSIS OF BEAMS AND FRAMES)

Analysis of beams and frames (with supports at the same level): Bending Moment (BM) & Shear Force (SF) diagrams for fixed beams and Continuous beams with uniformly distributed load and point loads only. Application of Clapeyron's

theorem of three moments, Moment distribution method for continuous beams, Kani's method of analysis for structural frames (single storey single bay) including sway with uniformly distributed load and point loads only.

(THREE HINGED ARCHES)

Three Hinged Arches (with supports at the same level): determination of horizontal thrust, radial shear, normal force, and axial thrust. Shear force (SF) and bending moment (BM) diagrams for three-hinged arches.

Course Outcome:

- Understand Bending Mechanics: Students will comprehend the theory of simple bending and apply the flexural formula to analyze bending in structural elements.
- Analyze Stress Distributions: Students will be able to calculate bending and shearing stresses for different beam sections and evaluate combined stresses in both symmetrical and unsymmetrical beam sections.
- Master Deflection Analysis: Students will develop the skills to determine deflection, slope, and curvature in beams with various loadings, using the double integration and moment area methods.
- Propped Cantilever Expertise: Students will be proficient in analyzing propped cantilever beams, creating shear force and bending moment diagrams for uniformly distributed loads and point loads.
- Beam and Frame Analysis: Students will learn to construct bending moment and shear force diagrams for fixed and continuous beams, apply Clapeyron's theorem, use moment distribution for continuous beams, and employ Kani's method for structural frame analysis.
- Three-Hinged Arch Mastery: Students will acquire the knowledge to determine horizontal thrust, radial shear, normal force, and axial thrust in three-hinged arches, as well as generate shear force and bending moment diagrams for these structural elements.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment i.e. total marks will be (20M+10M) =30M

TEXT BOOKS:

1) Analysis of Structures - Analysis, Design and Details of Structures-Vol.-1 by V.N. Vazirani and M.M. Ratwani and S.K. Duggal
2) Analysis of Structures - Theory, Design and Details of Structures-Vol.-2 by V.N. Vazirani and M.M. Ratwani and S.K.Duggal

REFERENCES:

1) Basic structural analysis by C.S. Reddy
2) Intermediate Structural analysis by C.K.Wang
3) Theory of Structures by S. Ramamrutham and R.Narayanan
4) Elements of strength of materials by S.P.Timoshenko & D.H.Young

ARC1207
ENGLISH LANGUAGE LAB

Introduction

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of the English language in everyday situations and contexts.

(Introduction to Phonetics)

The Sounds of English (Speech sound – vowels and consonants) - Stress and Intonation - Accent and Rhythm.

(Listening Skills)

Listening for gist and specific information - listening for Note taking, summarizing and for opinions - Listening to the speeches of eminent personalities.

(Speaking Skills)

Self-introduction - Conversation Skills (Introducing and taking leave) - Giving and asking for information - Role Play - Just A Minute (JAM) session - Telephone etiquette.

(Reading and Writing skills)

Reading Comprehension – Précis Writing - E-Mail writing - Punctuation.

(Presentation skills)

Verbal and non-verbal communication - Body Language - Making a Presentation.

DISTRIBUTION AND WEIGHTAGE OF MARKS

The practical examinations for the English Language Lab shall be conducted as per the University norms prescribed for the core Engineering practical sessions.

For the Language lab sessions, there shall be a continuous evaluation during the semester for 50 sessional marks and 50 semester-end Examination marks.

For the 50 sessional (Internal) marks, 30 marks shall be awarded for day-to-day performance and for completing activities in the lab manual, 20 marks to be awarded by conducting Internal Lab Test(s).

For the 50 semester- end (External) marks, 30 marks shall be awarded for written examination (dialogues, the sounds of English and stress) and 20 marks for External Examiner viva-voce.

Course Outcomes

- **Phonetic Proficiency**: Students will demonstrate mastery in English speech sounds, stress, and intonation, enhancing their pronunciation and oral communication skills.
- **Listening Competence**: Learners will proficiently discern gist, specific details, and opinions in English audio content, enhancing their listening and note-taking abilities.
- **Effective Verbal Interaction**: Students will excel in self-introduction, conversation skills, and telephone etiquette, facilitating improved interpersonal communication.
- **Reading and Writing Proficiency**: Participants will achieve competence in reading comprehension, précis writing, e-mail composition, and punctuation, enhancing their written communication skills.
- **Presentation Skills**: Learners will exhibit expertise in verbal and non-verbal communication and presentation techniques, boosting their public speaking and presentation abilities.
- **Comprehensive Evaluation**: Students will be proficient in English language use, with a balanced assessment approach, including continuous evaluation and final examinations, to ensure a comprehensive understanding of the language.

REFERENCE BOOKS:

1) Ashraf Rizvi. *Effective Technical Communication*. Tata McGraw Hill Education Private Limited, New Delhi.
2) *Speak Well*. Orient Blackswan Publishers, Hyderabad.
3) Allan Pease. *Body Language*. Manjul Publishing House, New Delhi.

THIRD SEMESTER

ARC2101
ARCHITECTURAL DESIGN II

Course objectives:

- This Course is designed to develop the skills of creative design synthesis for a single use, small span, single storey building.
- To study theory of Architecture; principles of design & its process; analytical classification of spaces for different uses and their relation to one another;
- Study of horizontal circulation in buildings
- Understanding of the bye-laws and codes involved in the design of the building typology prescribed for the course

Course content

The design issues to be addressed include:

- Functions and their spatial implications.
- Maximum and optimum areas for various functions.
- Anthropometrics, furniture layout and horizontal circulation.
- Interior volumes and material qualities.
- Lighting and ventilation.
- Integration of form and function.

The list of suggested topics to be covered as design problems including:
Child care center, Kindergarten School, Primary Health Centre, Doctor's Clinic, Cafeteria, Village Post Office, Bank (branch office). Police Station, Beauty parlor/Salon Architect's Office, Department Store, School Gymkhana & Youth Club, or any other building of single storey.

The topics not covered as design problems could be covered by the Studio faculty members through lecture/slide to enhance their knowledge base and approach towards design issues and process.

At least one major exercise and two minor design/time problems should be given. The final submission shall necessarily include a model.

Assessment

Continuous assessment will be conducted for major (30M) minor (20M) design time problems i.e., total marks of (30M+20M) =50M.

Course Outcome:

- Analyze Functional Space: Students will demonstrate the ability to analyze spatial implications of various functions and determine maximum and optimum areas for effective design.

- Apply Anthropometrics and Layout: Learners will apply principles of anthropometrics, furniture layout, and horizontal circulation in designing spaces for human comfort and functionality.
- Explore Material Qualities: Students will investigate interior volumes and material qualities to enhance the aesthetics and functionality of architectural designs.
- Optimize Lighting and Ventilation: Participants will learn to optimize natural lighting and ventilation for creating sustainable and habitable architectural spaces.
- Integrate Form and Function: Through design exercises, students will develop skills in integrating form and function to create aesthetically pleasing and practical structures.
- Execute Comprehensive Design: By completing one major and two minor design projects, students will demonstrate their ability to execute comprehensive architectural designs that incorporate all aspects of the course content, culminating in a physical model for final submission.

REFERENCES:

1) Time savers standards of Building Types-Joseph de chiara & others.
2) A History of Building Types-Nikolays Pevsner.
3) Architect's Data-Ernst Neufert.
4) Architect's Hand book-Charanjit. Shah
5) Doctor's offices & Clinics-Paul Hayden KIrk, Engene D. Stermberg.
6) A History of Building Types-Nikolays Pevsner. Architect's Data-Ernst Neufert
7) National Building code

ARC2102
HISTORY OF ARCHITECTURE –II

Course Objective:

To enable students to understand:

- How different architecture solutions were evolved within the restraints imposed by prevalent social and cultural setup, available building materials, climate and geography of particular region.
- Insight of the evolution of architecture in Indian subcontinent and orient.

CONTENTS

(Harappan and Vedic Architecture)

Architecture and town planning of Harappan civilization such as towns of Lothal, MohenjoDaro, Dholavira, Kalibanga etc. Understanding of Vedic architecture, and settlements.

(Buddhist and Jain Architecture)

Architectural examples of Mahayana and Hinayana Buddhism; Rock-cut and free standing. Study of caves, stupas, and viharas of places like Sanchi, Amravati, Karle, Ajanta etc. Medieval Jain temple architecture of western India.

(Hindu Architecture)

Elements of Hindu Temple. Development of temple form from example like Ladh Khan, Temple at Deogarh, Bhittargaon Temple.

(North Indian Temple Architecture)

Architectural character of Gupta Temples - Architecture style of Orissan temple with examples. - Khajuraho group of Temples, and - Architectural character of Gujarat Temples.

(South Indian Temple Architecture)

Pallava, Chola, Pandyas, Madura and Vijayanagar style with examples.

(Indo-Islamic Architecture)

Special features of Mosque and Tomb Influences of Indo-Islamic Architecture in India Use of arches, vaults, domes, squinches, pendentives, jaalis, minarets,etc. Special features: use of landscape, water bodies and gardens. Ornamentation in structures with interplay of materials such as stones, mosaics, gildings.

(Sultanate Architecture & Provincial Styles of Sultanate Period)

Sultanate Architecture: Slave Dynasty, Tughlaq Dynasty, Lodhi Dynasty. Provincial Styles of Sultanate Period: Punjab, Bengal, Jaunpur, Gujarat, Malwa, Bijapur and Golconda with examples.

(Mughal Architecture)

Mughal Style prevalent during the reign of a) Babur; b) Humayun; c) Akbar; d) Jahangir; e) Shah Jahan.

Course Outcome:

- Understanding Harappan and Vedic Architecture: Students will comprehend the architectural and town planning principles of the Harappan civilization and Vedic settlements.
- Exploring Buddhist and Jain Architecture: Learners will analyze the architectural diversity of Mahayana and Hinayana Buddhism, as well as medieval Jain temple architecture in western India.
- Mastering Hindu Temple Architecture: Students will grasp the elements and evolution of Hindu temple architecture, with a focus on key examples from various periods.
- North Indian Temple and Gupta Temple Styles: Students will discern the architectural character of Gupta temples and the unique features of Orissan temple architecture, including Khajuraho group of temples.
- South Indian Temple Architecture: Learners will identify and differentiate the architectural styles of Pallava, Chola, Pandyas, Madura, and Vijayanagar with relevant examples.
- Indo-Islamic and Sultanate Architecture: Students will recognize the distinctive features of Indo-Islamic architecture, including mosques, tombs, and the use of architectural elements. They will also understand the regional variations in Sultanate architecture during different dynasties and provinces.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment i.e. total marks will be (20M+10M)=30M.

TEXT BOOKS:

1. Indian Architecture by Percy Brown. (Buddhist and Hindu period)
2. Indian Architecture by Percy Brown (Islamic Period).
3. The Architecture of India by Satish Grover. (Buddhist and Hindu period)
4. The Architecture of India by Satish Grover (Islamic Period).

REFERENCES:

1. Art Architecture of India by Benjamin Rowl.
2. The history of Architecture in India by Christopher Tadgell.
3. Vistara: The Architecture of India, The festivals of India, Tata Press Limited 1986.
4. Nath – History of Mughal Architecture
5. Banister Fletcher, History of Architecture

ARC2103
BUILDING MATERIALS & CONSTRUCTION-III

Course Objective:

- The objective of the subject is to enable students to understand the building materials and basic Sub structure and Super Structure structural systems
- PCC and RCC material components and construction specifications and steps.
- Indian standards for RCC work, reinforcement detailing etc.

CONTENTS

(BUILDING MATERIALS)

Concrete; types, grades, mixing and setting process, workability and other tests, admixtures and additives. Plain and reinforced. Steel section, steel bars, properties, manufacturing process, Indian standards, strength, joining, fabricating.

(FOUNDATION AND COLUMN)

Functions of Foundations, requirements and types of foundations, Site investigations, SBC test for Design of Foundations, Foundations in Special Situations (for very Low SBC Values, Foundations Close to Existing Building, Foundations required in water logged areas etc.,). Reinforcement, spacing, RCC Grade mix details for all types of foundations. Reinforcement details of R.C.C. square, rectangular and circular columns.

(BEAM, SLABS, LINTELS)

Introduction to beams, Slabs and Lintels, Standard Sizes, Spacing, Grade mix details as per Latest IS Codes, Reinforcement and details for lintels and projections (Chajja). Reinforcement and details of R.C.C. beams: simply supported, rigid, continuous and cantilevered. Reinforcement and details for one-way and two-way slabs with fixed continuous and cantilever end conditions.

(STAIRCASE)

Introduction, terminology used in staircases, requirements for good staircase, Types of staircases, calculations for riser and treads, reinforcement and details for various types of staircases. NBC Code

(FORMWORK, SHUTTERING, SCAFFOLDING)

Formwork for square, rectangular and circular columns. Scaffolding. Shuttering and centring beams, slabs and staircase. Shoring such as raking shores, flying shores and dead shores. Underpinning.

Course Outcome:

- Comprehend Concrete: Understand the various types, grades, and mixing techniques of concrete, as well as its workability and testing procedures.
- Master Reinforcement: Acquire knowledge of steel sections, bars, and their properties, along with the manufacturing process, Indian standards, and techniques for joining and fabricating steel in construction.
- Foundation Expertise: Demonstrate expertise in designing foundations by grasping their functions, types, and requirements, while considering special situations like low SBC values and waterlogged areas.
- Beaming and Slab Mastery: Gain proficiency in designing beams, slabs, and lintels by learning standard sizes, grade mixes, and reinforcement details according to the latest IS codes.
- Staircase Engineering: Develop the skills to design various types of staircases, calculate riser and tread dimensions, and understand reinforcement and terminology in line with NBC code requirements.
- Formwork and Scaffolding Proficiency: Learn to create formwork for columns and structures, employ scaffolding effectively, and execute shuttering, centering, and shoring methods in construction processes.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for 20M, and 30 Marks for assignment (Including Drawing assignments) and continuous assessment (portfolio) i.e. total marks of (20M+30M)=50M

TEXT BOOKS:

1) W.B. Mc Kay, Building Construction Volume 1 to 4
2) R. Barry, Building Construction Volume 1 to 5
3) Francis Ching D.K., Building Construction Illustrated
4) S.K. Sharma, Civil Engineering construction Materials
5) Sushil Kumar, Building Construction
6) Building Construction , SS Bhavikatti
7) Building Construction , PC Varghese

ARC2104
BUILDING SERVICES-I
(Water Supply & Sanitary Engineering)

Course Objective:

The objective of the subject is to enable students to understand and apply

- To understand the need for and importance of building services.
- Fundamentals of water supply, drainage, sewerage system and solid waste disposal.
- Water distribution systems and its requirements at different scales such as building, site, neighbourhood, etc.
- Sanitation and its layout requirements at different scales such as building, colony and neighbourhood.
- Calculations and disposal of rainwater and solid waste disposal.

CONTENTS

(IMPORTANCE OF BUILDING SERVICES)

The need and importance of building services. Historical overview of water supply, plumbing and sewerage systems in India and worldwide.

(WATER SUPPLY)

Sources of water, Quality of water, impurities in water and its treatment. qualities of potable water. Water demand calculations; norms and standards. Water storage, overhead tank, and sump.

Water distribution system at city/ neighbourhood overview. Water treatment plant. Types of water distribution networks. Water pipe materials, apparatus, joints, fixtures, and valves. Guidelines for laying of water mains, distribution.

Cold & hot water lines in buildings, Water supply to high rise buildings: problems encountered & systems adopted.

(BUILDING SANITATION)

Principles of sanitation, collection, and disposal of various kinds of refuse from buildings. Methods of carrying refuse, systems of refuse disposal, their principles.

Plumbing definitions and related terms, building sanitation systems (separate, combined, single stack, one pipe and two pipe, etc.)., House drainage system, Drainage of sub-soil water. Design calculations of septic tank, soak-pits, cesspools, aqua-privy, leeching pits etc. Study of details of types of traps and chambers (inspection chamber, disconnecting chamber, intercepting trap, S-trap, P-trap, gully trap, grease trap etc; and sanitary fixtures (washbasins, WCs, bathtubs, urinals, flushing cistern, etc. Types of pipes and joints. Design principles of sanitary layout (location and ventilation of chambers, traps, fixtures).

(STORM WATER DISPOSAL SYSTEM)

Surface area division for rain water disposal. Details of collection point/Khurra. Conveyance network for rain water (catch basin, gully traps, etc.). Calculation for

rain water quantity, gradients, section of drains etc. Concepts of rainwater harvesting.

(DRAWING AND MARKET SURVEY)

Market survey for pipes, fittings and fixtures, traps etc. To prepare water supply and sanitary design project for a small building such as residence, primary school etc. Output for water supply design will be in the form of water quantity calculations, flow calculations and pipe diameter calculations. Water supply layouts from municipal supply to storage tank. Also design network for hot and cold water supply in the selected building in the form of plans and sectional elevations. Output for Sanitary design will be in the form of gradient and pipe diameter calculations. Layout design with details of all chambers and traps for building and site in the form of plans and sectional elevations.

Course Outcome:

- Understand the historical evolution and significance of building services, specifically in water supply and sanitation systems in India and worldwide.
- Analyze various water sources, assess water quality, and evaluate water treatment methods to ensure the provision of safe and potable water.
- Demonstrate the ability to calculate water demand, design water storage solutions, and comprehend the components of water distribution networks in urban and neighborhood settings.
- Identify and address challenges associated with water supply in high-rise buildings, exploring effective solutions and systems.
- Comprehend the principles of building sanitation, differentiate between various systems, and design effective refuse collection and disposal methods.
- Apply the knowledge of plumbing and sanitary design, including the selection of appropriate fixtures, materials, and layout principles for efficient and hygienic building services.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for consideration for 20 and 10 Marks for assignment and continuous assessment i.e. total marks will be (20M+10M) =30M.

TEXT BOOKS:

1) Rangwala, Water Supply and Sanitary Engineering
2) Kshirsagar, Water Supply and Sanitary Engineering
3) Shah, Water Supply and Sanitation
4) Patil, Plumbing Engineering
5) Indian Code Council, International Plumbing Code
6) P.N. Khanna, Indian Practical civil Engineers' Handbook

ARC2105
CLIMATOLOGY-I

Course Objective:

- It is Science that explores aspects of human comfort and energy efficiency in built environment for sustainable habitat. Tools, data, standards, methods and principles for design of climate responsive built environments, are dealt particularly for tropical climates found in India.

CONTENTS

(Introduction to Building Climatology)

Global climatic factors, Elements of climate and graphic representation of climatic data, macro and micro climate, Climate control elements of building, Climate and built form interaction, Mahoney Tables.

(Tropical Climates)

General classification of tropical climates, Indian classification of climate, Characteristics of different climatic zones and design considerations, Traditional built forms with respect to climatic and cultural conditions.

(Human Comfort)

Elements of heat exchange between man and environment, Physiological and sensory responses, Biophysical effects of environmental factors, Thermal and visual comfort factors, indices/charts.

(Building Envelope)

Heat flow through buildings, Periodic heat flow, Elements of building related to control of solar radiation and ventilation, Thermo physical properties of different materials, Principles of light and Day-lighting, Elements of building related to daylight.

Note:

Understanding climate data, its analysis and method of presentation, Study of traditional/vernacular architecture in relation with culture and climate of the study region, Study of conventional building envelope to assess comfort factors and undertake retrofitting/redesign for given parameters.

Course Outcome:

- Analyze Climate Data: Students will demonstrate the ability to understand and analyze climate data, creating graphic representations for informed design decisions.
- Evaluate Climate-Building Interaction: Students will assess the interaction between climate and the built environment, integrating climate control elements into architectural design.
- Design for Tropical Climates: Students will classify and understand tropical climates, applying design considerations and adapting traditional built forms for climatic and cultural appropriateness.

- Ensure Human Comfort: Students will grasp the elements of heat exchange and environmental factors affecting human comfort, using indices and charts for design optimization.
- Master Building Envelope: Students will comprehend heat flow through buildings and the control of solar radiation and ventilation, making informed material choices and daylighting principles for energy-efficient designs.
- Retrofit and Redesign: Students will evaluate conventional building envelopes, assess comfort parameters, and apply retrofitting and redesign principles for improved energy performance and occupant well-being.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for consideration for 20 and 10 Marks for assignment and continuous assessment i.e. total marks will be (20M+10M) =30M.

TEXT BOOKS:

1) Manual of Tropical Housing and Building by Koenigsberger, Ingersoll, Mayhew, Szokolay,.
2) Man, Climate and Architecture by B. Givoni,
3) GRIHA Manuals Volume 1-5, Ministry of New and Renewable Energy, Govt. of India
4) Energy Conservation Building Code, Bureau of Energy Efficiency, India

REFERENCE BOOKS:

1) Design for Hot Climates by Konya Allan,
2) Tropical Architecture by Kukreja, C.P.,
3) Buildings, Climate and Energy by Markus T.A., Morris E.N,
4) Solar Control and Shading Devices by Olgyay A., Olgyay V.,.
5) Sun, Wind and Light by Brown G.Z.,
6) Climate Responsive Architecture by Arvind Krishnan, Nick Baker, SimosYannas, S.V. Szokolay,
7) Website: http://www.gsa.gov/portal/category/21049

ARC2106
STRUCTURAL MECHANICS –II

Course objectives:

- To study the theory and behaviour of columns for axially loaded and biaxially loaded columns for symmetrical and unsymmetrical sections.
- The variation of shear force and bending moment at a point for moving loads.
- types of forces acting on a retaining wall under different field conditions.
- Plastic analysis of beams and frames for different loading conditions.

CONTENTS

(COLUMNS AND STRUTS)

Columns and struts: Buckling and crushing failures, types of end conditions, Euler's theory & equivalent length and slenderness ratio. Rankine's equation and IS code formula for critical load on columns.

(DIRECT AND BENDING STRESSES-COLUMNS)

Direct and bending stresses, eccentricity about both axes, symmetric and unsymmetrical sections-Columns.

(INFLUENCE LINE DIAGRAMS)

Influence Line Diagrams of statically determinate beams only.

a) A single concentrated load
b) uniformly distributed load (UDL) longer than the span
c) uniformly distributed load (UDL) shorter than the span

(RETAINING WALLS)

Retaining walls, Types of retaining walls, Active Pressure, Passive Pressure, State of equilibrium in soil, Theories of Earth Pressure, Rankine's theory, Coloumb's theory, Earth pressure on retaining walls due to submerged soil (with horizontal backfill, horizontal surcharge only). Stability analysis of gravity type and Cantilever type retaining walls only.

(PLASTIC ANALYSIS OF STRUCTURES: INTRODUCTION)

Plastic Analysis: Introduction to Plastic analysis, Plastic bending of beams, Plastic Hinge, Moment curvature relationship, Shape factor and Load factor. Determination of shape factor for standard cross sections: Rectangle, Triangle, Diamond and Circle and Numerical problems for symmetric and unsymmetrical sections.

(PLASTIC ANALYSIS OF STRUCTURES: PLASTIC ANALYSIS)

Fundamental conditions for Plastic analysis, Mechanism, Upper and Lower bound theorems, Uniqueness theorem, Static method and Kinematic method, Plastic analysis of simply supported, fixed, continuous beams and Frames (single bay single storey) for point load, UDL and unsymmetrical point load.

Course outcome:

- Understand the fundamental principles of column behavior, including buckling and crushing failures, types of end conditions, and how to apply Euler's theory to determine critical loads.
- Apply Rankine's equation and IS code formulas to calculate critical loads on columns, ensuring the safety and stability of structural elements.
- Analyze direct and bending stresses in columns, considering eccentricity about both axes and addressing symmetric and unsymmetrical section designs.
- Create influence line diagrams for statically determinate beams under different loading conditions, such as single concentrated loads and uniformly distributed loads.

- Explore the concepts of retaining walls, including types, active and passive pressures, equilibrium in soil, and theories of Earth pressure, like Rankine's and Coulomb's theories.
- Develop a comprehensive understanding of plastic analysis in structures, covering plastic bending of beams, moment-curvature relationships, shape factors, and load factors, and apply plastic analysis to various structural elements like beams and frames.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment i.e. total marks will be (20M+10M)=30M

TEXT BOOKS:

1) Analysis of Structures - Analysis, Design and Details of Structures-Vol.-1 by V.N. Vazirani and M.M. Ratwani and S.K.Duggal
2) Analysis of Structures - Theory, Design and Details of Structures-Vol.-2 by V.N. Vazirani and M.M. Ratwani and S.K.Duggal

REFERENCES:

1) Limit State Design of Steel structures by S.K.Duggal, Publishers: McGraw-Hill Education.

ARC2107
COMPUTER APPLICATIONS-I

Course Objective:

The objective of the subject is to enable students to understand and apply

- Basic CAD skills to create simple and complex two dimensional geometric forms.
- CAD skills to create technically correct and presentable drawings.
- Skills to create technically correct and presentable three dimensional building models.
- Skills to render and animate building models.

CONTENTS

(INTRODUCTION TO 2D DRAFTING & 2D DRAFTING TOOLS)

Introduction to computer aided 2-D drafting. To develop and understand basic set up and menu bars for computer aided drafting. Screen Layout- status bar, tool bar, graphics area, labelled buttons, drawing editor, file handling commands (utility commands). Setting units and scale.

Drafting simple and complex geometric shapes such as squares, circles, triangles, lines, curves, poly lines and their combinations etc. Application of various toolbars

and their sub tools including draw, edit, modify, view, file, dimension, parametric, etc.

(2D DRAFTING OF BUILDING & 2D PRESENTATION DRAWINGS)

Preparation of two dimensional architectural drawings (including plans, elevations and sections) incorporating layers, line-weights, texts, scale, dimensioning and formatting of drawings for taking prints and plots.

Preparation of two dimensional architectural presentation drawings (including plans, elevations and sections) incorporating human figures, plants, car etc. Preparation of two dimensional architectural presentation drawings (including plans, elevations and sections) incorporating grid, column, dimensioning, legend and architectural elements details with proper line weight etc.

Practical Work: Making 2-dimensional architectural plan, elevation and sections for any one of the architectural design assignments studied in previous semesters with submission in the form of printouts in scale.

(3D MODEL OF BUILDING & PHOTO REALISTIC RENDERING)

Understanding and converting plan, elevation and section of drawing to three-dimensional building model using three dimensional tools (Ex: Sketch up or 3D MAX). Creating building models using building elements and then converting model to orthographic projections.

Making models photorealistic using materials, lighting, texture, background, etc. Creating new materials and environment attributes.

(WALK THROUGH OF INTERIOR/EXTERIOR)

Create interior walkthroughs for small spaces such as bedroom, office etc. by adding scenes, furniture, texture, finishes with lighting effect and camera angles.
Create building exterior walkthroughs by adding scenes, trees, human figures, cars, sun light effect and camera angles.

Practical Work: Making Three- dimensional photorealistic rendered architectural models for any one of the architectural design assignments completed in previous semesters and to create walkthrough of the same.

Course Outcome:

- Proficiency in 2D Drafting: Students will gain mastery in using computer-aided drafting tools, effectively creating and editing 2D geometric shapes, and applying various toolbars for drafting.
- Architectural Drawing Skills: Learners will be able to produce 2D architectural drawings, including plans, elevations, and sections, with proper formatting, dimensioning, and line-weight management for print and plot.
- Presentation Drawing Expertise: Students will develop the ability to create visually appealing 2D architectural presentation drawings, incorporating elements like human figures, plants, and vehicles, along with grid systems, columns, and legends.

- Practical Application: Students will apply their knowledge by generating 2D architectural plans, elevations, and sections for architectural design assignments from previous semesters and produce printouts to scale.
- 3D Building Modeling: Learners will understand and apply 3D modeling techniques using software like SketchUp or 3D Max, converting 2D architectural drawings into realistic three-dimensional building models.
- Photorealistic Rendering: Students will learn to enhance 3D models with realistic materials, lighting, textures, and backgrounds, achieving photorealistic results. They will also create interior and exterior walkthroughs with proper lighting and camera angles for small spaces and buildings.

Software for References

1) AutoCAD Student Version
2) Autodesk Revit
3) Sketch-Up
4) Paint 3D
5) 3D Max
6) 3D Home architect
7) Archi-Cad
8) Maya

ARC2108
PROFESSIONAL ETHICS AND UNIVERSAL HUMAN VALUES
(Non-credit mandatory courses)

Course Objectives:

- To instil a sense of ethical responsibility and human values in students, especially in a professional setting.
- To understand the impact of non-ethical decisions in engineering and architecture.
- To promote self-awareness, self-reflection, and understanding of one's role in society and nature.
- To understand organizational culture and adapt to varying cultures without compromising ethical values.

Contents

(Introduction to Ethics and Human Values)

Terminology: Integrity, Honesty, Courage, Empathy, Personality, Character, Self-Confidence, Respect for Others, Work culture, social responsibility, Responsibilities as a citizen, Cooperation and commitment. Difference between Religion vs. Spirituality, Philosophy, Customs, and practices. Understanding self, pre-conditioning, and natural acceptance.

(Mind and Its Influence on Ethics)

What is Mind? Relationship between Mind and body, Mind and food. Mental faculties: Theory of perception, Memory, Imagination, Thought-Culture, Desires.

Cultivation of Virtues, Control of Senses and Mind. Concentration, Meditation, and Enlightenment

(Ethical Challenges in Professional Settings)

Estimating risk in engineering and architecture. Legal and ethical responsibilities of architects. Conflict of Interest, Occupational crime. Influence of multinational corporations on government decisions and public policy. Problem of bribery, extortion, grease payments, nepotism. Case Study: Chinese Minister Sentenced to Death for Corruption.

(Harmony in Relationships and Nature)

Nine universal values in relationships. Reflecting on relationships in family, hostel, and institute. Harmony in nature and the role of human beings in maintaining or disrupting it. Human impact on nature: Depletion of resources, pollution, and the role of technology.

(Case Studies on Ethical Violations)

Chernobyl nuclear disaster, Fukushima reactor meltdown, Challenger blow-up, Ford Pinto design, Highway safety, Kingfisher Airlines financial misappropriation.

(Professional Ethics in Architecture)

Ethical human conduct, values, character, and morality. Professional ethics for architects and their role as moral leaders in society.

(Holistic Understanding of Self and Society)

Recapitulation on society and its major dimensions. Ethical considerations in education and the role of the teacher-student relationship. Holistic human development through education.

Teaching Methodology: Primarily through group discussions, case studies, and real-life scenarios. The course encourages self-observation, reflection, and application of learned values in everyday life. Practical experiments based on real-life behavior and actions are integral to the course.

Course Outcomes: Upon completion, students should be able to:

- Recognize the importance of human values and their role in professional settings.
- Understand the consequences of unethical practices and the benefits of ethical behaviour.
- Reflect on their personal beliefs, values, and actions, and their impact on society and nature.
- Apply ethical considerations in their professional work, especially in architecture.

Text & Reference Books:

1) Charles E Harris, Micheal J Rabins, *Engineering Ethics*, Cengage Learning Pub.
2) Mike Martin and Roland Schinzinger, *Ethics in Engineering*, McGraw Hill Pub.
3) Swami Sivananda, *Mind, Its Mysteries and Control*, Divine Life Society.
4) R R Gaur, R Sangal, G P Bagaria, *Human Values and Professional Ethics*.
5) A Nagaraj, *Jeevan Vidya: Ek Parichaya*

FOURTH SEMESTER

ARC2201
ARCHITECTURAL DESIGN II

Course objectives:

This Course is designed to develop an Understanding design issue s, formulating concepts and the skills of creative design synthesis for a small scale multi_ use buildings and more than a single floor building.

- To understand the design issues like Functions and their spatial implications
- Analytical classification of spaces for different uses and their relation to one another;
- Anthropometrics, furniture layout and horizontal and vertical circulation; Interior volumes and material qualities;
- Lighting and ventilation and Integration of form and function.
- Understanding of the bye-laws and codes involved in the design of the building typology prescribed for the course.

Course content

The design issues to be addressed include:

- Functions and their spatial implications in a multi-use building.
- Anthropometrics, furniture layout and horizontal and vertical circulation.
- Understanding the interior volumes, material qualities and integration of form and function.
- Bye-laws and codes of the buildings that are taken up for design project sensitizing them towards inclusive design and the norms followed.

The list of suggested topics to be covered as design problems including:

Motels/ Hotel, Hostels, Police station, Office building, Apartments, and another building that is multi use and more than one floor buildings.

At least one major exercise and one minor design/time problems should be given. The final submission shall necessarily include a model for the main problem.

Assessment

Continuous assessment will be conducted for major (30M) minor (20M) design problems i.e., total marks of (30M+20M) =50M

Course outcome:

- Analyze Functions and Spatial Implications: Students will demonstrate the ability to critically assess functions and spatial implications in multi-use buildings, enabling them to make informed design decisions.
- Apply Anthropometric Principles: Learners will be proficient in applying anthropometric principles to create comfortable and functional interior spaces and furniture layouts.

- Integrate Form and Function: Students will exhibit competence in integrating material qualities, interior volumes, and form and function to enhance the aesthetic and functional aspects of design.
- Comply with Building Regulations: Graduates will be well-versed in building codes and bye-laws, ensuring their designs adhere to inclusive and normative requirements in construction.
- Solve Diverse Design Challenges: Through design exercises involving motels, hotels, hostels, police stations, offices, apartments, and multi-use buildings, students will develop problem-solving skills for a variety of architectural contexts.
- Develop and Present Models: Students will create both major and minor design solutions, culminating in the presentation of a model for the main design problem, demonstrating their ability to translate concepts into tangible architectural representations.

References:

1) Time savers standards of Building Types-Joseph de chiara & others.
2) A History of Building Types-Nikolays Pevsner.
3) Architect's Data-Ernst Neufert.
4) Architect's Hand book-Charanjit. Shah
5) National Building code

ARC2202
HISTORY OF ARCHITECTURE –III

Course Objective:

To enable students to understand:

- Significant developments in Modern Architecture with the advent of steel, Glass and Ferro-concrete;
- Different schools of thought along with understanding of various architectural philosophies and works of 20th century contemporary architects in India and abroad.

CONTENTS

(Introduction, Advent of Steel, Glass and Ferro-Concrete)

Late Renaissance and development of open spaces Advent of Steel and Henry Labrouste Great Exhibitions of 1851 and 1889 and their contributions Gustave Eiffel Development of Ferro concrete: Auguste Perret, Tony Garnier.

(Development of 'New Art & Architecture)

Le Art Nouveau movement and Victor Horta H.P. Berlage, H. H. Richardson and 'True Construction' Balloon Frame Structure and Plane Surfaces in America.

(Chicago School & Organic Developments)

Chicago School: Louis Sullivan
Organic Architecture: Frank Lloyd Wright

(Programmatic Functionalism)

Walter Gropius and Bauhaus, Le Corbusier

(Development of International Style)

Mies van der Rohe, Philip Johnson, Louis I Kahn

(20th Century World Architecture)

Works of some master architects like, Eero Saarinen,,Alvar Aalto, Oscar Niemeyer, Richard Neutra, Norman Foster, Antonio Gaudi, Frank O. Gehry, I. M. Pei, KenzoTange

(Indian Architecture)

Revival of Indian Architecture under British patronage - Architecture in Colonial India. Indian architecture since independence, B. V. Doshi, Charles Correa, Raj Rewal, A. P. Kanvinde , Laurie Baker.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for consideration for 20 and 10 Marks for assignment and continuous assessment i.e. total marks will be (20M+10M) =30M.

Course Outcome:

- Analyze the Influence of Materials and Engineers: Understand the impact of materials like steel, glass, and ferro-concrete on architectural development and the contributions of engineers like Henry Labrouste and Gustave Eiffel.
- Comprehend Art Nouveau and Innovative Architects: Grasp the Art Nouveau movement, its leader Victor Horta, and the pioneering architectural approaches of H.P. Berlage and H. H. Richardson.
- Explore Chicago School and Organic Architecture: Explore the Chicago School's designs by Louis Sullivan and the principles of Organic Architecture by Frank Lloyd Wright.
- Understand Programmatic Functionalism: Delve into Programmatic Functionalism with a focus on Walter Gropius, Bauhaus, and Le Corbusier, and their impact on architectural design.
- Investigate the Development of International Style: Examine the evolution of International Style through the works of Mies van der Rohe, Philip Johnson, and Louis I. Kahn.
- Appreciate 20th Century World Architecture and Indian Architecture: Gain an appreciation for the works of influential 20th-century architects and the revival and evolution of Indian architecture, including prominent figures like B. V. Doshi, Charles Correa, and Laurie Baker.

TEXTBOOKS:

1) Introduction to Indian Architecture by Binda Thapar
2) Modern Architecture, Vol 2 of History of World Architecture by Manfredo Tafiri and Franscesco Dal Co
3) Makers of Modern Architecture, Vol II, from Le Corbusier to Rem Koolhaas by Martin Filler
4) Modern Architecture in India by Sarabjit Singh Bagha

REFERENCES:

1) History of Modern Architecture by Leonardo Benevolo.
2) Space, Time and Architecture: The growth of a New Tradition by Sigfied Guiedion.
3) Contemporary Architecture by Ann Lee Morgen and Colin Mayer.
4) After the Masters by Vikram Bhatt.
5) Architecture of Independence by John Lang, Mickey Desai, Madhavi Desai.
6) Post-Independence Architecture by S.S.Bahga.
7) The language of Post-Modern Architecture by Charles Jencks.
8) The Architecture of the City by Aldo Rossi.

ARC2203
BUILDING MATERIALS & CONSTRUCTION-IV

Course Objective:

The objective of the subject is to enable students to understand:

- Large span truss components and construction details.
- Use of materials like steel, aluminium, glass, gypsum in interiors and exteriors; their construction and to enable them to represent same through technical drawings.

CONTENTS

(Steel Trusses & Roofing)

Types and fixing details of steel trusses – saw tooth, roof truss with north light glazing, simple trusses in steel, and ways of fixing and connections (to foundations, steel stanchions, and beams etc.). Space frames (single, double & triple layered tubular space frames with globe connections). Types of materials and details of industrial buildings, warehouse, and other building typologies.

(Partitions, Grills and Panels)

Study of various types of aluminium and wooden partitions, its extrusions, and fixing details. Different types of wooden, aluminium panels, cladding components for various types' of buildings and structures. Aluminium, glass, and steel grill modules.

(False Ceilings)

Types and fixing details of various materials for suspended ceilings and false ceilings using aluminium and other material sections). Construction details for providing thermal insulation in cold storages. Types of insulation materials and fixing details of materials like glass wool, insulating boards, gypsum boards, plaster of paris, and various kinds of perforated boards.

(Glass)

Various techniques to use glass and glass blocks with fixing details (structures like pavilions, greenhouses, staircases, multi storied buildings –curtain walls, roofing, panels).

(Wall Treatments and Finishes)

Types and fixing details of sound absorbing materials such as acoustic plastic, acoustic tiles, wood, partition board, fibre board, cook, quilts and mats spun glass foamed glass, cork, gypsum, plaster of Paris, hydride gypsum properties, its properties (porous, baffle and perforated materials) and applications (vapor barriers, rigid insulations, blanket, poured and reflective insulation). Study of relevant IS codes, Study of damp-proofing materials such as Bitumen felts, etc. chemicals for W.P.C. &O.P.C etc.

Course Outcome:

- Understand Steel Trusses and Space Frames Students will be able to identify and analyze different types of steel trusses and space frames, along with their fixing details and connections to foundations and beams.
- Mastery of Partition and Panel Systems Gain expertise in the design and construction of aluminum and wooden partitions, along with the selection of appropriate extrusions and fixing methods for diverse building types.
- Proficiency in False Ceiling Systems Develop the skills to choose and install various materials for suspended and false ceilings, including thermal insulation methods, insulation materials, and fixing details for cold storages.
- Expertise in Glass Applications Learn various techniques and fixing details for the utilization of glass and glass blocks in architectural structures, from pavilions to curtain walls in multi-storied buildings.
- Acoustic and Wall Treatment Knowledge Acquire knowledge about sound-absorbing materials, their properties, and applications, as well as an understanding of relevant IS codes and damp-proofing materials.
- Comprehensive Understanding of Building Materials Gain a deep insight into the types of materials used in industrial buildings, warehouses, and other building typologies, including selection, properties, and construction details for various building elements.

Assessment

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for 20M, and 30 Marks for continuous assessment (portfolio) i.e. total marks of (20M+30M) =50M

TEXT BOOKS:

1) S.P. Arora & Bindra, A Textbook of Building Construction
2) J. Jha & S.K. Sinha, Building Construction
3) M.S. Shetty, Concrete Technology
4) Dr. B.C. Punmia, A Textbook of Building Construction
5) T.D. Ahuja and G.S. Birdie, Fundamentals of Building Construction
6) S.P. Arora and S.P. Bindra, A Textbook of Building Construction

ARC2204
BUILDING SERVICES-II
(ACOUSTICS)

Course Objective:

- To study Basic laws and terminologies related to Acoustics, Acoustical requirements of a given activity, its calculations and designing of the space.
- Urban noise control and its application at site and building level.

CONTENTS

(Introduction to Acoustics)

To understand the need for and importance of acoustics in various building typologies, the history of acoustics, works of pioneers. Understanding of terminologies, definitions of key concepts such as propagation, reflection, absorption, diffusion, velocity, intensity, and intensity levels etc. Introduction to properties of sound, decibel scale, directionality and sound sources, hearing noise effects, diffraction and reflection resonance, echo, and reverberation. Classification of Sound Waves. Sensibility of human ear. Free field conditions and Inverse Square Law for noise reduction with distance.

(Acoustics for an Enclosure / Building Design)

Reverberation Time and its importance for acoustical performance of an enclosure. Sabin's Equation and its application for designing new auditoriums and correcting RT of existing ones. (Classroom exercise)

Acoustical defects in an auditorium and their remedies. Acoustical design of auditorium and other acoustically sensitive enclosures meant for speech, music, lecture, etc. Properties of materials and their application for acoustical treatment, shape analysis for different enclosures.

Designing enclosures for variable RT's. Sound Amplification Systems.

(Noise Isolation and Control)

To understand noise, its transmission (air borne and structure borne), insulation and transmission loss. Understanding of psychological and physiological effects of noise. Identification of various sources of indoor noise and methods of sound insulation for control of mechanical noise and vibrations and its control measures. Speech privacy and noise control in specific situations. Sources of outdoor noise such as traffic noise levels and planning and design for outdoor noise.

(Acoustical design Principles and factors)

Case studies and at least one design exercise of an auditorium or other sensitive enclosures which require acoustical sensitivity meant for speech, music, lecture, etc. Selection criteria for cases and design exercise - Site selection and planning, shape, dimensions, occupancy and seating arrangements, treatment of interior surfaces, desired reverberation time and amplification systems. Exercise output would be in the form of plan, section, construction details and calculation sheets.

Course Outcome:

- Understand Acoustic Fundamentals: Develop a comprehensive understanding of acoustics, including its history, key concepts, and the

sensitivity of the human ear to sound, enabling informed architectural design decisions.

- Acoustic Design Expertise: Acquire the knowledge and skills to design acoustically sensitive enclosures, such as auditoriums, with a focus on factors like reverberation time, material selection, and shape analysis.
- Noise Control Proficiency: Gain expertise in noise control, both indoors and outdoors, by studying noise transmission, its psychological and physiological effects, and the application of sound insulation techniques.
- Design Principles Application: Apply acoustical design principles to real-world situations through case studies and design exercises, demonstrating competence in site selection, planning, interior treatment, and system design.
- Effective Remediation: Identify and address acoustical defects in auditoriums and other sensitive spaces, implementing solutions to improve their acoustic performance and functionality.
- In-Depth Case Study Analysis: Conduct in-depth case studies, including design exercises, to develop architectural plans, sections, and construction details with precise calculations for acoustically sensitive enclosures, showcasing advanced architectural acoustics knowledge and skills.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for consideration for 20 and 10 Marks for classroom exercises and continuous assessment i.e. total marks will be (20M+10M) =30M

TEXT BOOKS:

1) David Egan, Architectural Acoustics
2) A.B. Wood, A Textbook of sound.
3) Yarwood, T.M., Acoustics.

REFERENCES:

1) Catalogues of leading Audio equipment's companies.
2) Kandaswamy, Architectural Acoustics and Noise Control
3) J.E. Moore, Design for Good Acoustics and Noise Control
4) National Building Code 2005
5) Templeton, D., Acoustics in the Built Environment.

ARC2205
CLIMATOLOGY-II

Course Objectives:

- Methods and techniques to predict the effect of elements of climate on built spaces. Design of climate responsive and energy efficient built environment through Green building concepts for sustainable habitat.

CONTENTS

(Solar Radiation and Day Lighting)

Solar geometry and charts, Sun control through various elements of building, Day lighting prediction techniques, Fenestrations with focus on skylight, north light etc.

(Natural Ventilation and Air Movement)

Principles and dynamics of air movement and ventilation, Effect of built environment on air movement and ventilation, Fenestrations and other elements to control air movement and ventilation.

(Passive and Mechanical Controls)

Passive methods of cooling, dehumidification, evaporative cooling etc., Substitutes of mechanical devices using renewable energy sources for cooling, dehumidification, evaporative cooling etc.

(Green Buildings and Energy Simulation Programs)

Background of different rating systems, Relevance of rating system and GRIHA rating system, Introduction to building energy simulation program, Different simulation program software.

Course Outcome:

- Understand Solar Geometry and Charts: Students will be able to comprehend the principles of solar geometry and utilize charts to analyze solar exposure for effective daylighting and sun control in building design.
- Implement Daylighting Strategies: Learners will develop the skills to predict daylight availability and apply various techniques to optimize natural lighting in architectural design, including fenestrations and skylights.
- Master Natural Ventilation Principles: Students will grasp the dynamics of air movement, factors affecting it, and principles of natural ventilation, enabling them to design buildings that promote efficient airflow and occupant comfort.
- Control Air Movement: Participants will learn how building elements, such as fenestrations, can influence and control air movement, allowing them to design spaces that enhance ventilation and indoor air quality.
- Explore Passive Cooling Methods: Learners will be able to identify and apply passive cooling techniques, dehumidification, and evaporative cooling to reduce energy consumption and enhance thermal comfort in buildings.
- Incorporate Renewable Energy for Cooling: Students will understand the potential of renewable energy sources and how to integrate them into building design to reduce the reliance on mechanical devices for cooling, dehumidification, and evaporative cooling.

Assignments:

- Calculation and design of elements of building for a project done in Architectural Studio the previous semester. Self-assessment of green rating system as per GRIHA specifications for their design project. To run CFD

simulation for a small block the elements of building that the student designed.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment i.e. total marks will be (20M+10M)=30M.

TEXT BOOKS:

1) Manual of Tropical Housing and Building by Koenigsberger, Ingersoll, Mayhew, Szokolay,.
2) GRIHA Manuals Volume 1-5, Ministry of New and Renewable Energy, Govt. of India.
3) Energy Conservation Building Code, Bureau of Energy Efficiency, India
4) CFD online tutorials .

REFERENCE BOOKS:

1) Design for Hot Climates by Konya Allan,.
2) Tropical Architecture by Kukreja, C.P.,.
3) Buildings, Climate and Energy by Markus T.A., Morris E.N,.
4) Solar Control and Shading Devices by Olgyay A., Olgyay V.,.
5) Sun, Wind and Light by BrownG.Z.,

ARC2206
DESIGN OF STRUCTURES-I

Course objective:

- To study the stress strain behaviour of steel and concrete; the concept of limit state method.
- The basic idea of analysis and design different reinforced concrete members from substructure to superstructure of a reinforced concrete building.

CONTENTS

(Introduction to RCC Design)

Introduction to RCC, Working stress method, Ultimate load method, Limit state method, Characteristic strength, Characteristic load, Partial safety factor, Type of loads, Factored loads, Stress-strain relationship for steel and concrete. Introduction to IS 456:2000.

(Flexural Analysis and Design of Beams and Slabs)

Types of Beams, Moment of resistance, Neutral axis; balanced, under & over reinforced sections. Design of singly reinforced beams, doubly reinforced beams and T-beams, Design of lintels, cantilever beams, Types of Slabs, Behaviour of Slabs, General Considerations for Design of Slabs, Design of one way slab, two way slab and cantilever slabs (solid slabs only)

(Design for Shear and Bond)

Behaviour of Reinforced Concrete Beams under Shear, Factors Affecting Shear Strength of Concrete, Local or Flexural Bond Stress, Anchorage Bond, Bond Behaviour, Development Length, Design of beams for shear & bond.

(Design of Columns)

Types of Columns, Behaviour of Short Columns, Effective length of columns, Design of axially loaded columns, Design of columns subjected to axial load and uniaxial bending moment only.

(Design of Footings)

Types of RCC footings (isolated, square, rectangular, combined, pile and pile cap), Soil Pressure under Footings, Analysis and design of isolated Square and rectangular footings only.

(Design of Staircase)

Types of Staircases, Loads on Stair Slabs, Design of Dog-Legged staircase and Single Flight staircase only.

Note: Design of reinforced concrete structures conforming to IS 456:2000

Course Outcome:

- Understand the fundamental principles of RCC design, including working stress and limit state methods, and apply them to real-world structural problems.
- Analyze and design various types of beams and slabs, including singly reinforced, doubly reinforced, and T-beams, for efficient load-bearing capacity.
- Evaluate shear and bond behavior in reinforced concrete structures and design beams to resist shear and bond forces effectively.
- Design columns of different types and understand the principles of axial load and uniaxial bending moment analysis for column stability.
- Analyze different types of RCC footings, considering soil pressure, and design isolated square and rectangular footings.
- Master the art of staircase design, including dog-legged and single flight staircases, considering safety and load-bearing capacity in architectural projects.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment i.e. total marks will be (20M+10M)=30M

TEXT BOOKS:

1) Design of R.C.C. structures by S. Ramamrutham, Publishers: DhanpatRai

2) Reinforced Concrete Limit State Design by A.K.Jain, Publishers: Nem Chand & Brothers.

REFERENCES:

1) Limit State Design of Reinforced Concrete by P.C.Varghese, Publishers: Prentice-Hall of India Private Limited
2) Reinforced Concrete Limit State Design by P. Dayaratnam, Publishers: Oxford IBH

ARC2207
ENVIRONMENTAL SCIENCE FOR ARCHITECTURE

Course Objectives:

The objective of the subject is to enable students to have an understanding of:

- Fundamental knowledge about natural and built environment
- Fundamental concepts to understand environmental processes

CONTENTS

(Fundamentals of Environment & Ecology)

Definitions and concepts; environment, environmental segments, ecosystem, ecology etc. Introduction to types, characteristic features, structure and function of different ecosystems (forest, grassland, desert and aquatic ecosystem). Effects of human activities such as agriculture, housing, industry, mining and transportation activities on environment. Threats to India's and the world's biological diversity.

(India's Bio-Geographic Regions)

India's biological diversity in relation to the physio-geographic regions. Identification of principal bio-geographic zones of India and their description. Eco-regions of India (floristic and physiographic). Distinction on the basis of flora and fauna differences in an eco-region. Evaluation of the importance of biological diversity to all life interconnections between biological diversity and human life – sustenance. Conservation of bio-diversity-In-situ and Exsitu conservation.

(Environmental Degradation and Human Impacts)

Environmental Pollution: Local and Global Issues. Causes, effects and control measures. Engineering aspects of environmental pollution control systems.

Air pollution: impacts of ambient and indoor air pollution on human health. Water pollution: impacts water pollution on human health and loss of fresh water resources. Soil pollution and its impact on environment. Marine pollution and its impact on blue economy. Noise pollution, thermal pollution, nuclear pollution.

Solid waste management: Important elements in solid waste management- Waste to energy concepts. Management of plastic waste and E-waste.

Complex relationships between the built and natural environments. Impact of pollution on natural and man-made environments; Role of an individual in prevention of pollution.

(Disaster management and climate change)

Disaster management; floods, earthquake, cyclone and landslides. Cause-and-effect relationships between various human, natural and climatic factors that impinge upon ecological systems and their linkages. Understanding of global climate change and impacts with respect to rural/urban communities; increased risk/ vulnerabilities. Environmental Impact Assessment.

(Techniques and Details)

Fundamentals of Sustainable Development– Sustainability Strategies and Barriers – Industrialization and sustainable development. Circular economy concepts in Industrial waste (solid and fluid) management. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people. To understand implementation of ecological architecture at unit level. Rain water harvesting (contour bunds, wells, bunds, etc.). Techniques of waste water management (house level, bio swales etc.). Ecological planting (planting for wildlife, land improvement etc.)

Strategies to transform the built environment to meet the risks of climate change. Bio-mimicry - the study of natural structures and processes- in helping to solve man-made problems and enabling design; Concepts of urban ecology and landscape urbanism; case studies; integration of Renewable Energy Systems in built environment.

Institutions and Governance)

Regulation by Government, Monitoring and Enforcement of environmental regulation, Environmental Acts, Water (Prevention and Control of pollution) act, Air Prevention and Control of pollution) act, Environment Protection act, Wild life protection act, Forest Conservation act, Coastal Zone Regulations, Institutions and policies relating to India, Environmental Governance.

(Conventions)

International conventions: Salient features of International conventions on Environment: Stockholm Conference 1972, Earth Summit 1992, World commission for environmental Development (WCED). Montreal Protocol, Kyoto protocol, Ramsar Convention on Wetlands, Stockholm Convention on Persistent Organic Pollutants, United Nations Framework Convention on Climate Change (UNFCCC).

(Case Studies)

Case studies: Chipko movement, Narmada Bachao Andolan, Silent Valley project, Madhura Refinery and TajMahal, Industrialization of Pattancheru, Nuclear reactor at NagarjunaSagar, Tehridam, Ralegaon Siddhi (Anna Hazare), Kolleru lake – aquaculature, Florosis in Andhra Pradesh, etc.

Course Outcome:

- **Environmental Understanding**: Students will grasp the fundamental concepts of the environment, ecosystems, and human impact, enabling them to analyze architectural projects with environmental awareness.
- **Biogeographic Expertise**: Graduates will identify and assess India's diverse biogeographic regions, making informed design decisions that respect regional flora and fauna variations.

- **Pollution Control Proficiency**: Students will gain expertise in recognizing, understanding, and mitigating various forms of pollution, ensuring eco-friendly architectural solutions.
- **Disaster Resilience**: Graduates will comprehend the impact of natural disasters and climate change, equipping them to design resilient, sustainable structures and communities.
- **Sustainable Development Know-How**: Students will develop a strong foundation in sustainable development, circular economy, and renewable energy integration for environmentally responsible architectural projects.
- **Legal and Ethical Compliance**: Graduates will understand environmental regulations and international conventions, promoting adherence to legal standards and ethical architectural practices.

REFERENCES:

1) Miller T.G Jr., Environmental Sciences,
2) SC Sharma & MP Poonia, Environmental Studies
3) OP Gupta, Elements of Environmental Pollution Control
4) SC Sharma, Disaster Management
5) Cunningham, W.P. Cooper, T.H. Gorhani, E &Hepworth, Environmental Encyclopedia
6) E.P. Odum, Ecology
7) Keshav Kant & Rajni Kant, Air Pollution and Control

FIFTH SEMESTER

ARC3101
ARCHITECTURAL DESIGN-IV

Course Objective:

This Course is intended to develop an understanding on design issues, formulating concepts and the skills of creative design synthesis and considerate essentials for a housing project, user- satisfaction and how to design closed environment buildings in urban areas.

- To understand how the site's functional activities are organised in response to the needs of the user.
- Integrating the horizontal and vertical circulation systems, services, open areas, and parking, etc.
- Analysing the response of a building to the environment, interior comfort for activities, air conditioning, lighting, and other factors.
- Assessing the relationship between housing demands and socio-economic variables such as income levels, privacy, social behaviour, socialisation, and so on.
- Designing a building with consideration for materials, structure, and services.
- Lighting and ventilation and Integration of form and function.
- Understanding of the bye-laws and codes involved in the design of the building typology prescribed for the course.

The list of suggested topics to be covered as design problems include:

Row housing, block of flats and residential complexes at an intermediate scale such as staff housing, housing for specific communities in urban areas.

Auditoriums, Art Gallery, Museums, Public Library, Corporate Offices.

At least one major exercise (8 weeks) and two minor design (6weeks) problems should be given. The final submission shall necessarily include a model for the main problem.

Assessment:

Continuous assessment will be conducted for major (30M) and minor (20M) design problems i.e., total marks of (30M+20M) =50M

Course Outcome:

- **Analyze Architectural Concepts**: Apply critical thinking and analysis skills to deconstruct and evaluate architectural concepts and principles in the design of row housing, flats, and residential complexes.
- **Evaluate Design Solutions**: Assess and critique design solutions for urban housing, auditoriums, art galleries, museums, and corporate offices, considering functionality, aesthetics, and user needs.

- **Create Innovative Design Proposals**: Generate innovative design proposals for staff housing, community-specific housing, and public facilities, integrating creativity and originality.
- **Apply Advanced Design Techniques**: Apply advanced architectural design techniques and principles to develop detailed architectural plans, models, and presentations for complex design problems.
- **Collaborate in a Design Team**: Collaborate effectively within a design team, demonstrating strong communication, teamwork, and leadership skills in design projects.
- **Construct Physical Models**: Demonstrate proficiency in architectural modeling, creating a physical model as the final submission for the major design project, integrating knowledge and skills acquired throughout the course.

References:

1) Time saver standards for housing and residential development, Joseph De Chaira
2) Designing Architecture, The Elements of Process By Andrew Pressman · 2012
3) Social Housing, Architecture and Design, By Carles Broto · 2014
4) The Housing Design Handbook, A Guide to Good Practice By David Levitt, Jo McCafferty · 2018
5) National Building Code : 2016, Bureau of Indian Standards

ARC3102
HUMAN SETTLEMENTS & TOWN PLANNING

Course Objective:

- To give an overview of the historical aspects of settlements, planning and urbanisation.
- To introduce the vocabulary, elements and classification of human settlements.
- To study the scope of town planning and legislation in development.
- To sensitise on the byelaws and contemporary policies/programmes with particular emphasis in Indian context.
- To give an understanding of planning addressing current issues.
- To introduce various planning techniques and surveys.

CONTENTS

(Settlements history)

Brief review of the origin of early human settlements and factors responsible. Brief study of settlements up to and after the industrial revolution in Europe, U.S and India in particular.

Contributions of Ebenezer Howard, Lewis Mumford, Patrick Geddes, C.A. Doxiadis. Visionary/ Utopian city concepts by Le Corbusier, Frank Lloyd Wright. Modern town planning principles and examples including Manhattan and New Town movement in Britain. Planning of the capital cities of Brasilia and Chandigarh.

(Forms of Human Settlements)

Human beings and settlements. Nature, shells and networks- their functions and linkages. Anatomy and classification of human settlements- locational, resource based, population size and occupational structure.

Structure and form of settlements - linear, non- linear and circular, combinations. Reasons for development. Advantages and disadvantages. Case studies. Factors influencing the growth and decay of human settlements.

(Rural and Urban Settlements)

Type and classification of settlements of Urban and Rural, according to formal, administration norms (census etc.) and according to planning theories. Physical differences and relationships between Urban and Rural settlements, Rural-Urban Migration.

(Administrative Aspects of Town Planning)

General aim and principles of development control in urban areas, legislation as a tool in town planning. Ecological, social and economic aspects of town planning in India. Brief introduction to the town planning organization in India (National & Local) and Urbanization – Facts, elementary theories and problems related to urbanization with social reference to India.

(The planning concepts, techniques and urban renewal)

Introduction to the concepts of green belts, satellite towns, neighbourhood, housing, community facilities etc. Techniques of Planning: Planning survey techniques. Scope, content and limitations of master plan. Urban renewal, redevelopment, rehabilitation and conservation. Urban development projects – case studies.

(Building Byelaws & Contemporary Policies/Programme)

Principles, Objectives and Importance of Bye Laws. Basic standards like Setbacks, Plot Sizes, FSI, CBD, Land use, Net Density etc. Review of Housing & Slums in 5 Year Plans. Introduction to Policies/Programmes of urbanization, Housing, Slums and development with special reference to Andhra Pradesh.

(City Planning)

Principles of city planning; contemporary aspects of urban planning in India: Sustainable planning concepts, new forms of developments, to include self-sustained communities, SEZ, integrated townships, eco-cities, smart cities. Case studies.

(Traffic and Transportation Planning)

Classification of Urban Roads and street systems; Parking. Principles and Survey Methods: O-D surveys, desire line diagrams trip generation, attraction, distribution and model split. Traffic and Transport Management in urban areas, intelligent transportation System; mass transportation, transit-oriented development (TOD), para-transits and other modes of transportation, pedestrian & slow-moving traffic planning.

Course Outcomes:

- **Remember**: Students will recall historical events and key figures in urban development, such as Ebenezer Howard, Le Corbusier, and urbanization facts, demonstrating knowledge of foundational concepts in town planning.
- **Understand**: Learners will explain the principles and classifications of human settlements, differentiating between rural and urban areas, and interpreting the legislative tools used in town planning.
- **Apply**: Students will apply their knowledge of settlement structure and planning techniques to analyze real-world case studies, proposing solutions for urban development, renewal, and rehabilitation projects.
- **Analyze**: Through the examination of factors influencing the growth and decay of human settlements, students will assess the advantages and disadvantages of various settlement forms and sizes, demonstrating critical thinking and problem-solving skills.
- **Evaluate**: Learners will assess the ecological, social, and economic aspects of town planning in India, evaluating the impact of legislation on urban development and suggesting improvements for sustainable planning concepts.
- **Create**: Informed by contemporary policies and principles of city planning, students will design and propose innovative urban development projects, incorporating traffic and transportation planning, showcasing their creativity and ability to synthesize knowledge for practical applications.

TEXT BOOKS:

1) C.L.Doxiadis, Ekistics, 'An Introduction to the Science of Human Settlements', Hutchinson, London, 1968.
2) House, Form and Culture by Amos Rappoport.
3) Urban Pattern by Arthur.B.Gallion.
4) Andrew D Thomas, 'Housing and Urban Renewal', Harper Collins, 1986

REFERENCES:

1) Town Planning by Rangwala.
2) Planning the Indian city by Mahesh.N.Buch.
3) Strategies in Development Planning Edited byAlok Kumar Singh, Vinay Kumar Rao, Anand Promod Mishra.
4) Land-use Planning Techniques of Implementation by T.William Patterson.
5) Land Acquisition Manual in Andhra Pradesh by E.L.Bhagiratha Rao.
6) Urban and Rural Development in India. By R.K.Khosla.
7) Commentates on hand Reforms laws in Andhra Pradesh by Padala Rama Reddy, Padala Srinivasa Reddy.
8) Urban and Regional Planning by K.S.RameGowda.
9) Regional Planning in India by Mahesh Chand., Vinay Kumar Puri**.**

ARC3103
LANDSCAPE DESIGN & SITE PLANNING

Course Objective:

The objective of the subject is to enable students to understand:

- To provide an overview of evolution of landscape through time.
- To understand various elements of landscape
- To be able to do site studies
- To develop skills of design, planting design and construction details

CONTENTS

(Introduction to Landscape Design)

Landscape development in historical perspective – brief review of development of garden styles. Importance and role of landscape in architecture. A brief review of evolution of concepts in landscape design. Contemporary application of landscape designs. Recent trends of landscape practices (Biophilic, Miyawaki Methods, etc.)

(Site Studies and Site Planning)

Understanding different site characteristics and evaluation of their potential for development. Philosophical and design issues related to site development –i.e. siting of buildings, spatial and contextual relationships of built and outdoor spaces, site and its relationship to its surroundings. Importance of climatic, social factors in development of site. Process of design development. Identifying functional requirements of site, development of site by mutual exploitation of forms and use of grading principles. (Study should include at least two exercises in site planning).

(Elements in Landscape Design)

Use of landform, water, vegetation as elements of Landscape design and types of garden furniture, lighting and water feature Pavement types, patterns, and hard landscapes Sculptures and architectural features and elements Design concept related to use of landscape elements in outdoor design - Grouping of elements, visual effects etc.

(Plants and Planting Design)

Botanical nomenclature, anatomy and physiology

Plant growth and development, plant communities and their environments in Indian Context

Plants and landscape - Basic principles, appearance of plants, functional and visual effects with plants in landscape

Landscape layout and planting techniques Planting design and practice.

(Landscape Construction)

Elementary knowledge of grading cut and file, shaping the site Use of materials use in landscape and their details

Laying paths with different materials like pebble paving slabs, stone etc Construction of garden steps

Construction of screen, trellis, wall fences, gates, decks Construction and detailing of drain inlets, curbs and gutter details Fountain and pool construction

Elementary knowledge of irrigation systems, and water supply, lighting systems.

Course outcomes:

- **Remember**: Students will recall historical events and key figures in urban development, such as Ebenezer Howard, Le Corbusier, and urbanization facts, demonstrating knowledge of foundational concepts in town planning.
- **Understand**: Learners will explain the principles and classifications of human settlements, differentiating between rural and urban areas, and interpreting the legislative tools used in town planning.
- **Apply**: Students will apply their knowledge of settlement structure and planning techniques to analyze real-world case studies, proposing solutions for urban development, renewal, and rehabilitation projects.
- **Analyze**: Through the examination of factors influencing the growth and decay of human settlements, students will assess the advantages and disadvantages of various settlement forms and sizes, demonstrating critical thinking and problem-solving skills.
- **Evaluate**: Learners will assess the ecological, social, and economic aspects of town planning in India, evaluating the impact of legislation on urban development and suggesting improvements for sustainable planning concepts.
- **Create**: Informed by contemporary policies and principles of city planning, students will design and propose innovative urban development projects, incorporating traffic and transportation planning, showcasing their creativity and ability to synthesize knowledge for practical applications.

Important Note: Community Service Project like botanical survey and documentation should be an integral part of the Landscape Design as an assignment.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for 20M, and 10 Marks for Community Service Project i.e. total marks will be (20M+10M)=30M.

TEXT BOOKS:

1) An introduction to Landscape Architecture – Michael Laurie
2) Landscape Architecture, A Manual of Site Planning and Design By John Ormsbee Simonds · 1998
3) A Guide to Site Planning and Landscape Construction, By Harvey M. Rubenstein

References:

1) Landscape Construction and detailing by Alan Blanc
2) T.S.S. for Landscape Architecture
3) Planting Design by Bian Hacheat
4) Land and Landscape – Brenda Colise
5) Common trees by Snatapaer
6) Beautiful Shrubs by Prathiba Devi

ARC3104
BUILDING MATERIALS & CONSTRUCTION-V

Course Objective:

The objective of the subject is to enable students to understand:

- Large span truss components and construction detail

CONTENTS

(Modular Co-ordination, Systems)

Modular space grid. Modular dimensioning and modular drawing. Modular dimensioning according to Ancient Indian Treatise. Preferred sizes for horizontal and vertical coordinating and controlling dimensions. Controlling dimensions for widths of building components. Controlling dimensions for heights of building components. Floor heights & room heights. Analysis of building elements / components for introduction of prefabrication in India context. Classification of prefabricated components.

(Space Structures)

Skeleton frame works (space frames) - single layer grids (two-way, three way & four way) and double layer grids (lattice grids & true space grids). Offset grids and differential grids.

(Advanced Use of Concrete)

Concrete shell roofs of various types and folded plates construction techniques, its strength and durability. Study on different forms& shapes of shell structures (its construction details and materials). Study of prefabricated commercially available systems (Space Deck System, Triodetic System, Mero System & Nodus System, Geodesic Domes).

(Precast and Prestressed Construction)

Design and detailing of concrete used in advanced construction such as Precast concrete, pre stressed concrete, folded plates, shell structures, vaults, domes, decorative concrete, insulated concrete forms (ICF), Concrete for Seismic design.

(Digital and Tensile Materials)

Types of materials and its constitution –manufacturing, construction technology and requirement for 3D printed buildings structure and extraterrestrial printed structures. Tensile fabric structure by digital printing - translucent fabric, thin-film photovoltaic, texlon foil, PVC (poly vinyl chloride) coated polyester cloth and poly tetra fluroethlene, coated glass cloth etc.

Course outcome:

- **Knowledge**: Define and explain the principles of modular coordination, space structures, and advanced concrete construction techniques, showcasing comprehension of terminology and concepts.
- **Comprehension**: Compare and contrast various precast and prestressed concrete systems, and evaluate their suitability in diverse construction scenarios.

- **Application**: Demonstrate the ability to use modular dimensioning principles, perform structural analyses of building elements, and propose prefabrication strategies in real-world construction projects.
- **Analysis**: Analyze the strengths and weaknesses of different space frame structures, evaluating their structural integrity and design considerations.
- **Synthesis**: Develop innovative solutions for concrete shell roof designs and shell structures, integrating advanced construction techniques and materials to create durable, aesthetically pleasing buildings.
- **Evaluation:** Assess the environmental and economic implications of digital and tensile materials in construction, and critique their suitability for 3D printed and extraterrestrial structures, considering sustainability and efficiency.

TEXT BOOKS:

1) Building Construction Handbook, By Roy Chudley, Roger Greeno
2) Advanced Materials and Techniques for Reinforced Concrete Structures By Mohamed El-Reedy
3) Construction of Prestressed Concrete Structures By Ben C. Gerwick ·

REFERENCES:

1) Makowski, Analysis, Design and Construction of Double - Layer Grids
2) K.Heki, (ed.), Shells, Membranes and Space Frames
3) Material Architecture: Emergent Materials for Innovative Buildings and Ecological Construction
4) Blaine Brownell, Trans material 2

ARC3105
BUILDING SERVICES-III
(ELECTRICAL & HVAC SERVICES)

Course Objective:

The objective of the subject is to enable students to understand and apply:

- Understand Basic laws and terminologies related to electrical services in buildings.
- Electrical requirements for given situation, its calculations and design.
- Artificial Illumination and its application in buildings.
- Overview and introduction to heating, ventilation, and air conditioning focusing on different HVAC systems.
- HVAC requirements for given situation, its calculations and design.

CONTENTS

(Introduction to Electrical Services)

To understand the need for and importance of electrical services and artificial illumination in buildings. Principles of electricity, units and basic terminology. Brief introduction to generation of electricity; types of power stations, power distribution system in city; function of sub stations; locational guidelines for substations, land and other infrastructural requirement for substation; power distribution system in locality.

(Electrification)

Calculation of electrical load for residential and non-residential buildings. Types of wires and electrical wiring systems, electrical installations in a building from the supply company mains to individual outlet points including meter board, distribution board, and layout of points with load calculations. Electrical control and safety devices such as switches, fuse, circuit breakers, earthing, lightning conductors etc. Norms and standards for site level transformers and layout of substations. Types of distribution networks at site level. Solar energy integrated electrical design of buildings and smart buildings. Strategies for low power consumption.

(Illumination)

Light and its characteristics, terminologies such as luminous flux, candle, solid angle, illumination, utilization factor etc. Types of illumination schemes such as ambient, task, focal decorative, etc. Illumination standards for different activities and numerical on design calculations for illumination schemes. Types of luminaries such as direct, indirect and diffused. Discharge lamps such as incandescent, high- and Low-pressure lamps, CFLs, LEDs etc. Principles of luminous efficiency. Understanding natural illumination and integrating it with artificial illumination.

(Introduction to HVAC & Psychrometry)

To understand the need and importance of mechanical services. Basic principles, laws and terminologies related to HVAC such as solar angles, U-values, psychrometric charts, etc. Evaporative cooling systems of air conditioning, refrigerant cycle and its reversal. Components of mechanical vapour compression and refrigeration systems. Natural and artificial ventilation. Thermal comfort parameters. Understanding psychometric chart for HVAC design. Heat load calculations.

(Air Conditioning Systems)

To understand types of air conditioners such as window, split, packaged, direct expansion, central etc. Their selection criteria, design, structural considerations and energy requirements. To understand passive heating and cooling systems and integration with active systems.

(Electrical, Mechanical Drawing and Market Survey)

Market survey for Materials, apparatus, joints, fixtures, breakers and luminaries such as recessed, mounted, spot, decorative, etc. To prepare electrical design project for a small building such as residence, primary school etc. Output will be in the form of load calculation sheets, circuit diagrams and layout drawings. Illumination calculations and design for a space for the selected building.

Market survey of HVAC equipment's. The understanding of HVAC needs for different building like residential commercial, etc. project work: To calculate AC load for small space such as Living, bedrooms, home theatre, conference and seminar halls etc.

Course Outcomes:

- Understanding the Basics At the end of this course, students will be able to demonstrate knowledge and comprehension of electrical services and HVAC systems in buildings, including principles, terminology, and the generation of electricity. (Knowledge and Comprehension)
- Electrical Load Calculations Students will be proficient in calculating electrical loads for residential and non-residential buildings, selecting wiring systems, and designing electrical installations from mains to individual outlets, incorporating control and safety devices. (Application)
- Illumination Design Upon completion, students will be capable of designing effective illumination schemes, selecting appropriate luminaries, and integrating natural and artificial lighting in buildings while adhering to standards and conducting design calculations. (Analysis and Synthesis)
- HVAC Understanding Students will demonstrate a thorough understanding of HVAC principles, laws, and components, and be able to perform heat load calculations, select air conditioning systems, and integrate passive heating and cooling systems. (Comprehension and Application)
- Market Survey and Project Design By the end of the course, students will possess the skills to conduct market surveys for electrical and HVAC materials and equipment, and they will be able to prepare electrical and HVAC design projects for small buildings. (Application and Evaluation)
- Load Calculation and Design Students will excel in calculating air conditioning loads for different spaces within buildings, such as living areas, bedrooms, home theatres, conference rooms, and seminar halls. They will be able to apply this knowledge to design efficient HVAC systems. (Application)

TEXT BOOKS:-

1) John Mathew, Introduction to the Design and Analysis of Building Electrical System.
2) Kothari and Nagrath, Basic Electrical Engineering
3) Grondzik, Kwok, Stein, Mechanical and Electrical Equipment for Buildings.
4) Ananthanarayana, Basic Refrigeration and Air Conditioning
5) Ananthanarayana, Basic Refrigeration and Air Conditioning

REFERENCES

1) Catalogues of leading Audio equipment's companies
2) National Building Code of India: National Electrical Code.
3) Raina & Bhattacharya, Electrical Design Estimating and Costing.
4) Kelly & Connell, Interior Lighting Design - A Student's Guide.
5) Sadhu Singh, Refrigeration and Air Conditioning

ARC3106
DESIGN OF STRUCTURES- II

Course objective:

- To familiarize the student about steel structures and the type of steel sections available in the market and used in design.
- To impart knowledge about the limit state method of design of steel structures.
- To develop knowledge and skills to analyse and find strength of a joint and member.
- To develop knowledge and skills to design a joint, tension member, compression member and beam.
- To develop knowledge and skills to analyse and design foundations.

CONTENTS

(Introduction to Steel structures)

Introduction, Advantages and disadvantages of steel as structural material, Stress-Strain curve for mild steel, rolled steel sections, Introduction to IS 800:2007.

(Design of connections: Bolted and Welded connections)

Bolted connections: Introduction, types of bolts, types of bolted joints, types of failure of bolted joints, Behavior of bolted joints, Strength and efficiency of a joint, Design of bolted connection (concentrically loaded).

Welded Connections: Introduction, Advantages of welding, types of welds, Types and prosperities of welds, Types of joints, weld specifications, Design of Groove welds and Fillet welds subjected to axial load.

(Design of Tension Members)

Introduction, Types of tension members, Slenderness ratio, Net sectional area, Effective net area, Types of failure, Strength of tension members, Displacement of tension members; Design of tension members subjected to axial load.

(Design of Beams)

Introduction, Types of sections, Classification of Cross section, Lateral stability of beams, Elastic critical moment, Bending and Shear strength of beams, Web buckling, Web crippling, Deflection, Design of Laterally supported and unsupported rolled steel beams, Design of built-up beams (with flange plates only), checks for shear and deflection.

(Design of Compression Members)

Introduction, Types of sections, Classification of Cross section, Effective length, Radius of gyration, Slenderness ratio, Types of buckling, Deflection, Design of axially loaded compression members, built up compression members (Lacing only).

(Design of Foundations)

Introduction, Types of column bases, Allowable stress in bearing, Design of slab base and Design of gusset base subjected to axial load only.

Note:

Design of steel structures conforming to IS 800:2007. The class and assignment work should be supplemented with appropriate site visits.

Course Outcome:

Student should be able to

- Design a Bolted connection and Welded Connection and determine the efficiency of a joint.
- Design a tension member subjected to axial load and check its adequacy.
- Design Laterally supported and Laterally unsupported beams and check for shear, deflection, Web buckling and Web crippling.
- Understand the behaviour of compression members and importance of slenderness ratio and type of sections.
- Design of axially loaded compression members and built up compression members with Lacing.
- Design of slab base and gusset base subjected to axial load.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment i.e. total marks will be (20M+10M) =30M

TEXT Books:

1. Limit State Design of Steel structures by S.K.Duggal, Publishers: McGraw-Hill Education.

REFERENCES:

1. Design of Steel structures by N. Subramanian, Oxford University Press.
2. Limit State Design of steel structures by Ramchandra and Virendra Gehlot, Scientific Publishers (India)
3. Design of steel structures by K.S.Sai Ram, Pearson Education India.
4. Design of steel structures by Limit State Method as per IS: 800-2007 by S.S. Bhavikatti, IK International Publishing House, Bangalore.

ARC3107
OPEN ELECTIVE -I

Open Electives - Student shall choose an open Elective from the list of courses offered by the department in such a manner that he/she has not studied the same course in any form during the Programme.

(Or)

The student may be allowed (with prior permission from HoD) to select course (Minimum of 8 Weeks) from NPTEL/ SWAYAM platform other than the basic courses of the programme and submission of pass certificate at the end of the semester is mandatory for completion of the semester.

OPEN ELECTIVE –I
A. SUSTAINABLE ARCHITECTURE

Course objectives:

- To understand the concept of sustainability and sustainable development.
- To inform the various issues of climate change, ecological footprint, etc.
- To explain about various aspects of sustainable practices related to built Environment.
- To understand low impact construction practices, life cycle costs and alternative energy resources.
- Familiarize the concept of sustainable communities and urban ecology issues.
- To enhance understanding about application of sustainable practices in built-Environment by studying of efficient projects through case-studies.

CONTENTS

(Introduction to Sustainability)

Concept of sustainability – carrying capacity, sustainable development- Brutland report – ethics and visions of sustainability. Circles of sustainability – sustainable economy and use, cradle to cradle concept.

(Sustainable Architecture Practices)

Study on sustainable Architecture, vernacular techniques, selection of materials, eco building materials and construction, technological advancements in climate control in various climatic zones.

(Energy and Buildings)

Energy efficiency, sources of energy and need for energy conservation, concept of embodied energy and transportation energy, total energy assessment in buildings, zero energy buildings.

[Sustainable Planning]

Sustainable site selection and development, urban ecology, urban heat island effect, smog, etc. various case studies on eco cities or communities.

[Case Study]

Case study on contemporary sustainable architecture.

Course outcomes:

- Knowledge Application: Apply the concept of sustainability to analyze the carrying capacity of a site, demonstrating the ability to integrate ecological principles into architectural design.
- Comprehension and Analysis: Critically evaluate the Brutland report and various ethical perspectives on sustainability to inform design decisions and ethical considerations in architectural projects.
- Synthesis of Sustainable Practices: Integrate vernacular techniques, eco-friendly materials, and advanced climate control technology into architectural designs, promoting sustainable building practices.

- Evaluation of Energy Efficiency: Assess energy sources and conservation needs, employing embodied energy and transportation energy concepts to design energy-efficient buildings.
- Application of Sustainable Planning: Demonstrate the selection of sustainable building sites, incorporating urban ecology principles to mitigate urban heat island effects and smog in real-world scenarios.
- Case Study Analysis: Analyze and present a case study of contemporary sustainable architecture, showcasing the ability to evaluate, compare, and draw insights from successful sustainable architectural projects.

REFERENCE BOOKS:

1. Dominique Gauzin – Muller, "sustainable Architecture and Urbanism: concepts, technologies and examples", Birkhauser, 2002.
2. Slessor, Eco-Tech: "Sustainable Architecture and High Technology", Thames and Hudson 1997.
3. Ken Yeang, "Ecodesign: A manual for Ecological Design", Wiley Academy, 2006.
4. Patrick Waterfield, "The Energy Efficient Home: A Complete Guide", Crowood press ltd, 2011.
5. Dean Hawkes, "Energy Efficient Buildings: Architecture, Engineering and Environment", W.W. Norton & Company, 2002
6. Majumdar M, "Energy-efficient Building in India", TERI Press, 2000.

OPEN ELECTIVE-I
B. BARRIER FREE ARCHITECTURE

Course Objective:

- Indian Disabilities Act, is promulgated in 1995 for the purpose of ensuring equal opportunities to persons with disabilities in society for their development through education, training and rehabilitation services. The principle objective is to ensure their full participation by preventing discrimination and integrating them into the mainstream of society. An Architect plays a very crucial role in this endeavor by designing the needed barrier free environment. The objective of this course is to acquaint the students of architecture regarding the various provisions and design issues.

CONTENTS

(Unit I)

Introduction to Provisions of persons with Disabilities (Equal opportunities, Protection of Rights and Full Participation) Act, 1995, Type of disabilities- Orthopedic, Hearing, Visual Impairments, National Policy for provisions for elderly persons, Concept of equal opportunity, human rights, social justice and empowerment of physically challenged persons.

(Unit II)

Introduction to similar efforts in other countries. Initiatives at global and International level for protection of rights of disabled and also elderly person. American disabilities Act 1990 etc.

(Unit-III)

Information on various types of national Institutes, agencies and professional bodies involved in disabled welfare, associated norms and standards thereof. The role of NGO's, professional and outreach.

(Unit-IV)

Design principles in Architecture for creating environments friendly for various types of physically challenged persons. Educational Institutions, Hospitals, Transportation terminals such as bus, railway stations and airports for barrier free spaces. Study of standards as given in TSS, TCPO, CPWD, ADA etc., and others.

(Unit-V)

Provisions in public spaces and site planning– parks, play grounds, public transportation, parking lots, Details of sidewalks, road intersections, access to public toilets.

(Unit-VI)

Provisions in design of public buildings - Details in, ramps, guide rails, lifts, dimensions of wheel chairs, accessibility in public buildings, Signage, audio visual facilities etc. Design of Toilets and interiors spaces for use of physically challenged. Exercises in design of user friendly spaces for physically challenged persons. Term paper on certain type of disability and requirements thereof for making environs barrier free or any other exercise appropriately framed by the subject faculty.

Course outcome

- Knowledge Application: Apply an understanding of the Provisions of Persons with Disabilities Act, 1995 to design barrier-free environments in various settings, considering the needs of different disability types.
- Comprehension and Analysis: Analyze global initiatives and legislation related to disability rights and elderly care, demonstrating an understanding of international efforts in the field.
- Application of Standards: Utilize knowledge of national institutions, agencies, and professional bodies to meet established norms and standards for creating accessible spaces, including those set by TSS, TCPO, CPWD, ADA, and others.
- Design Proficiency: Demonstrate proficiency in designing user-friendly spaces for physically challenged individuals in public areas, educational institutions, healthcare facilities, and transportation hubs.
- Problem-Solving and Creativity: Innovatively address challenges related to public space design, offering solutions for parks, playgrounds, transportation terminals, and public restrooms that accommodate the needs of individuals with disabilities.
- Critical Evaluation and Communication: Critically assess the accessibility of public buildings, including the design of ramps, guide rails, lifts, and interior spaces, while effectively communicating these evaluations through term papers and exercises.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for 20M, and 10 Marks for continuous assessment i.e. total marks will be (20M+10M)=30M

References:

1. Micheal J. Bednar. "Barrier Free Environments", Dowden, Hutchinson and
2. Ross, Ive 1977.
3. Ministry of Urban Affairs and Employment. Central Public Works Department, India, "Guidelines and Space Standards for Barrier Free Environment for Disabled and Elderly Person, 1998.
4. Unnati. "Design Manual for a Barrier – Free Built Environment", Handicap
5. International, December, 2004.

OPEN ELECTIVE-I
C. THEORY OF ENVIRONMENTAL PLANNING

Course Objective:

- To study Concepts of Ecology and Ecosystem and undertake Resource Analysis for various Ecosystems.
- To study Environmental Issues and Development Imperatives.

CONTENTS

(Concepts of Ecology, Ecosystem and Environmental Planning)

History of Environmental Planning, Development of habitat patterns, settlement structure and form in response to environmental challenges; Concepts of Ecology and Ecosystem, Urban Ecosystem.

(Resource Analysis and Conservation)

Resource analysis for various ecosystems and development imperatives (land, geology, soil, climate, water, vegetation) characteristics, exploitation, causative factors for degradation, analytical techniques.

(Environmental Zones)

Environmental Zones (Hill, coastal, arid, characteristics, resources, settlements pattern, problems and potentials, regulating mechanisms for development.

(Environmental Policies, Significant Conventions, Conferences)

Environmental Policies and initiatives including policies, strategies, protocols, treaties and agreements.

Course Outcome:

- **Knowledge**:Understand the historical evolution of environmental planning and its impact on habitat patterns and settlement structures in response to environmental challenges.
- **Comprehension**: Explain the fundamental concepts of ecology and ecosystem dynamics, and their relevance to urban ecosystems.

- **Application**: Apply resource analysis techniques to assess various ecosystems, considering land, geology, soil, climate, water, and vegetation, and identify development imperatives.
- **Analysis**: Analyze the causative factors contributing to environmental degradation and utilize appropriate analytical methods for assessing resource characteristics.
- **Synthesis**: Create comprehensive environmental zoning strategies for hill, coastal, and arid regions, considering their unique characteristics, resources, settlement patterns, and potential for development.
- **Evaluation**: Evaluate the effectiveness of environmental policies, strategies, protocols, treaties, and agreements, and their impact on sustainable environmental planning and conservation efforts.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for 20M, and 10 Marks for continuous assessment i.e. total marks will be (20M+10M)=30M

References:

1. The Human Impact on the Natural Environment – Past, Present and Future, Andrews, Goudie, 2006 Wiley Publishers.
2. James K. Lein Integrated Environmental Planning, 2002 Wiley Publishers
3. V.H. Dale, Mary R.English Tools to Aid Environmental Decision Making Latest Edition Swinger.

ARC3108
SUMMER INTERNSHIP -I

Summer Internship 8 weeks: Every student must complete a mandatory 8-week Summer Internship at any local Architectural firm (Chief Architect of the firm shall have at least 2 years of professional experience) during the summer vacation after completion of 2nd year 2nd semester, and the completion certificate along with portfolio must be submitted in the department at the beginning of the 3rd year of the 1st Semester for oral presentation by the student and evaluation through the departmental committee for awarding a credit.

SIXTH SEMESTER

ARC3201
ARCHITECTURAL DESIGN – V

Course objectives:

- To study issues related to institutional design development, understanding the norms and design issues associated with urban infrastructure design in urban context, Integration of climate, sound; structure and services into group of buildings; functional movement; landscape and site planning; Institutional character; User behaviour and requirements pertaining to the physically handicapped.

Course Content

- The design studio shall conduct on Institutional design addressing to nature of contemporary institution, correlation to urban structure; Development control and urban infrastructure affecting design; Various attitudes to building in urban context; Integration to function and movement, climate, and sound, structure and services into group of buildings; landscaping and site planning; Institutional character from abstract to detail; User behaviour and requirements pertaining to the physically handicapped along with necessary theoretical inputs to be given highlighting the norms and design issues.

List of Suggested Design Topics

Institution of learning–colleges with various departments such as medical, engineering, law, business, music and dance colleges, vocational training institutes etc,. topics to be covered as design problem.

Institutions of research in various disciplines.

Institutions of life such as hospitals, reformatories and rehabilitation institutes for the disabled.

Local/ legal institutions such as the high courts, secretariat, development authorities, directorates etc.

One major exercise (8 weeks) and two minor design (6weeks) problems shall be conducted. Use of 'SKETCHUP' software in development of design concepts and other related work during continues assessment of the major and minor design problems shall be compulsory. The final portfolio submission in AutoCAD and a model for the main problem shall be compulsory.

Assessment

Continuous assessment will be conducted for major (30M) and minor (20M) design problems i.e. total marks of (30M+20M) =50M

Course outcome:

- **Create Innovative Institutional Designs**: Apply creativity and originality to design contemporary institutions that seamlessly integrate with urban environments, demonstrating high-level synthesis and evaluation skills in the design process (Bloom's Synthesis).
- **Analyze and Address User Needs**: Assess and address the unique functional and accessibility requirements of diverse users, including the physically handicapped, within institutional spaces, utilizing a deep understanding of design norms and issues (Bloom's Analysis).
- **Interdisciplinary Design Thinking**: Integrate multiple aspects, such as urban infrastructure, climate, sound, structure, and services, into institutional design, showcasing a comprehensive grasp of various design factors (Bloom's Comprehension).
- **Demonstrate Proficiency with Design Software**: Utilize 'SKETCHUP' software to develop and communicate design concepts effectively, demonstrating competence and practical application of design tools (Bloom's Application).
- **Develop Complex Design Portfolios**: Construct a comprehensive design portfolio in AutoCAD, showcasing both major and minor design projects, highlighting the ability to organize and synthesize information for effective communication (Bloom's Evaluation).
- **Construct Physical Design Models**: Create detailed physical models for major design exercises, exhibiting proficiency in translating abstract concepts into tangible representations (Bloom's Application).

REFERENCES:

1) Libraries - Allan Konya.
2) Institutional Buildings Architecture of Controlled Environment –Louis G.Stone.
3) Hospital Architecture and Beyond – IsodoreRosenfield.
4) Time savers standards of building types – Joseph De Chiara & others 5
5) A History of Building Types – Nikolaus Pevsner
6) Architects` Data - Ernst Neufert
7) Handbook of Planning and Designing Data.
8) Doctor’s office & clinics – Paul Hayden kirk ,EngeneD.Stermberg.
9) Libraries for Schools and Universities – Triedmann wild.

ARC3202
WORKING DRAWINGS-I

Course Objective:

- Drawings good for construction for effective execution at construction site, explaining the building services scheme both inside and outside the building envelope but inside the construction site are the core objectives of this course.
- To impart to students a thorough insight into various finishes, both internal and external of a building.

- Students will learn various fabrication techniques needed for project successful completion.
- Preparation of Execution drawings with illustrations
- Students shall do site visit and case studies to know the various details
- Data collection from the market survey regarding construction material and detailing.

CONTENTS

(Architectural Drawings at Building level)

Preparation of detail site plan, floor plans, furniture layout, and roof level plan required for the execution of work at the site. Preparation of drawings giving detail of site sections, building sections and elevation to depict building heights, projections, floor levels and material used.

(Structural Layout Drawings)

Preparation of detail drawings like Centre line drawing, trench layout, footing layout, plinth beam and beam layout and RCC Slab layout and the cross sections wherever necessary as per the design.

(Architectural Drawings of Masonry and Openings)

Preparation of detail masonry drawing of the whole building as per the design. Design and prepare detail drawings of doors, windows, openings with specifications of materials. Detail drawing for the grill, jail work etc. as required for the building.

(Architectural Drawings of Vertical Circulation as Staircase/ Lift etc.

Preparation of drawing for the layout of staircase, its detail and specification for the execution on the site as per the design. Illustration drawing of the handrail, baluster, rail fitting etc. as per the design.

(Architectural Drawings for Landscape and Site Development)

Preparation of drawing for the landscape layouts at the building level and at site level as per the design. Detailing of the site for example different level on the site, as required for the site development.

Course outcome:

- **Comprehension** Upon completing this course, students will be able to understand the essential components of architectural drawings, including site plans, floor plans, and elevations, and demonstrate a grasp of their significance in construction.
- **Application** Students will apply their knowledge to create detailed structural layout drawings, including centerline, footing, plinth beam, and slab layouts, ensuring alignment with the design specifications and requirements.
- **Analysis** Upon completion of this course, students will critically analyze masonry and openings, producing detailed drawings of doors, windows, and specifications for materials, while addressing design integrity and functionality.
- **Synthesis** Students will synthesize their learning to develop architectural drawings for vertical circulation elements like staircases and lifts, creating detailed layouts and specifications that adhere to the design criteria.

- **Evaluation** Upon completing the course, students will be able to evaluate landscape and site development drawings, ensuring that the site's topography and features are appropriately addressed in the design, and assessing the impact on the overall project.
- **Creation** Students will demonstrate the ability to create comprehensive working drawings that depict building levels, sections, and material usage, facilitating successful execution of construction projects in alignment with the original design.

Continuous Assessment:

All of the drawings stated in the syllabuses will be assessed for 50Marks as an internal assessment. The final portfolio of the student must be submitted for an external viva-voce. An external examiner will conduct a practical test and a viva-voce for the student.

Textbooks

1) Architectural Working Drawings –Ralph W.Liebing, Mimi Ford, Raul

References

1) Architectural Graphics by Francis D. K. Ching
2) Architectural Graphics Standard by Charles George Ramsey
3) Architectural Graphics Standard for Residential Construction by Dennis J. Hall
4) Drafting & Design: Basics for Interior Design by Travis Kelly Wilson
5) Specification in detail –Frank W.Makay
6) Building Drawing – M.G.Shah, CM,Kale, S.Y.Paoui

ARC3203
SPECIFICATION ESTIMATION AND COSTING

Course objective:

- To provide the student with the ability to estimate the quantities and specification of various item of works involved in buildings.

CONTENTS

(Estimation)

Purpose – Definitions and terms used principles of measurements in estimating Methods of estimation – advantages – types of estimates – detailed estimates of residential buildings – single storied and multistore buildings – earthwork – foundations – Super structure – Fittings including sanitary and electrical fittings – paintings. Earth work excavation in all types of soils including blasting operations. b) Foundation in CRS and UCRS in RCC c) Superstructures in brick masonry. d) RCC works in slabs, sunshades, lintels, etc. e) Doors and windows in wood and steel. f) Finishing work (I) painting, (II) flooring,(III) Cladding. g) Built in furniture. h) Partitions. i) Modes of measurements. Knowledge of manufacturer's specifications as a database for writing specifications for the following materials, components of the building based on surveys: Glass Plywood and laminates

Hardware Electrical wires and accessories Water supply and plumbing: fittings and fixtures flooring and cladding.

(Specifications)

Specifications – Detailed and general specifications – construction specifications – sources – types of specifications –

(Contracts, Tenders and Analysis of Rates)

Contract – types of contracts – formation of contract – contract conditions – contract problems – contract for labour, material, Tender notices – types – corrigendum notice – tender procedures - Rate analysis – preparation of rate analysis.

Course Outcome:

- Knowledge Comprehension: Students will demonstrate a comprehensive understanding of estimation principles and various methods, as well as construction specifications and their sources.
- Application: Learners will be able to apply estimation techniques to produce detailed estimates for residential buildings, including single and multi-story structures, and understand the methods for earthwork excavation and foundation construction.
- Analysis: Students will analyze different types of construction contracts, their formation, conditions, and potential problems, while also demonstrating the ability to analyze tender notices and procedures.
- Synthesis: Graduates will synthesize their knowledge to create detailed construction specifications for various building components, utilizing manufacturer's specifications as references.
- Evaluation: Learners will evaluate the advantages and disadvantages of different estimation methods, types of estimates, and construction contracts, along with conducting rate analysis for construction materials and labor.
- Creation: Students will create effective and accurate cost estimates, contracts, and tender notices for construction projects, as well as develop detailed construction specifications based on surveys and database information.

Assessment : Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for 20M, and 10 Marks for continuous assessment i.e., total marks will be (20M+10M) =30M.

TEXT BOOKS

1) Estimating and costing in Civil Engineering –Dutta B.N & Dutta S UBS Publishers & Distributors Pvt. Company, Lucknow 1986

REFERENCES:

1. Kohli, D.D and Kohli, R.C., “A Text Book of Estimating and Costing (Civil)”, S.Chand & Company Ltd., 2004.
2. Birdie G.S. “A text book on estimating and costing” –– Dhanpat Rai and Sons, New Delhi.
3. Jagannathan G, Getting more at less cost – The Value Engineering Way, Tata McGraw Hill, New Delhi, 1992.

ARC3204
BUILDING REPAIRS AND MAINTENANCE

Course Objective:

- To understand building failures, causes of decay and damage of material deterioration and defects of structural and non-structural members
- To equip students with appropriate management and technical skills that is needed for building repair and maintenance.
- To understand nature of various materials and its appropriate uses through case studies and site visits.
- To ensure maintenance through design processes and be aware of the causes of decay or damage
- To equip students to develop appropriate management and technical skills for repairs and maintenance

CONTENTS

(Failures)

Introduction to building failures, causes of decay and damage in old buildings, influence of environmental elements: heat, moisture, precipitation & frost on buildings, effect of biological agents like fungus, moss, plants, trees, algae, termite control & prevention, chemical attack on building materials & components, issues of maintenance and repair.

(Building common defects and failures)

Understanding causes of building decay/defects & ailments, Building failures-examining symptoms of various types and patterns of buildings disease, structural, non-structural finishes, stains, services ailments, leakages & dampness, corrosion protection, Sulphate attacks.

(Timber)

Moisture content, treatment prior to installation, factors reducing strength of timber, approach to repair and to the timber roofing system.

(Bricks)

Strength reducing factors in brick work, effect of ageing, weathering, temperature variation of brick-work, joints and cracks, construction defects, repair and maintenance,

(Methodical approach to Repairs in concrete and masonry)

Cracks in buildings: types, classification, investigation. Cracks over openings, sinking and sagging balconies, repairs to decayed floors and floor joints, example, jack arch, madras roof terrace, foundation sinking.

RC Concrete; Mixing methods at site, structural design for repairs, causes of failure in concrete structures, pressure-grouting,

Repair of cracks: Diagnosing & determining causes, prescribing effective remedial action. Methods of repair, epoxy injection, mortar repair for cracks: grunting and shotcreting, Waterproofing of concrete roofs, repairs to walls, Propping, strutting under pinning and jacketing, Non-destructive testing methods,

(Maintenance)

Issues of maintenance and repair, Preliminary inspection and general observation of decayed elements and difference between decay and damage. Routine preventive and curative maintenance methods. Creating database for maintenance, maintaining building registers, inventories, inspection reports, records, User complaints, buildings in danger.

Fundamentals of strengthening measures for beam and columns. Repairs to the large span rooms, water proofing the roof terraces, leakages from toilets through case studies and site visits.

Assessment

This is a studio subject and students should be made to document the problems in old buildings through inspections and propose remedial measures by preparing construction drawings as studio exercise with the theoretical inputs given through lectures.

Assignments on Building Repairs Materials for repair: special mortar & concrete, chemicals, special cements & high grade concrete, admixtures, techniques for repair, Surface repair: material selection, surface preparation, rust eliminators & polymers coating,

Course Outcomes:

- Analyze the Causes of Building Failures (Understanding): Students will demonstrate the ability to identify and understand the various causes of building failures, including environmental factors, decay, and damage, using Bloom's Taxonomy's "Understanding" level of cognitive skills.
- Diagnose and Classify Building Defects (Applying): Students will apply their knowledge to diagnose and classify building defects and ailments, differentiating between structural and non-structural issues, using the "Applying" level of cognitive skills.
- Design Effective Repair Solutions (Creating): By integrating their knowledge, students will develop creative and effective repair solutions for different building components, such as timber, bricks, and concrete, achieving the "Creating" level of cognitive skills in Bloom's Taxonomy.
- Implement Maintenance and Preventive Strategies (Analyzing): Students will analyze decayed elements and differentiate between decay and damage, developing maintenance strategies and creating a database for ongoing building care, demonstrating "Analyzing" skills in Bloom's Taxonomy.
- Apply Strengthening Measures for Structural Components (Applying): Using their understanding of strengthening measures, students will apply appropriate techniques to repair and strengthen beams, columns, and large-span rooms, emphasizing the "Applying" level of cognitive skills.
- Evaluate Repair and Maintenance Case Studies (Evaluating): Students will critically assess real-world case studies and site visits involving waterproofing,

leakage management, and repair of specific building elements, achieving the "Evaluating" level of cognitive skills in Bloom's Taxonomy.

TEXTBOOKS

1) B.G. Blake, Building Repairs, B.T. Batsford Press (1999) U.K.
2) Lan A. Melvice, Repairs and Maintenance of Houses, Estate Gazette (1999)
3) R.N. Raikar, Learning from Failures, Dhanpatrai & Sons (2008), New Delhi
4) Malcolm Hollis, Surveying for Dilapidation, Estate Gazette (1999).

REFERENCES:

1) Jagadish, K.S, Reddy, B.V. Venkatarama & Rao, K.S. Nanjunda, Alternative Building Materials and Technologies, New Age Publisher (2007), New Delhi.
2) Chandler, I. (1992). Repair and Renovation of Modern Buildings. McGraw-Hill.
3) Danish Standards Association. (2004). Repair of Concrete Structure to En 1504: A guide for renovation of concrete structures repair materials and systems according to the EN 1504 series. Boston : Elsevier.
4) Guha, P. K., Maintenance and Repairs of Buildings. New Delhi: New Central Book
5) Agency (2011).
6) Nayak, B. S. A Manual of Maintenance Engineering. New Delhi: Khanna Publishers (2013).
7) Roger, G. and Hall, F. Building Services Handbook. New York : Routledge (2013).

ARC3205
DESIGN OF STRUCTURES-III

Course objective:

- To develop skills to analyse and design flat slabs.
- To develop knowledge and skills to analyse and design combined footing and portal frames.
- To impart skills to analyse and design combined footings.
- To familiarize the student about pre-stressed structures and its application.
- To impart knowledge about the analysis of pre-stressed concrete structures.

CONTENTS

(Design of Flat slabs)

Design of flat slabs with Column Head and Column Drop only.

(Design of Footings)

Design of Circular footing and combined footing

(Portal Frames)

Design of Reinforced Concrete Portal Frames (single bay single storey)

(Retaining Walls)

Cantilever and Counter fort type, Design of Cantilever type Retaining wall only.

(Pre-stressed Concrete Structures)

Introduction, Principles, Materials, Classification, Advantages and disadvantages of prestressed concrete. Pretentioning systems, Post-tensioning and Post-tensioning anchorages.

(Losses of Prestress)

Analysis of prestress and bending stresses. Losses of prestress.
Note: Prestressed concrete conforming to IS: 1343 **198**0

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment i.e. total marks will be (20M+10M)=30M.

Course Outcome:

Student should be able to

- **Apply Structural Design Principles**: Students will be able to apply the principles of designing flat slabs with column heads and column drops, showcasing their ability to create practical structural solutions.
- **Analyze Footing Design**: Using critical thinking skills, students will analyze circular and combined footing designs to determine their suitability for specific construction projects.
- **Create Innovative Portal Frames**: Students will demonstrate their creative skills by designing innovative reinforced concrete portal frames for single-bay, single-storey buildings, fostering higher-order thinking.
- **Evaluate Retaining Wall Designs**: Applying analytical skills, students will evaluate cantilever and counterfort-type retaining wall designs, with a focus on the design of cantilever-type retaining walls.
- **Demonstrate Mastery of Prestressed Concrete**: Students will exhibit a deep understanding of prestressed concrete, its materials, and pre/post-tensioning systems, showing expertise at the comprehension level of Bloom's Taxonomy.
- **Analyze Prestress and Bending Stresses**: Through critical analysis, students will evaluate the analysis of prestress and bending stresses, identifying and mitigating losses in prestressed concrete structures, highlighting their ability to apply knowledge at the synthesis level of Bloom's Taxonomy.

TEXT Books:

1) Design of Reinforced Concrete Structures by S. Ramamrutham, Publishers: Dhanpat Rai
2) Prestressed Concrete by N. Krishna Raju, Publishers: McGraw-Hill Education.

REFERENCES:

1) Design of Reinforced Concrete Structures by M.L.Gambir, Publishers: Prentice-Hall of India Private Limited
2) Design of Reinforced Concrete Structures by P. Dayaratnam, Publishers: Oxford & IBH
3) Advanced Design of Reinforced Concrete Structures by N. Krishna Raju, Publishers: CBS Publishers and Distributers

ARC3206
COMPUTER APPLICATIONS-II

Course Objective:
The objective of the subject is to enable students to understand and apply:

- Skills and information to build comprehensive Building Information Models (BIM) using appropriate Digital software and Media.
- To understand area of computational media techniques and technologies and their impact on architectural design and production.
- To critically explore the impact of existing and emerging digital media and software, for advanced digital visualization, simulation and communication as well as associated theories and methods on the conceptualization and development of architecture.
- To delve deeper in digital techniques for visualization, data collection and analysis, building information modelling (BIM) and introduction to physical model making using computer technologies.
- To see how building systems come together improves efficiency, reduces errors and allows control of greater complexity in design.

CONTENTS

(Introduction to Fundamentals)

Key concepts of BIM - reading and manipulating the software Interface - navigating within views - selection methods - the importance of levels and grids- create walls, doors, windows, and components - working with essential modification commands and load family. Creating floors, ceilings, and stairs - working with type and instance parameters – importing drawings - understanding the project browser and type properties palettes - adding sheets -inserting views onto sheets - adding dimensions and text to the mode and plotting.

(Advanced Modeling – Family Types and Topo Surface)

Modeling - Creating curtain walls, schedules, details, a custom family, and family types - “flex” a family with family types and work with reference planes - creating rooms and an area plan – tag components - customize existing wall styles. Create and edit a topo-surface, add site and parking components - draw label contours - work with phasing - understand groups and links work with stacked walls - and learn the basics of rendering and create a project template.

(Rendering and Material Application)

Choosing material for buildings- Creating custom walls, floors, and roofs - keynoting – working with mass elements - enhancing rendering with lighting - producing customized materials -Using sun and shadow settings - Walkthrough technique - adding decals - working with design options and work sets - and calculating energy analysis - managing revisions.

(BIM for Building Energy Simulation)

Energy simulation for conceptual BIM models using massing- Detailed modeling using design elements- Rapid energy modeling and simulation with software. Conceptual Energy Analysis features to simulate performance. To produce energy consumption, carbon neutrality and renewable potential reports.

(BIM for Cost Estimating, Project Phasing and Administration)

Introduction and theoretical information on the following topics- Model based Cost Estimating Challenges in cost estimating with BIM - Cad geometrics verses BIM element description- Visual data models - Material substitutions and value engineering- detailed estimates and take- off sheets- XML and automated cost estimate- project phasing and management- 4D modeling - BIM for project lifecycles.

Course Outcomes:

- **Remembering**: Recall software interface elements and navigation techniques. Students will memorize key BIM software interface elements and demonstrate proficiency in navigating views and selection methods.
- **Understanding**: Comprehend the importance of levels and grids in architectural modeling. Students will explain the significance of levels and grids in architectural design and apply them effectively in their projects.
- **Applying**: Implement advanced modeling techniques and modify building components. Students will apply advanced modeling skills to create custom family types, curtain walls, and schedules, and demonstrate expertise in modifying building components.
- **Analyzing**: Evaluate rendering and material application to enhance architectural visualization.Students will analyze rendering and material application methods, assess their impact on architectural visualization, and propose improvements.
- **Creating**: Generate energy simulations for BIM models and cost estimates. Students will create energy simulations for conceptual BIM models and produce detailed cost estimates, demonstrating their ability to apply BIM tools effectively.
- **Evaluating**: Critique BIM's role in project phasing and administration. Students will critically evaluate the use of BIM in project phasing, cost estimating, and project lifecycle management, proposing improvements and addressing challenges.

TEXT BOOKS

1) Autodesk Revit for Architecture Certified User Exam Preparation, Revit 2022 Edition

REFERENCES

1) Building Information Modelling For Dummies
2) BIG BIM, little BIM: The Practical Approach to Building Information Modelling
3) The BIM Manager’s Handbook: Guidance for Professionals in Architecture, Engineering, and Construction
4) Catalytic Formations: Architecture and Digital Design - Ali Rahim
5) BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors - Chuck Eastman

ARC3207
OPEN ELECTIVE -II

Open Electives - Student shall choose an open Elective from the list of courses offered by the department in such a manner that he/she has not studied the same course in any form during the Programme.

(Or)

The student may be allowed (with prior permission from HoD) to select course (Minimum of 8 Weeks) from NPTEL/ SWAYAM platform other than the basic courses of the programme and submission of pass certificate at the end of the semester is mandatory for completion of the semester.

OPEN ELECTIVE -II
A. ENVIRONMENTAL IMPACT ASESSEMENT

Course Objective:

- To study Assessment of Impacts on Resources.
- To Assess the Role of Public Participation in EIA.

CONTENTS

(Role, Definition and Scope of EIA)

Role of EIA in the Planning and decision-making process. Definition and need, evolution and objectives, tasks and scope.

(Methods of EIA)

Methods of EIA; advantages and limitations.

(Assessment of Impacts)

Assessment of impacts on resources (Including air, water, flora and fauna); assessment of impacts on Land use. Assessment of social and health impacts.

(Role of Public Participation in EIA)

Public Participation in EIA; definition and concepts, objectives, techniques, advantages and limitation, PRA techniques.

Course Outcomes:

- **Remembering:** Course Outcome: Recall the key elements of Environmental Impact Assessment (EIA), including its role, definition, and scope.
- **Understanding:** Course Outcome: Explain the need, evolution, and objectives of EIA, and describe its tasks and scope in the context of planning and decision-making.
- **Applying:** Course Outcome: Apply various methods of EIA to assess the environmental impacts of a given project, discussing their advantages and limitations.
- **Analyzing:** Course Outcome: Analyze the impacts of a project on different resources, such as air, water, flora, and fauna, as well as its impact on land use. Assess the social and health impacts comprehensively.

- **Evaluating:** Course Outcome: Evaluate the significance of public participation in EIA, including its objectives, techniques, advantages, and limitations. Discuss the role of Participatory Rural Appraisal (PRA) techniques in EIA.
- **Creating:** Course Outcome: Develop and propose effective EIA strategies for real-world architectural projects, considering all the dimensions of EIA, from planning to public participation, to ensure sustainable and environmentally responsible design and decision-making.

TEXT BOOKS

1) Environmental Impact Assessment for developing Countries in Asia Vol. I and II, Asian Development Bank, 1997, ADB Publication
2) Environmental Impact Assessment, L.W. Canter, McGraw Hill, New York

OPEN ELECTIVE -II
B. REMOTE SENSING AND GIS

Course Objective:

- To study principles of Remote Sensing for Urban and Regional Planning
- To study the Introduction to Geographical Information Systems

CONTENTS

(Principles Of Remote Sensing)

History of Remote sensing, Remote sensing in India, Electromagnetic Radiation and Electromagnetic Spectrum, Spectral signature, Reflectance characteristics of Earths materials.

(Platforms And Sensors)

Platforms, Remote sensing sensors, resolutions Across track and along the track scanning, Optical sensors, satellite missions: Landsat series, SPOT series, IRS satellite series.

(Fundamentals Of Photogrammetry And Photo Interpretation)

Types of photographs; Vertical photographs – principal point; scale; Stereoscopy; Vertical exaggeration – factors involved and determination; Overlap, side lap and flight planning, Aerial mosaics: comparison with maps; Elements of aerial photo interpretation – (a) landforms; (b) surface drainage patterns; (c) erosion features, (d) gray tones; (e) miscellaneous elements.

(Introduction To Geographical Information Systems)

Introduction maps and spatial information. Computer assisted mapping and map analysis. Geographic Information Systems. The components of geographical Information System. Future directions and trends in GIS. Data structures for Thematic maps. Data structures for Geographic Information Systems. Points, lines

and areas. Definition of a map Geographic data in the computer. File and data processing, data base structures, perceived structures and computer representation and geographical data.

(Remote Sensing Applications)

Applications in land use and land cover analyses

1. Land use classification principles and systems.
2. Mapping and monitoring of land use / land cover and regional Planning.
3. Urban land use, Urban sprawl and urban planning.
4. Resource mapping and integrated information for sustainable Development.
5. Fundamental concepts of GPS, Various segments, Observation principle and signal Structure.
6. Applications in planning, population estimation, identification of sources of pollution, etc.,

Course outcomes:

- **Remembering**: Students will recall the history and evolution of remote sensing, identifying key developments in this field in India.
- **Understanding**: Students will demonstrate an understanding of electromagnetic radiation and the electromagnetic spectrum, as well as the spectral signature and reflectance characteristics of various Earth materials.
- **Applying**: Through hands-on experiences, students will apply their knowledge to analyze satellite missions such as Landsat, SPOT, and IRS, while comprehending resolutions in both across track and along the track scanning.
- **Analyzing**: Students will analyze vertical photographs, aerial mosaics, and interpret landforms, surface drainage patterns, erosion features, and gray tones from aerial photos, comparing them to maps.
- **Evaluating**: Students will assess the components and data structures of Geographic Information Systems (GIS), gaining the ability to process and represent geographical data in a computerized environment.
- **Creating**: By integrating remote sensing and GIS, students will develop the capability to plan and execute land use classification, regional planning, urban land use analysis, resource mapping, and applications in areas like urban planning, population estimation, and pollution source identification.

TEXT BOOKS

1) Lueder, D.R.,McGraw Hill, Aerial photographic interpretation, 1959
2) Paul R. Wolf,McGraw-Hill, Elements of Photogrammetry, 2000
3) Lillesand and Keifer, John Wiley and Sons, Remote sensing and Image interpretation,1987

OPEN ELECTIVE -II
C. RURAL PLANNING AND DEVELOPMENT

Course Objective:

To provide students with a comprehensive understanding of rural development and planning in India, emphasizing historical context, infrastructure, housing, area-specific development, and the role of institutions and policies. The course will integrate both theoretical perspectives and practical case studies, enabling students to critically analyze and contribute to rural development initiatives.

CONTENTS

(Introduction to Rural Development and Planning in India)

Overview of national planning and its significance in India. Historical perspective: Five-year plans and their impact on rural development and planning. Growth of productivity in agriculture. The Green Revolution: An overview, its impacts, and critiques. Major rural development programs in India: Objectives and outcomes. Comparative study of rural and urban development programs in other developing nations. Case studies illustrating successful and unsuccessful rural development initiatives.

(Infrastructure and Social Amenities in Rural India)

Rural Infrastructure Planning: Emphasis on power and water supply. School education and vocational training programs: Role in rural upliftment. Health, sanitation, and rural well-being. Rural energy: Sources, challenges, and sustainable solutions. Employment generation in rural areas: Trends, challenges, and solutions.

(Rural Housing, Construction, and Area-Specific Development Programs)

Rural house types from various states in India. Low-cost construction materials, technologies, and services in rural housing. Emphasis on the use of locally available materials in various regions. Community-based rural planning: Principles and practices.

Special Area Development Programs: Planning and development in hilly regions, drought-prone areas, flood-prone zones, tribal areas, etc.

(Rural Institutions, Finance, and Policy Framework)

Rural institutions and organizations: Role and significance of rural banks, cooperatives, and marketing strategies. Mass media, communication, and their impact on rural development. Microfinance, Self-Help Groups (SHG), and rural credit access: Mechanisms and impact. Rural Development Schemes: Current schemes and their objectives.

Policies and programs related to rural development: Overview of NREP, IRDP, and other significant initiatives.

Course Outcome:

- Upon completion of this course, students will be able to trace the historical evolution of national planning in India, especially the five-year plans, and critically evaluate their impact on rural development and planning.
- Students will gain insights into the growth of productivity in agriculture, understanding the Green Revolution's nuances, its positive impacts, and the critiques associated with it.
- Students will understand the pivotal role of infrastructure, especially power and water supply, in rural India. They will also recognize the importance of school education, vocational training, health, sanitation, and rural energy in uplifting rural areas and addressing their unique challenges.
- Students will be exposed to various rural housing types across different Indian states and the significance of low-cost, locally-sourced construction materials and technologies. Additionally, they will understand the principles of community-based rural planning and the challenges and strategies involved in developing hilly regions, drought-prone areas, flood zones, tribal areas, etc.
- By the end of the course, students will appreciate the roles and significance of rural institutions like banks and cooperatives. They will also grasp the concepts of microfinance, Self-Help Groups (SHG), and the mechanisms that facilitate rural credit access, and their consequential impact on rural development.
- Students will become familiar with various rural development schemes, policies, and programs, including but not limited to NREP and IRDP. They will be equipped to critically analyze these initiatives, understanding their objectives and evaluating their effectiveness in achieving rural development.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted as per the university academic calendar and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment and assignments i.e. total marks will be (20M+10M) =30M.

TEXT BOOKS:

1. Indian Economy: Performance and Policies" by Uma Kapila.
2. Indian Agriculture: Four Decades of Development" by Ramesh Chand.
3. Rural Development: Principles, Policies, and Management" by Y.K. Alagh.
4. Rural Development in India" by G. Sharanappa.
5. Rural Infrastructure Development: Emerging Trends and Strategies" by R. Radhakrishna.
6. "Rural Housing and Habitat Policy" by R. N. Sharma.
7. Rural Development: Problems, Practices, and Perspectives" by D. R. Gupta

SEVENTH SEMESTER

ARC4101
ARCHITECTURE DESIGN-VI

Course Objective:
The objective of the subject is to enable students to understand and apply:

- To understand complexities involved in built spaces that have huge footfalls. The nature of way finding behaviours in familiar and unfamiliar spaces is discussed. Design issues related to multi-functional (flexible spaces) and workspace architecture in different typologies of buildings. Barrier free and emergency safety design issues and provision for building services are dealt with. Emphasis is on how design of spaces considering all these issues can improve human performance and building efficiency.

List of Suggested Design Topics

Following building typologies that have more footfalls of users are dealt during the semester. One major design exercise and Two minor design problems are given for the semester.

- Commercial / Recreational / Industrial / Terminal building typologies like shopping malls, corporate offices, conventional center, multiplex, factories, bus terminal etc. could be considered during the semester.

- Note: One major exercise (8 weeks) and two minor design (6weeks) problems shall be conducted. Use of 'SKETCHUP' software in development of design concepts and other related work during continues assessment of the major and minor design problems shall be compulsory. The final portfolio submission in AutoCAD software and a model for the main problem shall be compulsory.

Important Note: Community Service Project like documentation of Public and Historical building related to Design topics should be an integral part of the Architectural Design as an assignment.

Course outcome:

- Analyze and Evaluate Design Concepts: Students will critically assess design concepts for various building typologies, demonstrating the ability to dissect and interpret architectural ideas effectively.
- Generate Innovative Design Solutions :Through the use of SketchUp and creative thinking, students will develop innovative design solutions for both major and minor design problems, showcasing their ability to generate unique architectural designs.
- Apply Architectural Principles to Real-world Contexts: Students will apply architectural principles to real-world contexts by designing spaces for commercial, recreational, industrial, and terminal building typologies, addressing the practical needs and functions of these structures.

- Collaborate on Community Service Projects : By participating in community service projects, students will evaluate and document public and historical buildings, deepening their understanding of architectural heritage and fostering a sense of social responsibility.
- Communicate Design Ideas Effectively : Students will learn to communicate their design concepts clearly and persuasively, using both SketchUp and AutoCAD software, enhancing their ability to convey architectural ideas to clients and colleagues.
- Create Detailed Design Portfolios and Models : Students will produce comprehensive design portfolios in AutoCAD software and physical models for their major design problem, showcasing their capacity to present architectural designs in a professional and tangible format.

Assessment:

- Major design problem carries 30 marks and minor design problem carries 20 marks. Students will submit portfolio specified by the design faculty and attend external viva-voce to be conducted by an external examiner.

REFERENCES:

1) The Architects Handbook – Quentin Pickard
2) Corporate Interiors, No11 – Roger Yee
3) Handbook on functional requirements of Industrial Buildings (lighting and ventilation) – Indian Standard Institution
4) Time savers standards of Building Types – Joseph De Chiara & others
5) A History of Building Types – Nikolaus Pevsner
6) Architects` Data - Ernst Neufert

ARC4102
WORKING DRAWINGS-II

Course Objective:

The objective of the subject is to enable students to understand and apply:

- To Enable and train the students to illustrate and prepare the drawings good for construction for effective execution at construction site explaining the building services scheme inside and outside of the building envelop but within the site.to teach the students the specifications for the various internal and external finishes.
- To impart the students various fabrications which shall be required for the successful completion of the project?

CONTENTS

The architectural drawings prepared in subject: Working Drawings-I in the previous semester shall be continued for preparation of services layouts. The building drawings so prepared become part of the contract documents with proper labelling and dimensioning, specification and detailing.

(Building Services Drawings- External)

Preparation of detailed drawings:
Water supply source and connections
Sewage disposal and storm water disposal system, rain water harvesting systems, landscape details if required.
Construction details of Septic tank/STP, Sump, Overhead water tank etc.
Construction details of a Swimming pool along with its supporting services and its details for a size of a residence.

(Building Services Drawings- Internal)

Preparation of drawings like kitchen, toilets and other utility spaces along with specification of fixtures.
Plumbing layouts of kitchen and toilets.

(Building Finishes & Interiors Design)

Flooring patterns and specifications, Fabrication like gate, railings , fencing etc. and their specifications , Boundary wall design, fixtures and their specifications.
Preparation of suspended ceilings drawings with different materials like colloquial and innovative materials in use and finishing including fixing details of lighting fixtures and diffusers for ventilation and air conditioning.
TV Unit and Wardrobes design and its details with finishes and hardware fixtures and its specifications.
Special doors and windows constructions details with hardware details and specifications.

Course outcome:

- Knowledge: Students will demonstrate a comprehensive understanding of building services drawings, external and internal, including water supply, sewage, and construction details.
- Comprehension: Learners will interpret and explain the purpose and importance of various building service systems and their components in architectural design and construction.
- Application: Students will apply their knowledge to create accurate and detailed building service drawings, including water supply layouts, sewage disposal systems, and plumbing layouts for practical applications.
- Analysis: Participants will analyze different materials and construction methods for suspended ceilings, flooring patterns, and fixtures, making informed design choices.
- Synthesis: Learners will synthesize information to create complex drawings and designs for specialized areas like swimming pools, septic tanks, and wardrobes, incorporating innovative materials and fixtures.
- Evaluation: Students will critically evaluate the compliance of their drawings with building codes and standards, ensuring they meet safety and functional requirements in architectural projects.

Assessment

- The drawings will be assessed Unit Wise, i.e., each unit carries 15marks each and 5 marks for attendance. Student has to submit final portfolio for external viva-voce conducted by external examiner for 50 marks.

REFERENCES

1) Architectural working drawings – Ralph W.Liebing, Mimi Ford,Raul
2) Architectural Graphics by Francis D. K. Ching
3) Architectural Graphics Standard by Charles George Ramsey
4) Architectural Graphics Standard for Residential Construction by Dennis J. Hall
5) Drafting & Design: Basics for Interior Design by Travis KellyWilson
6) Osamu, A. W., Linde, R. M. and Bakhoum, N. R. (2011). The professional practice of architectural working drawings. 4th Ed. Hoboken: John Wiley & Sons.
7) Weston, R. (2004). Plans Sections Elevations – Key buildings of the twentieth century. London: Laurence King Publishing.

ARC4103
URBAN DESIGN

Course Objective:

- To understand the scope and nature of urban design
- To understand the evolution of historic cities urban form
- To familiarize the theories of urban design
- To introduce the components of a city and their interdependencies and interpret the city in different ways and layers
- To familiarize with the implementation processes and create awareness of contemporary urban issues.

CONTENTS

(Introduction to Urban Design)

Relationship between Architecture, Urban Design and Urban Planning; brief review of the evolution of the urban design as a discipline. Components of urban space and their interdependencies- outline of issues/ aspects of urban space and articulation of need for urban design- scope and objectives of urban design as a discipline.

(History of Cities and Urban Form)

Western: morphology of early cities- Greek agora- Roman forum- Medieval towns- Renaissance place making- ideal cities – Industrialization and city growth- the eighteenth century city builders Garnier's industrial city- the American grid planning- anti urbanism and the picturesque- cite industrielle- citte nuovo-radiant city . Modern movements in city design such as 'city-beautiful, Garden city utopian and model towns in the west.

Indian: evolution of urbanism in India- Temple towns- Mughal city form- medieval cities - colonial urbanism- urban spaces in modernist cities: Chandigarh, Bhuvaneshwar and Gandhi Nagar- subsequent directions – case studies.

(Theories of Urban Design)

Ideas of Imageability and townscape: Cullen, Lynch- place and genius loci- collective memory- historic reading of the city and its artifacts: Rossi- social

aspects of urban space: life on streets and between buildings, gender and class, Jane Jacobs, Wiliam Whyte, pattern language-Christopher Alexander.

(Urban Design Elements, Typologies and Procedures)

Understanding the city as a three dimensional element; determinants of Urban form Organization of spaces and their articulation in the form of squares, streets, vistas and focal points.Concepts of public and private realm; understanding different types and procedures of urban design interventions their scale relationships; constraints and challenges of urban design in democratic versus authoritarian settings.

(Urban Landscape)

Design of streets, public parks, green ways, parkways, promenade Park systems, water fronts, and plaza. Public art. Plant selection criteria, furnishings and lighting of public space, maintenance and management of public spaces and parks, Open space development in urban design context and new towns. Green infrastructure. Urban ecology, urban water sheds.

(Urban Design and Sustainability)

Sustainability concept; Relationship of urban design with economic, environmental and social sustainability; Urban renewal and urban sprawl; Concepts of Transit Oriented Development, Compact City, Healthy City and Walk able City;

(Urban Design Implementation)

Urban design and its control; Institutional arrangements for design and planning, their roles, powers and limitations; Types of planning instruments, structure plans, master plans and local area plans and zoning guidelines; Design communication and role of public participation.eg. smart cities, HRIDAY, PRASAD etc.

(Best Practice in Urban Design)

Contemporary case studies and emerging trends from developing and developed economies that offer design guidelines and solutions to address various issues/ aspects of urban space – case studies.

Course Outcomes:

- **Knowledge**: Demonstrate a comprehensive understanding of the evolution of urban design as a discipline and its interrelationship with architecture and urban planning.
- **Comprehension**: Interpret the historical development of cities in Western and Indian contexts, identifying key urban design movements and their impact on urban form.
- **Application**: Apply various theories of urban design, such as imageability, genius loci, and social aspects, to analyze and assess urban spaces, considering factors like gender, class, and collective memory.

- **Analysis**: Examine the determinants of urban form and articulate the organization of spaces, distinguishing between public and private realms while addressing the challenges of urban design in different governance settings.
- **Synthesis**: Design and propose urban spaces, including streets, parks, and public areas, considering elements like green infrastructure, sustainability, and urban ecology, while incorporating public art and maintaining public spaces.
- **Evaluation**: Assess the impact of urban design on sustainability, urban renewal, and urban sprawl, and critically evaluate the role of institutional arrangements, planning instruments, and public participation in urban design implementation.

Assessment:
Two mid examinations (Maximum 20 Marks each) are to be conducted as per the university academic calendar and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment i.e. total marks will be (20M+10M)=30M.
Course outcomes:

- Students are exposed theories of urban design, and contemporary trends and different methodologies and approaches in urban design.

REFERENCES:

1) City in History, Its origin transformation & its prospectus- Mimford, Lewis.
2) Design of Cities-Bacon, Edmund.
3) History of the City- Benevolo, Leonard.
4) Urban Space-Rob Krier
5) Urban Design, The Architecture of Towns, & Cities-Spreiregn, Paul.
6) Urban Design Street & Square-Moughtin, Cliff
7) Urban Design Ornament & Deocotation-Moughtin, Cli
8) Urban Design Green Dimensions-Moughtin, Cliff
9) Image of the city – Kevin Lynch
10) The Urban Pattern – Gallion – Eisner

ARC4104
BUILDING SERVICES-IV
(Advanced Services)

Course Objective:

- To Orient students on, fire safety systems, vertical transportation, building automation, Special Services in High rise Buildings, and large-scale housing projects, such as & its design and application in buildings; to sensitize students with Environmental management issues in buildings.

CONTENTS

(Fire Safety in Buildings)

Fire, causes of fire and spread of fire, firefighting, protection & fire resistance, equipment & methods of fighting fire, Code of fire safety, fire regulations, and combustibility of materials. Knowledge of essential electrical component related

to firefighting system (fire detection systems, alarm systems, fire extinguishing systems, smoke control etc. Structural elements and fire resistance, planning and design of Fire escape routes and elements, wet risers, dry risers, sprinklers, smoke detectors, fire dampers, fire doors, water curtains etc.

(Vertical Transport)

Elevators, escalators and travelators - Types of elevators-traction, sky lobby, lift lobby, provision of elevators for a building, planning considerations - location in building, recommendations of the National Building Code, etc. Safety features and codes. Service requirements: calculations for quality and quantity of service, time, passenger handling capacity, space and physical requirements, machine room spaces and their typical layout. Design of typical lift banks, escalators, (application - location and arrangement in buildings), space requirement (travelators).

(Building Automation and Management System)

Concept and application of Building Automation and Management system. Design issues related to building automation and its effect on functional efficiency Components of building automation system; modern security system, alarm system, fire-protection, intercommunication, monitoring devices, Introduction to essential electrical component of security systems like installation of CCTV, surveillance, etc.

(Special Services)

Design and application of cooking gas distribution, Garbage chutes, Lightning arresters, Waste generation, treatment and disposal in sustainable methods, solar energy system, applications of photo voltaic cells, biomass digesters, wind energy. in High-rise buildings, commercial buildings and large-scale housing projects.

Course Outcomes

- **Analyze Fire Safety Principles** By the end of this course, students will be able to evaluate the causes and spread of fires, as well as firefighting methods, demonstrating comprehension and application of fire safety principles in building design.
- **Design Fire Safety Systems** Students will be capable of designing fire detection and extinguishing systems, fire-resistant structural elements, and fire escape routes, applying creative problem-solving skills at the synthesis level of Bloom's Taxonomy.
- **Ensure Elevator and Escalator Safety** Upon completion, students will exhibit the ability to plan and design elevators and escalators in compliance with safety codes and building regulations, showcasing the application of building services knowledge.
- **Implement Building Automation Systems** Students will be proficient in implementing Building Automation and Management Systems, including security, alarm, and fire protection systems, demonstrating their understanding at the application level of Bloom's Taxonomy.
- **Optimize Special Services for Sustainability** Upon finishing the course, students will demonstrate the capability to design sustainable systems such as solar energy, waste disposal, and lightning protection for high-rise buildings and housing projects, emphasizing the evaluation aspect of Bloom's Taxonomy.
- **Evaluate Alternative Energy Sources** By the end of the course, students will be able to critically assess the applications of alternative energy sources like

photovoltaic cells, biomass digesters, and wind energy in commercial and large-scale building projects, showing their ability to analyze and synthesize information at a higher level of Bloom's Taxonomy.

TEXTBOOKS

1) Keyoumars Ehteshami, Handbook of Fire Protection and Safety
2) Principles of Fire Safety Engineering: Understanding Fire and Fire Protection- Akhil Kumar Das.
3) Barry's Advanced Construction of Buildings, By Stephen Emmitt, Christopher A. Gorse · 2014
4) People Flow in Buildings, By Marja-Liisa Siikonen · 2021
5) Intelligent Buildings and Building Automation, By Shengwei Wang · 2009

REFERENCES

1) Handbook of Designing and Installation of Services in High Rise Building - V.K.Jain.
2) National Building Code of India, 2016.
3) Green Building Management and Smart Automation, Anand Nayyar, Arun Solanki
4) Building Management Systems Explained Understanding Controllers and Field Devices, By Robert O'Connor Ceng · 2021
5) The Hidden Potential of Sustainable Neighborhoods Lessons from Low-carbon Communities By Harrison Fraker · 2013
6) Biogas from Waste and Renewable Resources, An Introduction, Angelika Steinhauser, Dieter Deublein

ARC4105
STRUCTURES DESIGN PROJECT

Course objective:

- The practical application of the analysis and design learnt in the previous semesters.

The students are free to choose any one of the structures design project mentioned below.

1) Structural Design Project: structural design calculations and structural drawings of a G+1 RCC framed residential building.

(or)

2) Structural Design Project: a steel truss including design calculations and structural drawings.

Assessment:

Two stage assessment are to be conducted each carrying 15 marks, 10 marks for report submission and 10 marks by the guide, i.e. 30+10+10 =50M. Each student should make oral presentation for the external Viva-voce conducted by the external examiner and internal guide for 50 marks.

Stage 1: The group /student should submit the drawings related to Proposed RCC G+1 plan/ Steel Truss. Each student should submit complete analysis of the RCC frames/ Steel truss.
Drawings:
RCC G+1 plan: Plinth beam layout, Floor beams layout, Column centre line, Trench drawings, 2-D frames along with loads on each frame and reactions, moments etc.
Steel Truss: Type of truss with its span, truss with loads acting, truss with calculated reactions and load on each member.

Stage 2: The group /student should submit the structural drawings related to the project. Each student should submit complete design of different elements in the structure.

Course outcome:

- **Understand**: Students will demonstrate a foundational understanding of structural analysis principles and their application to RCC and steel truss systems through accurate drawings and load analysis.
- **Apply**: Apply engineering knowledge to create comprehensive structural designs for both RCC G+1 plans and steel truss systems, effectively considering loads, reactions, and material selection.
- **Analyze**: Analyze and interpret structural data, including reactions, moments, and member loads, to assess the stability and strength of designed RCC frames and steel truss systems.
- **Evaluate**: Evaluate the structural integrity and efficiency of proposed designs, making informed decisions regarding material selection and design modifications for enhanced performance.
- **Create**: Develop professional-quality structural drawings and design elements for the proposed project, demonstrating the ability to transform conceptual ideas into tangible, functional structures.
- **Present and Communicate**: Effectively present and defend design choices during the external Viva-voce, showcasing the ability to communicate complex structural concepts to both external examiners and internal guides.

REFERENCES:

1) Design of reinforced concrete structures by Ramamrutham, Publishers : DhanpatRai
2) Limit state Design of Steel structures by S.K. Duggal, Publishers: Tata McGraw-Hill
3) Indian standard codes

ARC4106
PROFESSIONAL ELECTIVE-I
A. ARCHITECTURAL CONSERVATION

Course Objectives

- The student will understand the various practices of Conservation in India and familiarize with the various agencies involved in the field of conservation.

CONTENTS

(Introduction to Conservation)

Understanding Heritage; Types of Heritage. Heritage conservation: Need and purpose. Definitions of Conservation, Preservation and Adaptive reuse. Distinction between Architectural and Urban Conservation. Conservation related charters, International agencies like ICCROM, UNESCO and their role in Conservation.

(Conservation in India)

The role of Archeological Survey of India (ASI) and INTACH in heritage conservation. Central and State Government policies and legislations in India; INTACH Charter. Norms for Grading and Enlisting of heritage sites.

(Conservation Practice)

The role of conservation architect, Values and ethics in conservation, degrees of intervention such as prevention of deterioration, preservation, consolidation, restoration, rehabilitation, reproduction and reconstruction.

Listing of monuments- documentation of historic structures- assessing architectural character, inventory, and initial inspection of buildings and preparation of historic structure report.

(Urban Conservation)

Understanding the character and issues of historic cities – select case studies of towns like Srirangaram, and Kanchipuram-historic districts and heritage precincts.

(Conservation Planning)

Conservation as a planning tool- financial incentives and planning tools such as Transferable Development Right (TDR)-urban conservation and heritage tourism-case studies of sites like for Cochin, Pondichery French town.- conservation project management.

Note: Students have to make a document of at least two heritage buildings and prepare historic structure report. The department has to arrange a case study of heritage building/ Precinct to study and understand aspects of preservation, rehabilitation and adaptive re-use adopted in the study area.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted as per the University academic calendar and average of the both are to be taken for consideration for 20 and 10 Marks for documentation of heritage building and structure report i.e. total marks will be (20M+10M)=30M.

Course Outcomes

- Knowledge (Remembering): Course Outcome 1: Recall and identify various types of heritage and distinguish between architectural and urban conservation principles.
- Comprehension (Understanding): Course Outcome 2: Explain the roles of international agencies like ICCROM and UNESCO in heritage conservation, and comprehend the significance of heritage preservation.
- Application (Applying): Course Outcome 3: Apply the norms and guidelines for grading and enlisting heritage sites in India, demonstrating an understanding of heritage conservation policies and legislation.
- Analysis (Analyzing): Course Outcome 4: Analyze the architectural character and issues of historic cities through case studies like Srirangam and Kanchipuram, identifying heritage precincts.
- Synthesis (Creating): Course Outcome 5: Create a comprehensive historic structure report for two heritage buildings, including detailed documentation, assessment, and preservation strategies.
- Evaluation (Evaluating): Course Outcome 6: Evaluate and assess conservation project management, including financial incentives, planning tools like Transferable Development Rights, and the impact of heritage tourism using case studies like Cochin and Pondicherry French town.

REFERENCES:

1) Protection, Conservation and Preservation of Indian Monuments- Shanti Lal Nagar
2) Architectural and urban conservation- Santosh Ghosh, Ranajit Gupta, Sumita Gupta
3) History of Architectural Conservation- Jukka Jokilehto
4) James M. Fitch, " Historic Preservation: Curatorial Management of the Built World" University Press of Virginia; Reprint edition, 1990
5) Robert E. Stipe, A Richer Heritage: Historic Preservation in the Twenty-First Century", Univ. of North Caroling press, 2003.
6) Conservation Manual, Bernard Fielden; INTACH Publication, 1989.
7) Architecture in Conservation: Managing Development at Historic Sites (Heritage: Care Preservation-Management) –James Strike

ARC4106
PROFESSIONAL ELECTIVE-I
B. GREEN BUILDINGS & RATING SYSTEMS, ECBC & BUILDING BYE LAWS

Course objectives:

- To introduce the concept of energy efficiency and its need and importance in the field of architecture.
- To help comprehend various passive heating techniques which can be implemented at site or building level.

- To help comprehend various passive cooling techniques which can be implemented at site or building level.
- To introduce existing green building rating systems and explaining their evaluation process.
- To help analyze contemporary and innovative strategies to make the built environment energy efficient.
- To give an overall understanding and importance of Energy Conservation in built environment and help to design buildings which are ECBC compliant.

CONTENTS

(Introduction to Energy Efficiency in Buildings)

Definition of energy and its uses in buildings, Renewable and Non-Renewable energy sources. Significance of Energy Efficiency in the contemporary context, Simple passive design considerations involving Site Conditions, Building Orientation etc.

(Solar Passive Architecture-Passive Heating)

Plan form and Building Envelope -Heat transfer and Thermal Performance of Walls and Roofs, Direct Gain Thermal Storage of Wall and Roof - Roof Radiation Trap - Solarium - Isolated Gain

(Solar Passive Architecture-Passive Cooling)

Evaporative Cooling - Nocturnal Radiation cooling - Passive Desiccant Cooling – Induced Ventilation - Earth Sheltering - Wind Tower - Earth Air Tunnels

(Green Buildings and Rating Systems)

Efficient use of daylighting, energy reduction in artificial illumination, use of compact fluorescent lamps, use of grey water, waste recycling, reduction and reuse of water, Green building concepts and brief introduction to green rating systems such as LEED, GRIHA, etc.

(Contemporary and future trends)

Areas for innovation in improving energy efficiency such as Photo Voltaic Cells, Thermal Energy Storage, Recycled and Reusable Building materials, Nanotechnology, smart materials and the future of built environment

(Energy Conservation Building Code)

International Practices - Energy Efficiency Requirements in Building Codes, Energy Efficiency Policies for New Buildings, General status in regions in Europe, North America, Japan, New Zealand, Australia, China, Energy Codes in Singapore, Malaysia, Dubai and Middle east, ASHRAE 90.1, ASHRAE 90.2 IECC, Title 24.

ECBC Scope, Compliance and approach: Energy efficiency performance levels, building systems, precedence, building classifications, energy performance index, compliance approaches and requirements, approved analytical tools, administrative requirements, compliance documents, Benchmarking and Star Labelling.

ECBC Building Envelope: Mandatory requirements – Fenestration, opaque construction, day lighting, building envelope sealing, Prescriptive requirements – roof, opaque external walls, vertical fenestration, skylights, Building Envelope trade –off method, standard building EPF calculation.

ECBC Lighting and Controls: Mandatory requirements – lighting controls – automatic lighting shut off, space control, control in daylight areas, centralized controls for ECBC + and super ECBC buildings, Exterior lighting controls, additional controls, exit signs, **Prescriptive requirements** – interior lighting power, building area method, space function method, Installed interior lighting power, Exterior lighting power.

ECBC Electrical and renewable systems: Mandatory Requirements – Transformers, energy efficient motors, Diesel generators sets, check metering and monitoring, power factor correction, power distribution systems, uninterruptible power supply, renewable energy systems.

Comfort Systems and Controls: Mandatory requirements – ventilation, minimum space conditioning equipment efficiencies, controls, additional controls for ECBC + and super ECBC, additional controls for super ECBC buildings, piping and duct work, system balancing, condensers, **Service water heating** – solar water heating, heating equipment efficiency, other water heating systems, piping insulation, heat traps, swimming pools, **Prescriptive requirements** – pumps, cooling towers, economizers, variable flow hydraulic systems, boilers, energy recovery, total system efficiency – alternate compliance approach, low energy comfort systems.

Day lighting – Day lighting simulation, manual day lighting compliance method.

Whole building performance method and Energy Simulation- General Scope, compliance, annual energy use, trade-off limited to building permit, documentation requirements, Mandatory requirements, **Simulation requirements** – energy simulation program, climate data, compliance calculations, **calculating energy consumption of proposed design and standard design** - energy simulation model, HVAC systems, compliance thresholds for ECBC Compliant, ECBC + and super ECBC Buildings, maximum allowed EPI ratios, Schedules.

(Building Bye Laws)

Review Contents of National Building Code. Building bye laws, submission plans, Methods of municipal approval, Development Controls and Zoning regulations, and other regulatory aspects such as Master plan and Zonal plans.

Course Outcome:

- **Understanding Energy Efficiency Principles:** Define energy types and their relevance in buildings. Differentiate between renewable and non-renewable energy sources. Explain the significance of energy efficiency in contemporary architectural contexts.

- **Passive Solar Design Mastery** Analyze and apply passive heating techniques, including direct gain and thermal storage. Evaluate passive cooling strategies such as evaporative cooling and Earth Sheltering. Understand wind towers and Earth Air Tunnels for cooling in architectural design.
- **Green Building Expertise** Demonstrate efficient daylighting and artificial illumination techniques. Implement sustainable practices like water reuse, waste recycling, and energy reduction. Describe green building concepts and various rating systems like LEED and GRIHA.
- **Exploring Contemporary and Future Trends** Assess innovative technologies like PV cells, thermal energy storage, and nanotechnology. Discuss the use of recycled and reusable building materials and smart materials. Analyze the future prospects and advancements in the built environment.
- **Compliance with Energy Conservation Codes** Comprehend international energy efficiency practices and codes. Evaluate energy efficiency requirements and policies across different regions. Apply Energy Conservation Building Code (ECBC) guidelines, including building envelope and lighting controls.
- **Mastering Building Regulations and Approvals** Understand the National Building Code and building bye laws. Interpret municipal approval processes and development controls. Navigate zoning regulations, master plans, and other regulatory aspects in architectural projects

REFERENCES:

1) Manual on Solar Passive Architecture, IIT Mumbai and Mines New Delhi, 1999
2) Arvind Krishnan & Others, “Climate Responsive Architecture”, A Design Handbook for Energy Efficient Buildings, TATA McGraw Hill Publishing Company Limited, New Delhi, 2001
3) Majumdar M, “Energy-efficient Building in India”, TERI Press, 2000.
4) Givoni .B, “Passive and Low Energy Cooling of Buildings”, Van Nostrand Reinhold, New York, 1994
5) Fuller Moore, “Environmental Control Systems”, McGraw Hill INC, New Delhi - 1993
6) Sophia and Stefan Behling, Solpower, “The Evolution of Solar Architecture”, Prestel, New York, 1996
7) Patrick Waterfield, “The Energy Efficient Home: A Complete Guide”, Crowood press ltd, 2011.
8) Dean Hawkes, “Energy Efficient Buildings: Architecture, Engineering and Environment”, W.W. Norton & Company, 2002
9) IGBC Code books for new constructions
10) GRIHA Code books for new buildings.
11) Ching, F. (2020). Green Building Illustrated, John Wiley & Sons.
12) Sayigh, A. (2014). Sustainability, energy and architecture. Oxford, UK: Academic Press
13) Steven V Szokolay. Introduction to Architectural Science: The Basics of Sustainable Design. Architectural Press, Second Edition, 2010.

14) Vishal Garg, JyothirmayMathur, SurekhaTatali, Aviruch Bhatia. Building Energy Simulation: A workbook using Design Builder. CRC Press. 2017.
15) Energy Conservation Building Code 2017. Bureau of Energy Efficiency. New Delhi. 2017
16) American Society of Heating, Refrigerating and air conditioning Engineers, Inc. Standards (ANSI/ASHRAE) 90.1 –Energy Standards for Buildings except Low-rise residential buildings.2016.
17) American Society of Heating, Refrigerating and air conditioning Engineers, Inc. Standards (ANSI/ASHRAE) 90.2 –Energy Standards for Low-rise residential buildings. 2016.
18) Jens Lausts. Energy Efficiency Requirements in Building Codes, Energy Efficiency Policies for New Buildings. International Energy Agency (IEA) Information paper. March 2008.

ARC4107
SOFT SKILLS

Course Objectives:

- To develop skills to communicate clearly.
- To aid students in building interpersonal skills.
- To enhance team

(Introduction to Soft Skills)

Communication – Verbal and Non Verbal Communication - Personal grooming (Etiquette, Attitude, Body Language), Posture, Gestures, Facial Expressions, Eye Contact, Space Distancing, Presentation Skills, Public Speaking, Just a Minute (JAM) sessions, Adaptability.

(Goal Setting and Time Management)

Immediate, Short term, Long term, Smart Goals, Strategies to Achieve goals, Types of Time, Identifying Time Wasters, Time Management Skills, Stress Busters.

(Leadership and Team Management)

Qualities of a Good Leader, Team Dynamics, Leadership Styles, Decision Making, Problem Solving, Negotiation Skills.

(Group Discussions)

Purpose (Intellectual ability, Creativity, Approach to a problem, Tolerance), Group Behaviour, Analysing Performance.

(Job Interviews)

Identifying job openings, Covering Letter and CVs / Resumes, Interview (Opening, Body-Answer Q, Close-Ask Q), Telephone Interviews, Types of Questions.

Course Outcomes: building and time management skills.

- Knowledge: Students will demonstrate an understanding of effective communication techniques, including verbal and non-verbal communication, personal grooming, and presentation skills in the context of architecture.
- Comprehension: Students will be able to analyze the significance of goal setting and time management, identifying different types of goals and time management strategies to optimize architectural projects.
- Application: Students will apply leadership and team management principles to effectively lead architectural teams, make informed decisions, and solve complex problems in architectural design and construction.
- Analysis: Students will critically evaluate group dynamics in architecture, assess the impact of effective group discussions on project success, and analyze performance within architectural teams.
- Synthesis: Students will be able to demonstrate the ability to prepare for job interviews in the field of architecture, including crafting cover letters, CVs/resumes, and confidently handling various types of interview questions.
- Evaluation: Students will assess the relevance of soft skills in architecture by critically examining their adaptability, impact on stress management, and their influence on job opportunities within the architectural industry.

Reference Books:

1) Krannich, Caryl, and Krannich, Ronald L. Nail the Resume! Great Tips for Creating Dynamite Resumes. United States, Impact Publications, 2005.
2) Hasson, Gill. Brilliant Communication Skills. Great Britain: Pearson Education, 2012
3) Prasad, H. M. How to Prepare for Group Discussion and Interview. New Delhi: Tata McGraw-Hill Education, 2001.
4) Pease, Allan. Body Language. Delhi: Sudha Publications, 1998.
5) Rizvi, Ashraf M. Effective Technical Communication: India, McGraw-Hill Education. 2010
6) Thorpe, Edgar & Showick Thorpe. Winning at Interviews. 2nd Edition. Delhi: Dorling Kindersley, 2006.

ARC4108
SUMMER INTERNSHIP -II

Summer Internship 8 weeks: Every student must complete a mandatory 8-week Summer Internship at any local Architectural firm (Chief Architect of the firm shall have at least 5 years of professional experience) during the summer vacation after completion of 3rd year 2nd semester, and the completion certificate along with portfolio must be submitted in the department at the beginning of the 4th year of the 1st Semester for oral presentation by the student and evaluation through the departmental committee for awarding a credit.

EIGHTH SEMESTER

ARC4201
PRACTICAL TRAINING

Course objective

- To provide students hands-on experience in architectural practice under the guidance of a professional architect, focusing on various aspects of architectural design, project management, client interaction, and on-site supervision.

COURSE CONTENT

Practical Training shall commence on the reopening day of Fourth Year 2nd Semester. The students shall undergo practical training in the office/ organization where architecture and its related practice are carried out and under the guidance of the professional who is registered with Council of Architecture, India with a minimum of 8 years professional standing. In case the student opts to go abroad he / she will work under the guidance of the professional who is registered with the council / any other organization controlling the profession of Architecture in the respective country. The students will decide very carefully about their placement venue as it is expected that they learn best ethics in Professional Practice.

During this training, students should have to work on Architectural projects and information include

To facilitate an understanding of the evolution of an architectural and allied project/'s from the initial/sketch design to execution.

To enable an orientation that would include the process of development of conceptual ideas, design and presentation skills, preparation of submission drawings, working drawings & detailing. Involvement in office discussions, clients' meetings, meetings with the contractor/s.

Working on specification writing and tendering procedure.

Site Visits- Site supervision during the execution of the project, co-ordination with the various consultants / agencies involved in the constructions process (like MEP, Structural Consultants & other).

At the end of the practical training, the student has to prepare and submit a Portfolio of work done during the training period containing - Certificate of the Architect (Training Completion Certificate), work done in office as above along with the Log Book duly signed by the principal architect of the firm.

At the end of the semester, there will be an examination in the form of Viva-Voce; the student will be assessed jointly by Panel of Examiners (Internal and External Examiners) appointed by the university.

Course Outcomes

Upon successful completion of this course, the students will be able to:

- **Understand Architectural Design**: Develop a comprehensive understanding of the architectural design process, from initial sketches to execution.
- **Project Management Skills**: Gain practical experience in project management, including planning, scheduling, and resource management.
- **Technical Proficiency**: Develop skills in creating schematic designs, sanctioned drawings, working details/drawings, and BOQs.
- **Client Interaction**: Gain experience in client meetings, discussions, and project presentations.
- **Construction Site Experience**: Understand the dynamics and challenges of on-site project execution, including coordination with contractors and consultants.
- **Ethical Practice**: Learn and apply professional ethics in architecture, including effective communication, teamwork, and responsibility.

Assessment

Continuous Assessment for Practical Training shall be done for a weightage of 60% of the total marks assigned by the principal architect of the office/organization in whose office the candidate is undergoing training. During training period, the principal Architect will give three assessments in given format for every 8 weeks on his/her reflection about the student's work and his overall approach and attitude towards the office work.

20% of the total marks will be assigned for number of days attended.

20% of internal marks will be awarded by the internal examiner (s) of the practical training (nominated by the Hon. Vice-Chancellor) for the submitted portfolio of works at the end of the Semester.

A student who secures not less than 50% of the total marks prescribed for Practical Training and a minimum of 50% of the total marks prescribed for the Viva Voce examination shall be declared to have passed in the examination.
If a student fails to secure a pass in the Practical Training, of VIII semester he/ she shall repeat the course in the subsequent semester and it will be evaluated at the end of that semester.

NINTH SEMESTER

ARC5101
Architecture Design-VII

COURSE OBJECTIVE:

- This Course will be dealing with the design of large scale multistory complex projects and aims to develop skills for a comprehensive design approach in the areas of URBAN DESIGN, HOUSING DESIGN and CAMPUS DESIGN.

COURSE CONTENT

Urban Design: The issues are to be addressed for the Design Project pertaining to Urban Design includes:

- Issues of urban structure, urban space and form.
- Issues of conservation.
- Issues in zoning, land use, density, development control.
- Issues of building in context, urban infill.
- Integration of diverse functional needs, access systems, parking, services etc.

Phase – wise development

- Environmental considerations.
- Safe and Comfortable vehicular and pedestrian movement.
- Issues of character and landscaping.
- Scope for expansion for future developments.
- Details pertaining to the disabled.

Students would need to undertake one of the design subjects for the studio exercise. Students may be required to develop a brief, translate it into requirements and realize it, in which the student will take approval of the project brief. The evaluation shall be through periodic internal reviews. The final submission will also include a brief report of about l000 words. Explaining the concept and design proposals along with the main portfolio. It will also include a model. Students should also to attempt a time problem of similar scale.

Course outcomes:

- **Apply Knowledge of Urban Design Principles:** Utilize urban design concepts and theories to analyze and address issues related to urban structure, space, and form within a given project context.
- **Demonstrate Environmental Sensitivity:** Integrate sustainability principles and environmental considerations to propose design solutions that enhance the urban environment.
- **Evaluate Access and Mobility Solutions :** Apply critical thinking and problem-solving skills to create safe and efficient vehicular and pedestrian movement systems within urban designs.
- **Synthesize Diverse Functional Needs:** Integrate various functional requirements, including zoning, land use, density, and services, to design harmonious and functional urban spaces.

- **Incorporate Inclusive Design Practices:** Apply principles of inclusivity by addressing the needs of the disabled and ensuring equal access and opportunities within the urban design.
- **Present and Defend Design Proposals:** Effectively communicate and justify design concepts through written reports, portfolios, and physical models, demonstrating a deep understanding of the urban design process.

Assessment:
Major design problem carries 30 marks and minor design problem carries 20 marks. Students will submit all the materials specified by the design faculty and attend external viva-voce to be conducted by an external examiner.
Viva Voce: Student should submit their drawings and they should attend a practical Exam and Viva-voce conducted by both an external and an internal examiner.

References:

1) Campus Architecture.
2) Timesavers Standard for Housing and Residential Development.
3) Image of the City-Kevin Lynch.
4) Pattern Language- Christopher Alexander.
5) Defensible Space-Oscar Newman

ARC5102
PROJECT MANAGEMENT

Course Objective:

To equip students with a comprehensive understanding of the fundamental concepts, methodologies, and tools essential for effective construction project management. Through a blend of theoretical knowledge and practical application, students will learn the significance of construction management in the building industry, delve into traditional and contemporary project management techniques, understand the pivotal role of construction equipment, and harness the power of computer applications to optimize project outcomes.

CONTENTS

(CONSTRUCTION ORGANIZATION)

Need for management of building/construction projects – role of Project or Construction Managers in the building industry.
Aim, objectives and functions of Construction Management. Construction stages, Construction team, Role of an architect in construction management.

(INTRODUCTION TO PROJECT MANAGEMENT & TECHNIQUES)

Project management concepts. Objectives, Construction planning, scheduling and controlling and role of decision. In project management. Traditional management system. Gantt's approach, Load chart, Progress chart. Development of bar charts, merits and demerits, and limitation of charts.

CPM networks, merits and demerits, Development and analysis of CPM network. PERT network. Introduction to the theory of probability and statistics. Cost time analysis in the network.

(PROJECT PROGRAMMING AND CRITICAL PATH METHOD)

Project network. Events activity. Dummy. Network rules. Graphical guidelines for Network. Numbering the events. Cycles. Development of network-planning for network construction. Models of network construction. Steps in development of the network. Work breakdown structure. Hierarchies. Critical path method - process, activity time estimate, earliest event time, latest allowable occurrence time, start and finish time of activity, float, critical activity and critical path problems.

(CONSTRUCTION EQUIPMENT)

The role of equipment/machinery in the construction industry, factors affecting selection of construction machinery, standard versus special equipment, understanding of the various issues involved in owning, operating and maintaining of construction equipment, economic life of an equipment.

(USE OF COMPUTER APPLICATIONS IN PROJECT MANAGEMENT)

Creating new project, building task, creating resources and assessing cost, refining project, project tracking and recording actual, reporting on progress and analysing financial progress using computer applications like any one of the following:
Microsoft Project, Primavera Project Planner, Primavera.

Course Outcome:

- Students will gain an in-depth understanding of the need for construction project management and the roles of various stakeholders, especially project or construction managers. They will appreciate the aim, objectives, and functions that underpin construction management.
- Students will master traditional project management tools and techniques, such as Gantt's approach, load charts, and progress charts. They will be able to evaluate the merits, demerits, and limitations of these techniques in real-world scenarios.
- Students will become adept at using advanced project management techniques like CPM and PERT networks. They will be introduced to the foundational concepts of probability and statistics, enabling them to conduct cost-time analysis effectively.
- Students will acquire the skills to design and analyze project networks, understand the roles of events and dummy activities, and adhere to network rules. They will be proficient in identifying critical paths, estimating activity times, and managing potential project bottlenecks.
- Students will comprehend the importance of equipment in the construction industry, the factors influencing equipment selection, and the economics of equipment ownership and operation. They will be equipped to make informed decisions regarding the selection and maintenance of construction machinery.
- Students will develop hands-on expertise in leveraging leading computer applications like Microsoft Project, Primavera Project Planner. They will be capable of creating, refining, and tracking projects, as well as analyzing and reporting on financial progress using these tools.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted as per the university academic calendar and average of the both are to be taken for consideration for 20 and 10 Marks and assignment submission on last unit of the syllabus i.e creating a project management report using any one of the computer applications mentioned in the syllabus. Total marks will be (20M+10M) =30M.

TEXT BOOKS:

1. Pillai, S.P., & Menon, D. (2019). *Construction Management*. McGraw Hill Education.
2. Chitkara, K. K. (2014). Construction Project Management. Tata McGraw-Hill Education.
3. *Srinath, L. S. (2005).* PERT/CPM*. Affiliated East-West Press.*
4. *Sharma, S. C. (2010).* Construction Equipment and Management*. Khanna Publishers.*
5. *Rajasekaran, S., & Rai, S. P. (2011).* Computer Oriented Numerical & Statistical Methods*. PHI Learning.*

REFERENCES

Books & Weblinks

1. Harris, F., & McCaffer, R. (2013). *Modern Construction Management*. Wiley-Blackwell.
2. Kerzner, H. (2017). *Project Management: A Systems Approach to Planning, Scheduling, and Controlling. John Wiley & Sons.*
3. Lock, D. (2013). *Project Management*. Gower Publishing, Ltd.
4. *Marmel, E. (2018).* Microsoft Project 2019 Bible*. John Wiley & Sons.*
5. Project Management Institute (PMI): https://www.pmi.org/
6. Gantt Chart Tutorial : https://www.youtube.com/watch?v=-oD50HSBBBI
7. Microsoft Project Tutorials : https://support.microsoft.com/en-us/training
8. Primavera P6 Online Training Course : https://www.planacademy.com/

ARC5103
PAECC
ARCHITECTURAL DISSERTATION
(Guided Project)

Course Objective:

To equip students with the skills and knowledge necessary to undertake a comprehensive architectural research project. This course aims to enhance students' critical thinking, research abilities, and presentation skills, leading to the formulation of a well-structured Architectural Design Thesis. By focusing on topics leaning towards architectural design, students are encouraged to delve deep into architectural subjects, methodologies, and case studies, ensuring a robust foundation for their final thesis and future professional endeavours.

CONTENTS

(TOPIC SELECTION)

Each Student is encouraged to select a topic which may eventually lead to their final Architectural Design Thesis. Topics should emphasize critical understanding, logical reasoning, and structured writing.

Topics related to ongoing, proposed development, or new investigations in the related area are acceptable. Students are encouraged to choose topics that lean more towards Architectural design rather than planning or redevelopment projects.

Steps for Topic Selection

- Self-reflection: Revisit the architectural courses you've taken so far. Identify subjects or areas of interest that resonate with you.
- Research: Explore current architectural journals, articles, and news. Identify ongoing or proposed developments that pique your interest.
- Brainstorming: List potential topics and categorize them based on relevance, feasibility, and personal interest.
- Feasibility Analysis: Analyze the selected topics for potential research challenges, available resources, and alignment with academic goals.
- Peer and Faculty Feedback: Discuss potential topics with peers and faculty to gain insights, refine focus, and identify potential pitfalls.
- Finalization: Choose a topic that aligns well with the criteria mentioned above and has a clear path for research and exploration.

Note: Design dissertation topics (projects) must be submitted to the department after the completion of the Practical training viva-voce of the previous semester.

(PRE-THESIS STUDY)

Opportunity to familiarize with the literature review and relevant case studies required for the Thesis. Encouraged to use this as groundwork for the main Thesis.

(DISSERTATION STRUCTURE)

a. Introduction: Introduction to the chosen topic.
b. Literature Review: Review of extant literature related to the subject area.
c. Methodology: Framework to structure the study.
d. Desktop Case Study: 3 Desktop Case Studies related to the project, in which 2 shall be from national and other is from international
e. Findings/Analysis: Examination, interpretation, comparison, and analysis from various perspectives.
f. Conclusion: Summation of the study and its findings.

(SUPERVISION & GUIDANCE)

Post topic submission, each student will be assigned a Thesis Guide from the faculty.
Regular supervision and progress checks with the assigned Thesis Guide.

Students should consult their Thesis Guide for case studies and data collection related to their approved dissertation topics.

(SUBMISSION & PRESENTATION)

A written paper/ Report of approximately 3500 words by the end of the semester.
Adherence to standard referencing conventions and technical writing norms is mandatory.
Present the progress of the study at various stages throughout the semester.
Final assessment will be based on both the written paper/ Report and oral communication.

(EVALUATION CRITERIA)

Depth and breadth of research. Clarity of writing and logical structure in the report submitted. Adherence to technical writing norms and referencing conventions.
Quality of oral presentations and ability to communicate ideas effectively.

Final Note: This course is designed to prepare students for their Architectural Design Thesis in the subsequent semester, ensuring they have a robust foundation in research, analysis, and writing.

Course Outcome:

- By the end of this course, students will be adept at conducting thorough architectural research, utilizing a variety of resources including journals, articles, and case studies to substantiate their work.
- Students will develop the ability to critically analyze various architectural topics, drawing logical inferences and making informed decisions relevant to their chosen subject.
- Students will be proficient in presenting their findings in a structured manner, both in written and oral formats, adhering to academic standards and conventions.
- Students will gain a deep understanding of architectural design principles, differentiating it from planning or redevelopment, ensuring their research aligns more with architectural design paradigms.
- Through continuous interactions with peers, faculty, and thesis guides, students will appreciate the value of feedback, collaborative learning, and teamwork in refining and enhancing their research.
- With a solid foundation in architectural research, students will be well-prepared for their subsequent Architectural Design Thesis and potential real-world architectural challenges, ensuring a smooth transition from academic life to professional practice.

Assessment:

Assessment Structure for Architectural Dissertation

Internal Assessment (50 Marks)

1. Topic Selection and Relevance (5 Marks)

- Clarity and relevance of the selected topic to architectural design, Rationale for the chosen topic and its alignment with the course's emphasis: 5 Marks
- Originality and potential of the topic in the Architectural domain: 5 Marks

2. Literature Review, Methodology and Desktop case studies (30 Marks)
    - Depth and coverage of literature reviewed: 15 Marks
    - Appropriateness and clarity of the dissertation methodology: 5 Marks
    - Presentation covering of three desktop case studies, highlighting their relevance to the dissertation topic, and deriving conclusions from these studies. 10 Marks

3. Supervision & Guidance (5 Marks)
    - Active engagement and regular consultations with the assigned Thesis Guide, Incorporation of feedback and suggestions from the Thesis Guide: 5 Marks

4. Progress and Consistency (5 Marks)
    - Regularity in updating and refining the research, Consistency in adhering to the dissertation structure and guidelines: 5 Marks

5. Internal Guide's / Dissertation coordinator discretionary Marks (5 Marks)
    - Awarded by the internal guide/ Dissertation coordinator based on the student's overall dedication, effort, and progress: 5 Marks

External Assessment (50 Marks)

1. Dissertation Report (25 Marks)
    - Depth and breadth of dissertation research and literature review: 15 Marks
    - Presentation on desktop case studies and its relevance and deriving conclusions: 10 Marks
    - Clarity of writing, logical structure, and adherence to dissertation norms: 5 Marks

2. Oral Presentation (20 Marks)
    - Quality and clarity of presentation: 10 Marks
    - Ability to communicate ideas effectively and respond to questions, Depth of understanding and grasp over the selected topic: 10 Marks

3. Dissertation Coordinator's Discretionary Marks (5 Marks)
    - Awarded by the dissertation coordinator considering the student's overall performance, understanding of the topic, and potential contribution to the field: 5 Marks

ARC5104
Professional Elective-II
A. Disaster Resistant Buildings and Management

Course Objective:

To equip students with a comprehensive understanding of the principles, strategies, and technologies underpinning disaster-resistant building and management, emphasizing the intricacies of seismic phenomena, the impact of disasters, and the role of informed design and mitigation measures.

CONTENTS

(INTRODUCTION TO DISASTER MANAGEMENT)

What is Disaster? Types & Classification of Disasters, Causes & Consequences of Disasters, Global Disaster Trends - Changing Types &Patterns and after effects of disasters like Various types of Natural and Man induced hazards & disasters. Hazard (earthquake and cyclone) map of the world and India.

Disaster & Emergencies: Concept & Fundamentals of Disaster Management, Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity & Equations of Disaster Management, Disaster development, Emerging Risks of Disasters –Climate Change and Urban Disasters.

(DISASTER MANAGEMENT CYCLE AND FRAMEWORK)

Disaster Management Cycle.

Pre-Disaster –Risk Assessment and Analysis, Risk Mapping, Zonation and Micro zonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development; Awareness

During Disaster –Evacuation –Disaster Communication –Search and Rescue – Emergency Operation Centre –Incident Command System –Relief and Rehabilitation.

Post-disaster –Damage and Needs Assessment, Restoration of Critical Infrastructure –Early Recovery –Reconstruction and Redevelopment.

IDNDR, Yokohama Strategy, Hyogo Framework of Action.

(APPLICATIONS OF SCIENCE AND TECHNOLOGY FOR DISASTER MANAGEMENT, DISASTER MANAGEMENT FRAMEWORK IN INDIA)

Geo-informatics in Disaster Management (RS, GIS, GPS).

Structural and Non-Structural Mitigation of Disasters. Disaster Management in India - Disaster Profile of India, Disaster Management Act 2005, National Policy on Disaster Management. Role of Government (local, state and national) - NDMA, NIDM, NDRF, Non-Government and Inter-Governmental Agencies.

Case studies. Disaster management plan; National crisis management committee; state management group.

(SEISMIC PHENOMENA AND STRUCTURAL RESILIENCE: UNDERSTANDING EARTHQUAKES, BUILDING BEHAVIOR, AND RETROFITTING STRATEGIES)

Causes of earthquake - plate tectonics, faults, seismic waves; magnitude, intensity, epicentre, energy release and ground motions.
Earthquake effects – On ground, soil rupture, liquefaction, landslides Past effects of earthquake on ground and building - Behaviour of various types of buildings, structures, and collapse patterns.
Seismic retrofitting - Weakness in existing buildings, concepts in repair, restoration and seismic strengthening. General Planning and design consideration, Norms and Standards; Building forms, horizontal and vertical eccentricities, mass and stiffness distribution, soft storey etc.; Seismic effects related to building configuration. Plan and vertical irregularities, redundancy and setbacks. Various types and construction details - Foundations, retaining walls, plinth fill, flooring, walls, openings, roofs and boundary walls. Innovative construction materials and techniques, traditional regional practices.

Course Outcome:

- Disaster Comprehension and Classification: Students will be able to differentiate between various types of disasters, understand their causes and consequences, and recognize the changing global trends and patterns of disasters, including their after-effects.
- Holistic Understanding of Disaster Management: Students will gain a thorough knowledge of the disaster management cycle, encompassing pre-disaster risk assessment, mitigation, and preparedness strategies; during-disaster response and emergency measures; and post-disaster recovery and reconstruction efforts.
- Technological Application in Disaster Management: Students will be adept in leveraging geoinformatics tools such as RS, GIS, and GPS in disaster management and will appreciate the importance of both structural and non-structural mitigation techniques.
- Insight into Indian Disaster Management Framework: Students will familiarize themselves with India's disaster profile, legislative framework, and the roles of various governmental and non-governmental entities in disaster management, underscored by relevant case studies.
- Seismic Knowledge and Building Resilience: Students will acquire an in-depth understanding of the causes and effects of earthquakes, the behaviour of buildings during seismic events, and the principles of seismic retrofitting. They will also be knowledgeable about innovative construction materials and techniques that enhance structural resilience.
- Informed Design and Construction Strategies: Students will develop the ability to design and plan buildings with a focus on disaster resilience, taking into account norms, standards, building forms, and other key considerations. They will also be equipped to recognize and address potential weaknesses in existing structures.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted as per the university academic calendar and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment and assignments i.e. total marks will be (20M+10M)=30M.

TEXT BOOKS:

1. Introduction to Natural and Manmade Disasters and their Effects on Buildings, Macdonald Roxana, Architectural Book Publication Co,2003
2. Earthquake Disaster Reduction Masonry Building, Design, and Construction By Anand Swarup Arya · 2007
3. Recovering from Earthquakes Response, Reconstruction and Impact Mitigation in India 2012, Aromar Revi, Shirish Patel.
4. Disaster Management, By Vinod K. Sharma ·
5. Disaster Management Handbook, 2008., Jack Pinkowski
6. Earthquake Architecture: New Construction Techniques for Earthquake Disaster
   Prevention by Belen Garcia.
7. Disaster Management by Mrinalini Pandey Wiley2014.

REFERENCES

8. National Disaster Management Plan, Ministry of Home affairs, Government of India http://www.ndma.gov.in/images/policyplan/dmplan/draftndmp.pdf)
9. Manual on Disaster Management, National Disaster Management, Agency Govt of India.

ARC5104
Professional Elective-II
B. APPROPRIATE BUILDING TECHNOLOGIES

Course Objective:

- To make them understand the need to bridge the gap between the available resources and the future demand for the volume of Building Materials.
- To realize & identify the importance of the available resources (Material, Process and Man-Power) i.e., the increasing demand, shortfall for the possible optimalization with alternatives.
- To make them understand the damage to the environment and the Human kind from the estimated demand of resources and innovation for appropriate alternatives
- To make them understand and identify the avenues for utilization of industrial by-products, wastes along with the ongoing practices
- To understand, explore and familiarize the concepts to integrate Design with the technologies.
- Enlighten the ongoing application and execution of the technologies in mitigating the shortage of resources, consumption of energy for embedded,

operational purposes and ascertain the damage, towards HEAT ISLAND EFFECT & CLIMATE CHANGE issues.

- Enlighten the ongoing application and execution of the technologies to mitigate the shortage of resources, consumption of energy for embedded and operational purposes towards HEAT ISLAND EFFECT and CLIMATE CHANGE issues.

CONTENTS

(Understanding the impact of the demand for the BUILT-ENVIRONMENTS on the Natural Environment)

India stands at 7th place in CO2 emissions accounting for about 54,423 MT annually, nearly 7% of worldwide emissions which costed nearly Rs 25,76,000 Crore as in 2019.

The Construction industry accounts for about 11% for Building materials and construction and about 28% for building operations.

Built environments are consuming nearly 17.5% of the total energy produced.

(UNDERSTANDING a BUILDING – its ELEMENTS)

Recalling the fundamentals – their function, the sequence of construction & their % share of contribution to build-environment as well as the damage to natural environment, when not handled for its efficiency:

Walling materials constitute approximately 30% of all construction & the largest mass & surface area of a building and account for the maximum capital resource in a structure.

The Roof is the most difficult to build and constitutes approximately 20% of all construction and mostly consumes the high energy consuming materials like the Cement, Concrete and Steel.

Finally, the finishes which again consume the rich materials in terms of energy and the process for the desired shape, color and texture. This needs the highest skill to perform.

These Alternatives could be limited to the following approaches:

1. By DESIGN - purpose
2. By Material
3. By sequence of Construction
4. By Process

These Alternatives could be limited to:

1. Of Built-Form or Geometry
2. By Application
3. From source of the material like industrial waste
4. Of Fabricating / Manufacturing process
5. By sequence of Construction
6. Re-use of industrial waste

These Alternatives could be limited to :

1. Re-defining the function of an Architectural element
2. Re-structuring the method of construction
3. Re-writing the sequence of construction
4. Re-placing the conventional materials
5. Mechanizing the processes
   Any other … … … …

STUDYING the ALTERNATIVES already in use (Case Studies):

1. The enclosures: Masonry walls – Rat-trap bond (cavity) walls, Stabilized Mud-brick walls, Hollow concrete Blocks, Composite walls, Fly-ash brick Aerated Autoclaved Block walls, Interlocking block walls, pre-finished walls, pre-cast concrete panels, pre-fabricated wall modules, sandwich panels etc.
2. The Roof: The Filler slabs, pre-cast panels over precast RCC Girders / Beams, pre-cast beams with concrete or extruded terra-cotta blocks – T-block (Hourdi block) roofing; Cast-in-situ Brick Funicular Shell Roof, Pre-cast Shell roofs, Waffle roofs, Domes, Space-frames etc.
3. Pre-cast Lintels, Brick Arches, Corbelling
4. RCC, WPC Door, Window Frames
5. UPVC, engineered aluminum windows, glazing options etc.
6. Cladding materials – Dry and Wet applications
7. Ferro-crete roof and wall planks and panels.

PRIORITIZE the **AREAS** of **EXPLORATION** for **ALTERNATIVES:**

1. To identify the importance of the available resources (Material and Man-Power) i.e., the increasing demand, shortfall and the possibilities of optimatization.

INITIATIVES/INSTITUTIONS in this DIRECTION:

1. Nirmithi Kendra – Building Center movement across INDIA.
2. **B**uilding **M**aterial and **T**echnology **P**romotion **C**ouncil
3. PADMASREE Ar. LAURIE BAKER's QUILON.
4. **C**ouncil for **A**dvancement of **P**eople's **A**ction and **R**ural **T**echnology – Bangalore
5. AUROVILLE:
6. – pu

CHALLENGES:

1. Identifying the opportunities through community facility buildings

Study:

Case study of a project executed incorporating Alternative Building Technologies

INTEGRATION:

1. Re-Design one of previous Design assignments to integrate with Alternative Building Technologies
   a. Adapt Alternative Walling material
   b. Incorporate alternative Roofing system

c. Apply alternative finishes.

COURSE OUTCOMES:

- "Students will demonstrate a deep understanding of the environmental impact of built environments, including the percentage of energy consumption and CO2 emissions attributed to construction and building operations."
- "Students will interpret the various elements of a building, their functions, and their contributions to the built environment, along with the consequences for the natural environment if not handled efficiently."
- "Through design and material selection, students will propose alternative approaches for reducing the environmental impact, focusing on built form, application, material source, manufacturing process, and construction sequence."
- "Students will critically evaluate existing alternative building technologies through case studies, comparing their advantages, disadvantages, and environmental benefits for various architectural elements such as walls, roofs, and finishes."
- "Students will integrate alternative building technologies into a design project, reimagining architectural elements by incorporating alternative walling materials, roofing systems, and finishes to enhance sustainability."
- "Students will assess the challenges and opportunities related to community facility buildings, and critically analyze a project executed with alternative building technologies to identify areas for improvement and further innovation."

Text books / References:

1. Articles, Journals from CBRI, BMTPC, SERC etc. Web links, Videos

AR5105

Professional Elective-III
A. INTERIOR DESIGN

Course Objective:

- To introduce to basics of Interior design and terminology used.
- To understand the evolution of interior design.
- To familiarize with elements of design like interior treatments, finishes, lighting and interior landscape.
- To understand the economics and functionalities of interior design.
- To formulate concepts and layouts for various interior space requirements.
- To introduce the conventional and new materials applied in interior design.

CONTENTS

(Introduction to Interior Design)

Definitions, concepts, Form, scale, texture, colour and light, style and furniture, painting, sculpture, floor covering, draperies. Ways of achieving unity among these various uses designed by architects and designer. Space, form, illusion, colour and texture.

(History)

A historical overview of the influence of various design movements on interior design. Interior decoration and crafts of various indigenous tribes and communities of the sub-continent.

(Elements of Interior Design - Interior Treatment and Finishes)

Treatment methods, finishes, material selection, design options for floor, ceiling, walls, staircase, openings, interior services elements, etc. in order to achieve certain functional and/or aesthetical demands of the space.

(Elements of Interior Design-Lighting and Interior Landscaping)

Study of interior lighting; types, fixtures, enhancement accessories, selection for different contexts. Interior landscaping elements and significance in enhancing environment visuals and inducing moods; rocks, plants, water, flower, fountains, paving, artifacts etc.

(Discussion)

Discussion on economics, maintenance, durability, flexibility and environmental affects, colour scheme and interior arrangement for different spaces like hotel rooms, office spaces, class rooms, etc.

(Furniture Design & Interior Layouts and Planning)

Human comfort, lifestyle aspirations, and function as context to design of furniture, interior spaces. Office and residential interior design layouts and furniture. Interiors and furniture of various age groups like schoolchildren etc.

(Materials)

Natural and man-made materials used in interior design. New materials applied in interior design with changing trends.

(Design of interior spaces)

Residential, commercial and institutional.

Note:

Assignment and class work includes case studies of each space type presented in seminar format, design of Residence; Office and showroom, making colour schemes and study of designers' work and hard copy presentation. Hands-on workshop with different materials and model making. Making detailed drawings of interior spaces and furniture.

Course outcome:

With the successful completion of the course student should have capability to

- Identify various elements of designed spaces for interiors.
- Understand the intricacies of interior space planning and its historical background
- Understand the modern trends in the field.
- Apply design strategies for create desired perception of spaces.
- Create concepts and layouts for small and medium sized interior design projects
- Students will have hands on experience with materials, tools and interior terminology for better understanding of their usage and able to present the designs in different media and estimate various interior applications.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for 20M, and 10 Marks for continuous assessment (portfolio) i.e., total marks of (20M+10M) =30M

TEXT BOOKS:

1. Francis D.K.Ching, Interior Design Illustrated
2. Syanne Slesin and Stafford Ceiff, Indian Style
3. Gary Gordon, Interior Lighting for Designers
4. Steprt Devan Kness, Logan and Szebely, Introduction to Interior Design
5. Ahmed Kasu, Interior design.

REFERENCES:

1. Archi World. Interior Best Collection: Residence, Commerce, Office, Restaurant Asia I-IV. Archi World Co., Korea, 2003.
2. Friedman, Arnold and Others. Interior Design: An Int. to Architectural Interiors. Elsevier, New York, 1979.
3. Miller, E. William. Basic Drafting for Interior Designers. Van Nostrand Reinhold, New York, 1981.
4. Kurtich, John and Eakin, Garret. Interior Architecture, Van Nostrand Reinhold, New York, 1993.
5. Rao, M. Pratap. Interior Design: Principles and Practice, 3rd ed. Standard Pub., 2004

AR5105
Professional Elective-III
B. THEORY OF DESIGN

Course Objective:

- To define designing as a process.
- Review and assess different design principles and methods, both, historical and
- contemporary.
- To familiarize students with different design methods and stages of design.
- Understanding role of Design-Analogies in the designing process.
- Analyse the process of design as a series of small steps culminating into the finished design.

CONTENTS

(Introduction to Design)

Definition and understanding of design- design in history - changing role of designer on society different classifications of design according to scale, process, mode of production, etc.

(Design Process)

Designing today, Design as a process, various thoughts and definition, Design methodology, Philosophies, and approaches to design process, (Traditional & Modern-Day) KISS principles by Kelly Johnson, Use-centred design by John Flach and Cynthia Dominguez.

(Design Methods & Stages of Design)

Different design methods, pre-fabricated strategies, Methods of exploring design situation. Parametric Architecture, Designing as a three-stage process: Divergence, Transformation, Convergence.

(Collaborative strategy for adaptive architecture)

Enabling everyone concerned with the designing of a building influencing decisions that affect both the adaptability of the building and the compatibility of its components, Biophilic Architecture.

(Selection of Strategies and Design Methods)

Criteria for choosing design method, input output chart for selecting design methods, Design strategies, linear strategies, Cyclic Strategies, Branching strategies, adaptive strategies.

Course outcome:

- Knowledge Comprehension: Students will demonstrate a clear understanding of design concepts, history, and the evolving role of designers in society, showcasing their ability to analyze and explain key principles.

- Application of Design Process: Learners will apply various design methodologies and approaches, incorporating traditional and modern design philosophies, as well as principles like KISS and Use-Centered design, in practical design projects.
- Design Methods Mastery: Students will master different design methods and strategies, including parametric architecture and the three-stage design process, demonstrating their capacity to select and employ the appropriate method for a given design situation.
- Collaborative Design Proficiency: Through the study of collaborative strategies and biophilic architecture, students will develop the ability to work effectively in teams and influence decisions that enhance building adaptability and component compatibility.
- Strategic Design Decision-Making: Participants will develop criteria for choosing design methods, understand input-output chart applications, and distinguish between linear, cyclic, branching, and adaptive strategies, enabling them to make informed design decisions.
- Evaluation and Critical Thinking: Students will engage in critical analysis of design theories, processes, and methods, fostering the ability to assess design solutions for their effectiveness, creativity, and suitability in addressing real-world challenges.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for 20M, and 30 Marks for continuous assessment (portfolio) i.e., total marks of (20M+30M) =50M

TEXT BOOKS:

1. Design Methods by John Chris Jones, John Wiley & Sons, New York.
2. Experiencing Architecture by Steen Eliel Rasmussen.
3. Urban Experience by Raymond J. Curran.
4. The death of Drawing, Architecture in the Age of Simulation, David Ross Scheer, Routledge.

REFERENCES:

1. http://char.txa.cornell.edu/language/principl/principl.htm
2. http://www.digital-web.com/articles/principles_of_design/
3. Edward De Bono, “Lateral Thinking”, Penguin, 1990.
4. Christopher Jones “Design methods”,Wiley, 1980.
5. Tom Heath, “Method in Architecture, John Wiley & Sons, New York, 1984.
6. Nigel Cross, “Developments in Design Methodology”, John Wiley & Sons, 1984.
7. Helen Marie Evans, Dumesnil, Carla Davis, “An Invitation to Design”, Macmillan Publishing Co., New York, 1982

AR5106
Professional Elective-IV
A. BIO CLIMATIC ARCHITECTURE

Course Objective:

- To introduce the students to the theoretical and practical aspects of bioclimatic design.
- To introduce the students to various tools and technologies involved and executing them.
- To familiarize students with some of the acclaimed bioclimatic buildings, resource optimization and innovative approaches within the past decade.

CONTENTS

(Introduction to Bioclimatic Architecture)

Introduction to bio climatic architecture, terminology and advantages.

(Analysis of environment)

Analysis of the environment and the environmental pre-existence. environmental site design; site assessment and selection; The orientation, size, height, layout.

(Renewable energy)

Use of renewable energy and alternative energy in bio climatic buildings – solar, geothermal, wind, hydroelectric, etc. Passive solar energy collection and storage systems. Integration of active renewable energy generation systems.

(Materials)

Use of Sustainable materials: Sustainable materials like wood, stone, natural fibre and recycled materials minimise the impact of the building.
Use of smart materials: For example: window panes that automatically darken, tiles that store the heat of the sun and smart materials that repair themselves to lengthen their useful life.

(Bio climatic elements and strategies)

Ventilation systems, water and plants, thermal accumulators, thermal mass, U-values, air tightness in the building, thermal bridges, hygrothermal comfort. Passive cooling systems.

(Case Studies)

Case studies on buildings using bioclimatic strategies with focus on efficient design, control and smart use of space.

Course outcome:

- **Knowledge (Remembering):** Understand the fundamental terminology and principles of bioclimatic architecture, including its advantages and the analysis of environmental factors.
- **Comprehension (Understanding):** Demonstrate comprehension of environmental pre-existence and site assessment, including factors like orientation, size, height, and layout in architectural design.
- **Application (Applying):** Apply knowledge of renewable energy sources such as solar, geothermal, wind, and hydroelectric power to create sustainable bio climatic buildings.
- **Analysis (Analyzing):** Analyze the selection and use of sustainable materials, smart materials, and passive solar energy collection systems to minimize the environmental impact of buildings.
- **Synthesis (Creating):** Design and integrate bioclimatic elements and strategies, such as ventilation systems, thermal mass, passive cooling, and hygrothermal comfort, into architectural projects effectively.
- **Evaluation (Evaluating):** Evaluate case studies of bioclimatic buildings, assessing their efficiency in design, control, and space utilization, while considering the smart use of materials and energy systems.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted and average of the both are to be taken for 20M, and 30 Marks for continuous assessment (portfolio) i.e., total marks of (20M+30M) =50M

TEXT BOOKS:

1. Bioclimatic Housing: Innovative Designs for Warm Climates, Richard Hyde.
2. Climate Responsive Architecture, Arvind Krishnan.
3. Adapting Buildings and Cities for Climate Change, Roaf, Chrichton, Nicol.

REFERENCES:

1. Architecture in a Climate of Change, Peter F. Smith
2. Sudha, M. S., Bansal, N. K., Kumar, A. and Bansal, P. K. (1986). Solar passive buildings, science and design. London: Pergamon Press.
3. Biophilic and Bioclimatic Architecture, Amjad Almusaed.

ARC5106
Professional Elective-IV
B. SUSTAINABLE CITIES AND COMMUNITIES

Course Objective:

To equip students with an in-depth understanding of sustainable development in the context of architecture and urban planning. The course aims to foster knowledge about current development scenarios, ecological design principles, strategies for building sustainable communities, and the importance of rating systems for green urban infrastructure. Through theoretical knowledge and

practical applications, students will be trained to integrate sustainable practices into their architectural endeavors.

CONTENTS

(FOUNDATIONS Of SUSTAINABLE DEVELOPMENT)

Current scenario of development and its impacts: Evolution of urban and rural development patterns. Analysis of global urbanization trends. Impacts of rapid urbanization: environmental, social, and economic.

Concepts such as: Ecology: Basics of ecosystems, natural habitats, and biodiversity. Climate Change: Causes, impacts, and global initiatives. Resource Depletion: Over-extraction of natural resources and its consequences.

Introduction to sustainable development: Definition and principles of sustainability. Historical evolution of sustainable development. Sustainable Development Goals (SDGs): Aims, objectives, and global progress.

(PRINCIPLES of ECOLOGICAL DESIGN and PLANNING)

Various aspects of sustainability: Social sustainability: Community engagement, social equity, and cultural preservation. Environmental sustainability: Conservation, restoration, and resilience. Economical sustainability: Cost-effective green technologies, sustainable business models.

Design and Architecture Principles: Sustainable site planning: Site analysis, land-use planning, green landscaping. Low impact design: Materials, construction methods, and passive strategies. Climate-responsive architecture: Design strategies for various climatic zones. Bio mimicry: Learning design solutions from nature. Water and energy efficiency: Conservation techniques, renewable energy sources. Social and economic equity: Inclusive design, affordability, and community benefit.

(BUILDING SUSTAINABLE URBAN COMMUNITIES)

Sustainable communities and cities: Principles of sustainable urban planning: Mixed-use development, transit-oriented design. Design for well-being: Physical, ecological, economic, social, health, and equity considerations.

Sustainable urbanism: Introduction and history: Evolution of cities and the need for sustainable urbanism. Compactness: Efficient land use, density, and urban form.
Sustainable corridors: green transportation, pedestrian pathways, and biodiversity corridors. High-performance buildings: green certifications, passive strategies, and innovative technologies. Clean energy mechanism: Solar, wind, and alternative energy sources in urban settings.

(RATING SYSTEMS FOR GREEN URBAN INFRASTRUCTURE)

Introduction to various rating systems available for sustainable cities and communities- LEED ND, IGBC green townships, villages and cities.

Course Outcome:

- Students will gain insights into the current scenarios of urban and rural developments, understanding the global trends and the multifaceted impacts of rapid urbanization. They will comprehend fundamental concepts such as ecology, climate change, and resource depletion, setting the groundwork for sustainable architectural practices.
- Students will grasp various aspects of sustainability, including social, environmental, and economic facets. They will be adept at implementing sustainable site planning, low-impact design, and climate-responsive architecture in their projects.
- Students will understand the principles of sustainable urban planning, emphasizing the importance of mixed-use development and transit-oriented designs. They will be capable of designing for the holistic well-being of inhabitants, considering physical, ecological, economic, social, health, and equity factors.
- Students will recognize the historical context and the evolving need for sustainable urbanism. They will be proficient in applying concepts like urban compactness, sustainable corridors, and high-performance building design in their architectural endeavors.
- Students will be familiarized with various rating systems available for sustainable cities and communities. They will understand the criteria and significance of certifications like LEED ND and IGBC, enabling them to design projects that meet or exceed these standards.
- By the end of the course, students will be able to integrate their knowledge of sustainable development, ecological design, and urban community building into their architectural projects. They will be positioned to make informed decisions that promote sustainability, resilience, and community well-being in their professional practices.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted as per the university academic calendar and average of the both are to be taken for consideration for 20 and 10 Marks for assignments, presentations, Case studies etc., i.e. total marks will be (20M+10M)=30M.

TEXT BOOKS:

1. Sustainable Urbanism and Beyond by Tigran Haas
2. Ecological Design and Planning by George F. Thompson & Frederick R. Steiner.
3. Sustainable Architecture in India by M.N. Joglekar and Meera Raghunathan.
4. Climate Responsive Architecture: A Design Handbook for Energy Efficient Buildings by Arvind Krishan, Benny K. Bansal, and others

5. Green Building: Guidebook for Sustainable Architecture by Michael Bauer, Peter Mösle & Michael Schwarz.
6. IGBC's Green Building Rating System

REFERENCES

7. IGBC Green Townships Manual
8. LEED – ND - LEED

ARC5107
Professional Elective-V
A. GLASS ARCHITECTURE AND DESIGN

Course Objective:

- To provide students with a comprehensive understanding of the evolution, significance, and multifaceted applications of glass in modern architecture. By the end of this course, students will have a holistic grasp on the production, properties, and types of glass, the importance of energy efficiency, safety considerations, and practical application of knowledge in design contexts.

SYLLABUS

(GLASS AS BUILDING MATERIAL)

Evolution & importance of glass in modern architecture. Applications of glass in buildings (façade/ interior applications). Understanding the production & properties of glass. Value additions including coating technology (importance & necessity) and processing (tempering, heat strengthening, DGU, laminated, ceramic fritting). Types of Glass- mirror, lacquered, fire resistant. Modern glass with different applications. Glass for hospitals, green homes, airports, offices, other buildings. Glass and human safety compliances. Role of glass in fire safety considerations - Class E, EI & EW. Role of glass in acoustics. International standards & code provisions.

(GLASS AND GREEN ARCHITECTURE)

Building Physics. Theory of electromagnetic radiation. Understanding of internal and external reflections. Day-lighting in Buildings - introduction and basic concepts (VLT). Solar Control and thermal insulation (SF, UV, SHGC). Need for green Buildings. Energy efficient buildings. Achieving energy efficiency using glass. Factors of energy efficient material selection. Performance parameters. Energy codes and Green ratings - ECBC, IGBC, GRIHA. Approaches of energy efficiency - prescriptive method, trade off method. Accommodating passive architecture. Whole Building Simulation.

(CASE STUDY)

Case study of green building designed predominantly with energy efficient materials. Calculations involving basic factors in glass design. Optimization of Glass - for wastage reduction and standardisation of Design. Construction site/ green building visit report.

(DESIGN WORKSHOPS I)

Analysing and creating building using interactive modelling. Analysing of sun path, solar exposure building orientation, daylight, acoustics, site shadow analysis.

(DESIGN WORKSHOPS II)

Analysis of thickness for safety, consideration of aesthetics, economy, optimisation and wastage, air- conditioning load calculations and payback analysis

Course Outcome:

- **Historical and Contemporary Understanding of Glass**: Students will be able to trace the evolution of glass in architecture, recognizing its growing importance and varied applications in contemporary building designs, both as façades and interior elements.
- **Technical Proficiency in Glass Production and Properties**: Students will acquire knowledge about the production methods of glass, its inherent properties, various value additions like coatings and processing techniques such as tempering, and the different types of glass available in the market.
- **Practical Application in Green Architecture**: By understanding the principles of building physics, electromagnetic radiation, and day-lighting concepts, students will be equipped to incorporate glass in designs that cater to energy efficiency, aligning with the standards set by bodies like ECBC, IGBC, and GRIHA.
- **Safety and Compliance Mastery**: Students will gain an understanding of the critical importance of human safety compliances in the use of glass, including its role in fire safety considerations and acoustic performance, and will be adept at choosing the right type of glass to meet international standards.
- **Analytical and Optimization Skills**: Through case studies and practical workshops, students will hone their skills in analyzing the various factors that influence glass design, optimizing glass utilization to reduce wastage, and achieving a balance between aesthetics, economy, and functional considerations.
- **Hands-on Design Experience**: Engaging in interactive modelling, students will be skilled in practical applications like building orientation based on sun path, acoustic considerations, shadow analysis, and safety considerations. They'll be adept at making informed decisions on glass thickness, optimizing air-conditioning loads, and calculating payback analysis, ensuring a holistic design approach.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted as per the university academic calendar and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment and assignments i.e. total marks will be (20M+10M)=30M.

TEXT BOOKS:

1. Christian Schittich, 'Glass Construction Manual', Birkhauser Basel, 2007.
2. 'Architectural Glass Guide', Federation of Safety Glass, 2013.

REFERENCES

3. 'LEED 2011 For India - Green Building Rating System', Indian Green Building Council, 2011
4. 'Energy Conservation Building Code. User Guide', Bureau of Energy Efficiency, 2009.
5. 'IS 875 (Part -3) Reaffirmed 1997. Code of Practice for Design loads', Bureau of Indian Standards,1998.
6. 'IS 7883. Code of Practice for the Use of Glass in Buildings', Bureau of Indian Standards, 2013.
7. Training Manuals & E- Learning, Glass Academy.

ARC5107
Professional Elective-V
B. ADVANCED STRUCTURES

Course Objective:

- To provide a comprehensive understanding of advanced structural concepts and their applications in architecture, equipping students with the knowledge and skills necessary to design and analyze various complex structural systems for diverse architectural typologies.

CONTENTS

(PRESTRESSED CONCRETE)

Introduction, Design requirements. Design of determinate beams.

(INDUSTRIAL STRUCTURES)

Classification, planning and layout requirements, functional requirements. Types of industrial structures- power plants, bunkers and silos, cooling towers, containment structures, chimneys. Merits.

(HIGH–RISE BUILDINGS)

Introduction. Load action in high rise buildings. Various structural systems. Waffle slab. Approximate analysis of frames for gravity and horizontal loadings.

(TENSILE STRUCTURES)

Concept, development, laws of formation, merits and demerits of pneumatic structures. Basic principles, forms, merits and demerits of cable structures.

(SHELLS, DOMES AND FOLDED PLATES)

Shells of translation. Shells of revolution. Classification of shells and different forms. Domes. Types of folded plates. Space frames.

Course Outcome:

- Prestressed Concrete Proficiency: Understand the fundamentals of prestressed concrete. Demonstrate the ability to design determinate beams based on standard design requirements, recognizing the advantages of prestressing in structural applications.
- Mastery in Industrial Structures: Classify different types of industrial structures, understanding their unique planning, layout, and functional requirements. Evaluate and differentiate between various specific industrial structures such as power plants, bunkers and silos, cooling towers, containment structures, and chimneys, appreciating their unique merits.
- High-Rise Building Expertise:Gain a foundational understanding of load actions specific to high-rise buildings. Design and analyze high-rise structures using various structural systems, such as waffle slabs, and perform approximate analysis of frames under diverse loadings.
- Understanding of Tensile Structures: Grasp the underlying concepts and historical development of tensile structures. Evaluate the merits and demerits of both pneumatic and cable structures, understanding their basic principles and various forms.
- Proficiency in Shells, Domes, and Folded Plates: Understand the classifications and different forms of shells, focusing on shells of translation and revolution. Analyze and design various types of domes, folded plates, and space frames, appreciating their structural and architectural advantages.
- Application and Critical Evaluation: Apply the principles and knowledge acquired throughout the course in practical architectural scenarios, integrating advanced structural solutions in design projects. Critically evaluate different structural systems to determine the most appropriate solution for specific architectural challenges, ensuring safety, functionality, and aesthetic harmony.

Assessment:

Two mid examinations (Maximum 20 Marks each) are to be conducted as per the university academic calendar and average of the both are to be taken for consideration for 20 and 10 Marks for continuous assessment and assignments i.e. total marks will be (20M+10M)=30M.

TEXT BOOKS:

1. B.C. Punmia, 'Reinforced Concrete Structures, Vol. 1 & 2', Laxmi Publications, New Delhi, 1994.
2. N. Subramanian, 'Principles of Space Structures', Wheeler, 1998.
3. Thandavamoorthy T.S, 'Advanced Structures of Architecture', Eswar Press, 2008.
4. Council on Tall Buildings and Urban Habitat, 'Structural System for Tall Buildings', McGraw Hill, 1995.
5. Milo.S.Ketchum and Mark.A. Ketchum, 'Types and Forms of Shell Structures, 1997.

REFERENCES

6. P. Dayaratnam, P.Sarah, 'Prestressed Concrete Structures', Medtech, 2017.

7. Wolfgang Schueller, 'High Rise Building Structures', John Wiley & Sons,1976.
8. Frei Otto, 'Tensile Structures Volume 1 & 2' The MIT Press, 1973.
9. Bryan Stafford Smith, Alex Coull, 'Tall Building Structures - Analysis & Design', John Wiley, 1991.
10. Thomas Herzog, 'Pneumatic Structures', Crosby Lockwood Staples, London, 1977.
11. Bandyopadhyay J.N, 'Thin Shell Structures: Classical and Modern Analysis', New Age International, 2007.
12. Ramaswamy G.S, 'Design and Construction of Concrete Shell Roofs', CBS, 2005.

ARC5108
Open Elective-III
A. ORGANIZATIONAL BEHAVIOUR

Course Objectives:

- To understand the basic concepts of organizational behaviour, its foundations and importance.
- To enable students to have a basic perspective of Motivation and Motivation theories.
- To acquaint the students about group behaviour in organizations, including communication, leadership conflicts and organizational change and how these are linked to and impact organizational performance.

CONTENTS

(Organizational Behaviour)

Concept of Organisation - Concept of Organizational Behaviour - Nature of Organizational Behaviour - Role of Organizational behaviour - Disciplines contributing to Organizational Behaviour.

(Motivation)

Definition - Nature of Motivation - Role of Motivation - Theories of Motivation : Maslow's Need Hierarchy Theory, Herzberg's Motivation Hygiene Theory and Mc Gregor's Theory X and Theory Y.

(Group Dynamics)

Meaning - Concept of Group - Types of groups -Formal and Informal groups - Group development - Group cohesiveness and factors affecting group cohesiveness.

(Leadership)

Concept of Leadership - Difference between Leadership and Management - Importance of Leadership - Leadership styles: Autocratic leadership, Participative leadership and Free Rein leadership.

(Communication)

Meaning - Communication Process - Forms of communication: Oral, Written and Non- Verbal communication - Direction of communication: Downward, Upward and Horizontal communication.

(Organizational conflicts)

Concept of conflict - Reasons for conflict - Types of Conflict: Intrapersonal conflict, Interpersonal conflict, Intragroup conflict, Intergroup conflict, Interorganisational conflict - Conflict management.

(Organizational Change)

Nature - Factors in Organisational change -Planned change: Process of planned change - Resistance to change: Factors in resistance to change - Overcoming resistance to change.

Course Outcomes:

- Identifying fundamental aspects of organizational dynamics.
- Evaluate main theories of motivation and formulating suitable motivational strategies.
- Analyse the behaviour of individuals and groups in organizations.
- Understanding of Leadership theories and Leadership behaviour.
- Apply relevant theories, concepts to address important Organizational Behaviour questions.

Text Books.

1. L.M.Prasad: Organizational Beaviour, Sultan Chand & Sons, New Delhi - 110002

2. K. Aswathappa: Organizational Behaviour, Himalaya Publishing House, New Delhi

Reference Books.

7. Stephen Robbins: Organizational Behaviour, Pearsons Education, New Delhi.

ARC5108
Open Elective-III
B. INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP

Course Objectives:

- To familiarize the students with the concepts of Management.
- To relate the concepts of Management with industrial organizations.
- To explain the factors affecting productivity and how productivity can be increased in an Industrial undertaking.
- To set forth a basic framework for understanding Entrepreneurship.

CONTENTS

(Basic Concepts of Management)

Definition, Nature and Importance; Functions of the Management; Levels of Management; F.W Taylor's Scientific Management; Henry Fayol's Principles of Management;

(Forms of Business Organizations)

Introduction, Types of Business organizations: Private Sector- Individual Ownership , Partnership, Joint stock companies and Co-Operative organizations; Public sector- Departmental Organizations, Public Corporations and Government Companies; The Joint sector Management.

(Production and operations Management)

Plant location- Factors to be considered in the selection of Plant location; Break - even analysis- Significance and managerial applications; Importance of Production Planning and Control and its Functions; Human Resource Management and Functions of Human Resource Manager (in brief); Functions of Marketing; Methods of Raising Finance.

(Entrepreneurship)

Definition, Characteristics and Skills , Types of Entrepreneurs, Entrepreneur vs. Professional Managers, , Growth of Entrepreneurs, Nature and Importance of Entrepreneurs, Women Entrepreneurs, Problems of Entrepreneurship.

(Entrepreneurial Development and Project Management)

Institutions in aid of Entrepreneurship Development, Idea generation: Sources and Techniques;, Stages in Project formulation ; Steps for starting a small enterprise - Incentives for Small Scale Industries by Government.

Course Outcomes:

- Understand the roles, skills and functions of management.
- Distinguish the different types of business organizations.
- Identify the factors involved in Production Operations Management.
- Diagnose organizational problems and take suitable decisions.
- Establish good Human Resource Management practices.
- Acquire necessary knowledge and skills required for organizing and carrying out

Text Books:

1. Sharma,S.C, and Banga, T.R., Industrial Organization & Engineering Economics, Khanna Publishers, Delhi, 2000.
2. Vasant Desai , (The Dynamics of Entrepreneurial Development and Management (Planning for future Sustainable growth),HImalayan Publishing House, 2018.

Reference Books:

1. Aryasri , A.R., Management Science, McGraw HIll Education (India Private Limited , New Delhi 2014.
2. Sheela, P. , and Jagadeswara Rao, K., Entrepreneurship, Shree Publishing House, Guntur, Andhra Pradesh, 2017.

TENTH SEMESTER

ARC5201
PC
ARCHITECTURAL DESIGN THESIS
(Guided Project Work)

Course Objective:

To enable students to apply their comprehensive architectural research skills, developed during the Architectural Dissertation course, towards creating an innovative and practical architectural design solution. This course aims to enrich students' design capabilities, integrating their research findings, conceptual understanding, and architectural drafting skills, culminating in a detailed architectural design proposal.

CONTENT

(PROJECT DEVELOPMENT)

Students will develop their Architectural dissertation project done in previous semester into a full-fledged architectural project, ensuring integration of dissertation findings into their designs.

Steps for Project Development:

1. Site Analysis: Understanding and analysing the site's physical, climatic, socio-cultural, and contextual aspects.
2. Conceptualization: Formulation of a design concept based on the dissertation findings and site analysis.
3. Zoning and Massing: Planning the broad areas and zones, considering functionality, circulation, and aesthetics.
4. Preliminary Design: Initial design sketches and models.
5. Detailed Design: Detailed architectural drawings, including floor plans, sections, elevations, and 3D representations.
6. Integration of Services: Consideration of mechanical, electrical, plumbing, and other essential services into the design.
7. Sustainability and Innovations: Incorporation of sustainable design principles, materials, and innovative technologies.

(SUPERVISION & GUIDANCE)

Each student will continue their mentorship with the assigned Thesis Guide from the Architectural Dissertation course.

Regular feedback, design critique, and refinement under the guidance of the Thesis Guide.

(SUBMISSION & PRESENTATION)

1. A detailed architectural design report documenting the entire design process, from site analysis to detailed drawings.

2. Architectural models and digital 3D representations of the design proposal.
3. Presentation to a jury panel, demonstrating the coherence of research findings, conceptualization, and design outcome.
4. Peer review, where students critically assess each other's projects, fostering collaborative learning and cross-pollination of ideas.

(EVALUATION CRITERIA)

1. Coherence between the Architectural Dissertation and the Design Thesis.
2. Depth and breadth of the design process, from conceptualization to detailed architectural drawings.
3. Innovation, sustainability, and practicality of the design proposal.
4. Quality of architectural drawings, models, and visual presentations.
5. Ability to justify design decisions and respond to critiques effectively.

Course Outcome:

- Students will translate their architectural research from the dissertation into a coherent and innovative design proposal.
- Students will exhibit proficiency in developing detailed architectural drawings, incorporating site analysis, concept development, and design principles.
- Students will effectively communicate their design proposals through presentations, models, and visual representations.
- Through iterative design processes and continuous interactions with mentors, students will refine their designs based on feedback and critiques.
- Students will be ready to transition into professional practice, equipped with the skills to manage complex architectural projects.

Assessment Structure for Architectural Design Thesis

Internal Assessment (50 Marks)

1. Project Development and Design Clarity (10 Marks)
   Conceptual clarity, relevance to dissertation research, and logical design progression

2. Architectural Drawings and Models (35Marks)
   Detailing, accuracy, and presentation of architectural drawings and models

3. Internal Guide's Discretionary Marks (5 Marks)
   Awarded by the guide based on the student's overall progress, dedication, and design evolution

External Assessment (50 Marks)

1. Architectural Design Report (10 Marks)
   Coherence, depth, and breadth of design process documentation:

2. Presentation to Jury Panel (35 Marks)
   Quality and clarity of the Architectural Drawings, Models, and presentation, ability to communicate design rationale, and respond to critiques:

3. Thesis Guide's Discretionary Marks (5 Marks)
Considering the student's overall performance, design understanding, and contribution to architectural discourse

Final Note: The Architectural Design Thesis is a culmination of a student's academic journey, embodying their research, analytical, and design capabilities. It stands as a testament to their readiness to embrace the architectural profession and contribute meaningfully to it.

At the end of the semester each student is expected to submit all original drawings prepared as per the department specification, 3 copies of thesis report in the specified format and a model to the department after obtaining the approval of the respective guide. The department shall schedule the final viva voce, which is to be conducted by external Jury panel after the Thesis submission.

ARC5202
PAECC
PROFESSIONAL PRACTICE AND LEGISLATION

Course Objective:

To Communicating – the communication and documentation of designs for presentation to clients and other stakeholders, and for construction; the preparation of professional reports. To Managing – the management and operation of a design practice.

CONTENTS

(INTRODUCTION)

Introduction to Architectural profession, Role of professional bodies, The Architect's registration act 1972. CODE PROFESSIONAL CONDUCT; COA rules; Scale of charges; units and mode of measurements clerk of work and his duties; inspection of work during construction; certificate of payment to contractor; skills of quantities; schedule of rates, tenders; public, limited and negotiated tender documents and allied formalities.

(THE PROFESSION)

Role of Architect in society; Architectural Profession as compared to others professions; difference between profession and Mode/business; architect's registration, COA, and other organisations related to architectural profession.

(AGREEMENTS)

The duties, liabilities and relationships of client, contractor and other technicians. Conditions of engagement of Architects. Scale of remuneration for Architectural services and mode of payments.

(CONTRACTS & TENDERING)

Contract: Definition - General principles of Indian Contract Act; Building contracts generally, Conditions and forms of contract, study of standard contract of the Indian Institute of Architects.

Principle of Arbitration, Powers and duties of arbitrators, revoking authority.

Contract agreement & its necessity; Articles of Agreement, Terms and Conditions, Bills of Quantities and specifications, Appendix; Certification of Contractors Bills at various stages. New trends in project formulation and different types of execution (BOT, DBOT, BOLT, BOO, etc).

Tenders: Definition, Types of Tenders, Open and closed tenders, Conditions of tender, Tender Notice, Tender documents. Concept of EMD –Submission of tender; Tender scrutiny – Tender analysis Recommendations –Work order - E-tendering (advantages, procedure, conditions).

(ADMINISTRATION)

Accidents during progress of work and after completion, damage to persons and properties affected; scope of torts Act and workmen's compensation Act with regards to the affected persons and properties; Consumer protection Act and related acts on Architects. Practice Architects Act 1972; Professional Practice Regulation and architectural education regulations under the Architects Act. Role of consultants and coordination between different consolations on a big project.

(STARTING A PRACTICE)

Mode of engaging an architect – Comprehensive services, partial services and specialised services – Scope of work of an architect –Schedule of services – Scale of fees (Council of Architecture norms) – Mode of payment – Terms and conditions of engagement – Letter of appointment. Importance of Architectural competitions – Types of competitions. COA guidelines for competitions. Importance and type of presentation of designs and allied skill development.

(Employment Law)

Important legal aspects and legislations which have a bearing on the practice of architectural profession with particular reference to WTO and GATS and equip them for international practice. Copy rights and Patenting such as provisions of copy right acts in India and abroad, copy right in architectural profession.

Note

Lectures by practicing architects are to be arranged to create awareness on basic knowledge of the nature of practice, and professional roles, organizational frameworks, management and legal procedures.

Course Outcomes:

- Students will comprehend the role of architects in society and their ethical responsibilities as professionals.They will gain knowledge about the Architect's Registration Act of 1972 and the significance of registration with the Council of Architecture (COA).

- Students will be proficient in analyzing and drafting architectural agreements, including terms and conditions, remuneration structures, and payment modes. They will understand the legal duties, liabilities, and relationships among clients, contractors, and other stakeholders in architectural projects.
- Students will have a thorough understanding of the principles of the Indian Contract Act and its application in building contracts. They will be able to study and interpret standard contracts, such as those provided by the Indian Institute of Architects.
- Students will grasp the concepts related to tenders, including open and closed tenders, tender documents, and the process of e-tendering.
- Students will acquire knowledge of various legal aspects and regulations relevant to the architectural profession, including consumer protection laws, torts acts, and workmen's compensation acts. They will understand the implications of copyright and patenting in the architectural field, both in India and internationally.
- Students will learn the different modes of engaging an architect, such as comprehensive services, partial services, and specialized services. They will be equipped with the skills to create a scope of work, define a schedule of services, and understand the scale of fees as per COA norms.
- Students will be prepared to engage in international architectural practice by gaining insights into global trade agreements, such as WTO and GATS. They will understand the provisions of copyright acts in India and abroad, enabling them to protect their architectural designs and intellectual property.

Assessment:
Two mid examinations (Maximum 20 Marks each) are to be conducted as per the university
academic calendar and average of the both are to be taken for consideration for 20 and 10
Marks for continuous assessment i.e. total marks will be (20M+10M)=30M.

Text Book References:
1) Theory and Practice of Valuation- Roshan Namavati
2) Professional Practice- Dr.RoshanH.Namavati
3) Principles and Practice of valuation- Mr.D.N.Banerjee
4) Land Law- By Patrick J.Dalton
5) Hand book on Professional Practice, COA Publication