Bachelor of Architecture

5-Year Undergraduate Degree Course

(With Effective from **2020-2021** Admitted Batch and onwards)

SCHEME OF INSTRUCTION, EXAMINATION AND SYLLABI

DEPARTMENT OF ARCHITECTURE
COLLEGE OF ENGINEERING (A)
ANDHRA UNIVERSITY, VISAKHAPATNAM

(ANNEXURE-I)

Department of Architecture
College of Engineering (A), 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
		Universal Human Values	2	--	--	Self-Learning				
		Sub-Total	**13**	**12**	**5**	**310**	**390**	**700**	**30**	

L- Lectures	**S- Studio**	**W-Workshop**
EE/EJ : End Exam / External Jury	**A: 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
		Ethics	2			Self-Learning				
		NCC, NSS, NSO			2					
		Sub-Total	**16**	**9**	**5**	**270**	**430**	**700**	**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.
		Indian Traditional Knowledge	2			Self-Learning				
		Sub-Total	**21**	**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.
Summer Internship 8 Weeks (Mandatory) after second year (to be evaluated during V semester) / Community Service Project.									1	VV
		Personality Development	2	--		Self-Learning				
		Sub-Total	**21**	**9**	**--**	**250**	**450**	**700**	**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	30	70	100	3	3Hrs.
ARC3207	***OE-II**	*Open Elective-II	3	--	--	30	70	100	2	3Hrs.
		Constitution of India	2			Self-Learning				
		Sub-Total	**19**	**9**	**2**	**250**	**450**	**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
Summer Internship	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** a) Architectural Conservation b) Barrier free Architecture	3	--	--	30	70	100	3	3Hrs.
ARC4107	**SEC**	Soft Skills (Skill advanced course)	2		-	50	50	100	2	VV
Summer Internship 8 Weeks (Mandatory) after second year (to be evaluated during V semester)									1	VV
		Sub-Total	18	9	--	290	410	700	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	26	VV
		Sub-Total	**--**	**--**	**--**	**50**	**50**	**100**	**26**	**--**
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.).										

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
Summer Internship	1
Total Credits of 4th Year	**56**

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	6	--	50	50	100	10	VV
ARC5102	PC	Housing	3	--	--	30	70	100	3	3 Hrs.
ARC5103	PAECC	Project Management	3	--	--	30	70	100	3	3 Hrs.
ARC5104	PAECC	Architectural Dissertation	--	--	6	50	50	100	6	VV
ARC5105	PE	**Professional Elective-II** a) Disaster Resistant Buildings and Management b) Appropriate Building Technologies	3	--		30	70	100	3	3Hrs
ARC5106	PE	**Professional Elective-III** a) Interior Design b) Theory of Design	3	--		30	70	100	3	3Hrs
ARC5107	OE-III	*Open Elective-III	3	--	--	30	70	100	2	3Hrs
		Sub-Total	**17**	**6**	**6**	**250**	**450**	**700**	**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 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

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	15	--	50	50	100	21	VV
ARC5202	PAECC	Professional Practice & Legislation	3	--	--	30	70	100	3	3Hrs
ARC5203	PE	**Professional Elective-IV** a) Green Buildings & Rating Systems, ECBC & Bldg. bye-laws b) Sustainable Cities and Communities	3	--	--	30	70	100	3	3Hrs
ARC5204	PE	**Professional Elective-V** a) Traffic and Transportation Planning b) Hospital Systems & Services	3	--	--	30	70	100	3	3Hrs
		Sub-Total	**12**	**15**	**--**	**140**	**260**	**400**	**30**	**--**

Category	Credits
PC – Professional Core	34
Professional Elective Course	12
Professional ability Enhancement Compulsory Course / Job Oriented Course	12
Open Elective Course	2
Total Credits of 5th Year	**60**

S.No	Category	Code	No. of Credits	% of Credits	Suggested Breakup % Credits by CoA, 2020 Guidelines
1	Professional Core	PC	149	50.50	50
2	Basic Sciences and Applied Engineering	BS&AE	73	24.74	20
3	Professional Elective	PE	15	5.09	10
4	Open Elective	OE	6	2.03	5
5	Professional ability Enhancement Compulsory Course	PAECC	40	13.56	10
6	Skill Enhancement Courses / Life Skill Courses / Skill Advanced Courses / Skill Oriented Courses	SEC	12	4.08	5
		Total	**295**	**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.

List of Professional Electives offered – 10 Nos.	List of Open Electives offered – 12 Nos.
1. Architectural Conservation 2. Barrier free Architecture 3. Disaster Resistant Buildings and Management 4. Appropriate Building Technologies 5. Interior Design 6. Theory of Design 7. Green Buildings & Rating Systems, ECBC & Bldg. bye-laws 8. Sustainable Cities and Communities 9. Traffic and Transportation Planning 10. Hospital Systems & Services	1. IME/ OB – Industrial Management Entrepreneurship / Organizational Behavior 2. Sustainable Architecture 3. Product Design 4. Architectural Pedagogy 5. Management & Marketing Skills 6. Futuristic Architecture 7. Architectural Journalism 8. Bio-Climatic Architecture 9. Theory of Environmental Planning 10. Environmental Impact Assessment 11. Remote Sensing & GIS 12. Advanced Surveying & Geometric Techniques

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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 dimension.

Course Outcome:

- The student will gain an understanding into the fundamental issues in architectural design and develop the skill to create architectural solutions for simple problems

SYLLABUS

(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

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.

Learning Outcomes:

- Understand fundamentals of drawings and its practice.
- recognize and utilise appropriate drawing tools and methods for basic drawing.
- Develop skills of free hand sketching of outdoor and indoor, object drawing of natural and geometrical forms along with shades and shadows.
- Identifying elements such as line, shape, tone, texture, light and shade by regular indoor and outdoor exercises.
- Observe and appreciate the logic, patterns and design in nature.
- Understand the basic principles of design.
- Observe and understand the logic, patterns and design in nature.
- Develop the capacity to think in visual terms and gain command of the visual medium.
- Create the illustration of intricate compositions.
- Understand the colour theory and its uses.
- Application of appropriate colour and its behaviour to light in making different colour modules.
- Understanding form and space and their implications.
- Develop the capacity to define a space in order to generate forms.
- Evaluate contemporary trends in visual arts and architecture.
- Create and articulate original experiences creatively.

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.

Course Outcome:

- Students learn to develop drafting skills to facilitate effective visual communication.

SYLLABUS

(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.

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

Learning outcomes:

- To become familiar with various drawing instruments and its uses
- To develop geometric and non-geometric shapes using simply technique.
- To understand orthographic projections of points, lines, planes and solids located at various positions.
- To create advanced geometry objects by comprehending orthographic and to draw three dimensional drawings in metric projections
- To understand and apply of architectural symbols, terminology and abbreviation used in architectural representation.
- Learn to develop simple objects plan, elevation, section that are used in Architectural presentation drawing

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.

Course Outcome:

The Course is intended to provide brief background knowledge of Culture and Art in different parts of the world. It is also intended to serve as an introduction to other more advanced courses within the discipline of art history.

SYLLABUS

(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.

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.

Learning Outcomes:

- Appraise the ancient and cross-cultural significance of culture, art, and architecture.
- Understand shelter and shelter forms of man during prehistoric period.
- Evaluate the shelter forms with reference to culture, climate, technology and material.
- Identify different graces of art and architecture in India.
- Recognize styles of western art and architecture.
- Analyse the contributing factors for the design development of different styles.
- Familiar historical aspects of the art world.
- Being knowledgeable about the function artists play in society.
- Recognize concerning ornamentation in historic buildings and its usage and evolution.
- Design buildings in the historical architectural styles.

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

Course Outcome:

- With the successful completion of the course student should have capability to:
- Identify and differentiate types of bricks, stones etc.
- Type of foundation and load bearing masonry
- Principles behind lintels and arches and their application
- Analyze a design decision situation and come up with correct material choice and construction specification

SYLLABUS

(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.

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.

Course Outcome:

- The student will be in a position to calculate the forces acting on a rigid body in equilibrium and the nature of the force in the members of a truss.
- To determine the elastic properties of a material and the nature of internal force (stresses) acting in the body and able to calculate the cross-sectional properties of standard and built up shapes.

SYLLABUS

(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.

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
2) Engineering Mechanics by S.P.Timoshenko & D.H.Young
3) 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.

Course Outcome:

- The student will be able to learn about basics involved in different types of surveying instruments like tape, compass, levelling and develop surveying skills in measuring of distances, angles, and levelling and to apply error adjustment to the recorded reading to get an accurate surveying output

SYLLABUS

(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.

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.

Learning Outcome:

- Understand the basic principle of surveying and chaining.
- Classify the chain survey and errors in chaining and tape.
- Classify the plain table surveying and analyse the methods of plane table surveying.
- Understand the plane table surveying and methods of plane table surveying
- Differentiate between two point problem and three point problem and How to rectify the errors in plane table surveying.
- Understand the Compass survey and precautionary measures in using instrument.

- Differentiate the Whole Circle Bearing (W.C.B), Reduced bearing (R.B) and calculate the angles for the same
- Classify levelling and adjustments of levelling instrument.
- Characteristics of contours and methods of levelling
- Classify the types, methods and the adjustments of Theodolite instrument,
- Checks in open & closed traverse and rectify the errors.
- Understand modern surveying methods and mapping technics in GIS.
- Differentiate the advantages and dis-advantages in automated surveying.
- Understand field surveying in micro and macro level.
- How to overcome obstruction in field surveying.

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, Universities

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.

SYLLABUS

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.

Course Outcome:

- Student will understand principles of design, and develop the ability to translate abstract principles of design into architectural solutions for small problems

SYLLABUS

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

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.

Course Outcome:

- Students learn in developing drafting and documentation skills and understanding study of shade and shadows of different geometrical forms and improve in rendering skills to facilitate effective visual communication and architectural presentation.

SYLLABUS

(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.

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

Learning Outcomes:

- To understand the principles of perspective drawing and application in architectural presentation.
- To Apply principles of sciography for simple geometrical form
- To learn approach to rendering techniques for architectural presentation
- To prepare measure drawings like maps, plans, elevation, section, views for documentation building

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
13) Perspective: space and design by Lance Bowen Bellings.

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.

Course Outcome:

- Acquire knowledge to identify the common characteristics among the monuments of a particular style. Acquire graphic skills to present a building, analyse its elements and explain the composition. Acquire knowledge on good practices of architecture in the past.

SYLLABUS

(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.

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) 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.

Course Outcome:

With the successful completion of the course student will be able to

- Review various tools and techniques for model making and design model for real life situation

SYLLABUS

(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.

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

Course Outcome:

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

- Identify and differentiate types of timber, their joinery, finishes, etc.
- Understand the properties and uses of manmade and natural materials.
- Understand and differentiate between various types of openings
- Analyse a design decision situation and come up with correct material choice and construction specification.

SYLLABUS

(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.

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

Learning Outcomes:

- To understand the properties and uses of timber in the field of Architecture
- Differentiate between natural timber and industrial timber and their limitation.
- To understand the properties and uses of iron, steel, aluminium paints and varnish.
- Differentiate between ferrous and non-ferrous metals, manufacturing and treatment process.
- Understand the types of joinery in timber.
- Identify and differentiate types of timber joinery and finishes.
- To develop an understanding on the types of doors and there operations.
- Illustrate the types of doors with correct material choice and specification.
- To develop an understanding on the types of window and there operations.
- Illustrate the types of windows with correct material choice and specification.

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.

Course Outcome:

- The student will be in a position to calculate/access the variation of internal forces in a beam along the section of a beam for different cross-section; the deflection limits in a member.
- The variation of shear force and bending moment along the length of the continuous beams. The behaviour of three hinged arches subjected to different loadings.

SYLLABUS

(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.

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.

Course Objectives

- To make students recognize the sounds of English through Audio-Visual aids.
- To help students build their confidence and help them to overcome their inhibitions and self- consciousness while speaking in English. The focus shall be on fluency.
- To familiarize the students with stress and intonation and enable them to speak English effectively.

Course Outcomes

- Students will be sensitized towards recognition of unique English sound pattern and the fluency in speech will be enhanced.
- A study of the communicative items in the laboratory will help the students become successful in the competitive world.
- Students will be able to express themselves fluently and accurately in social as well professional context.
- Students will be able to participate in group activities like roleplays, group discussions and debates.

(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.

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.

UNIVERSAL HUMAN VALUES

(Non-credit mandatory courses)

The objective of the course is four fold:

- Sensitization of student towards issues in society and nature.
- Understanding (or developing clarity) of nature, society and larger systems, on the basis of human relationships and resolved individuals.
- Strengthening of self-reflection.
- Development of commitment and courage to act.

Course Outcomes:

- At the end of the course, students are expected to become more aware of their surroundings, society, social problems and their sustainable solutions, while keeping human relationships and human nature in mind.
- They would have better critical ability. They would also become sensitive to their commitment towards what they believe in (humane values. humane relationships and humane society).
- It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

The focus is on understanding society and nature on the basis of self and human relationships

- Ideas of self, pre-conditioning, and natural acceptance.
- Harmony in the self. Understanding human being as co-existence of self and body. Identifying needs and satisfying needs of self and body. Self-observations. Handling peer pressure.
- Nine universal values in relationships. Reflecting on relationships in family. Hostel and institute as extended family. Real life examples.
- Teacher-student relationship. Shraddha. Guidance. Goal of education.
- Harmony in nature. Four orders of nature – material order, plant order, animal order and human order. Salient features of each. Human being as cause of imbalance in nature. (Film "Home" can be used.)
- Human being as cause of imbalance in nature. Depletion of resources – water, food, mineral resources. Pollution. Role of technology. Mutual enrichment not just recycling.
- Prosperity arising out of material goods and understanding of self. Separation of needs of the self and needs of the body. Right utilization of resources.
- Recapitulation on society. Five major dimensions of human society. Fulfillment of the individual as major goal. Justice in society. Equality in human relationships as naturally acceptable. Establishment of society with abhaya (absence of fear).
- Ethical human conduct. Values, character and naitikataa.
- Professional ethics. Conduct as an engineer / architect / scientist.
- Holistic human being through holistic education in just order.

The mode of conduct would primarily be through group discussions in small groups. There would be no formal lectures in the course. In some group discussion sessions, the faculty mentor would introduce a topic and initiate the discussion. While analysing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students focus on the important or critical elements. In other group discussion sessions, there would be more "speaking out" and sharing by students.

While discussing different topics, the mentor encourages the student to connect with one's own self and do self-observation. Scenarios may be used to initiate discussion. The student is encouraged to take up" ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting. It would be preferable to conduct the course in the mother tongue of the student. This helps connect with the student much better, and also because the Indian languages are much richer than English while describing and discussing the "self".

Experiments or practical are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included.

The group discussions would also provide support to a student in performing actions commensurate to his/her beliefs. Hopefully, this would lead to development of commitment, namely behaving and working based on one's beliefs (or values).

REFERENCE BOOKS:

1) R R Gaur, R Sangal, G P Bagaria, Human Values and Professional Ethics
2) A Nagaraj, Jeevan Vidya: Ek Parichaya
3) A.N. Tripathi, Human Values
4) Life and Philosophy of Swami Vivekananda
5) Swami Vivekananda on Himself
6) Dharampal, Rediscovering India
7) Mohandas K. Gandhi, Hind Swaraj or Indian Home Rule
8) Maulana Abdul Kalam Azad, India Wins Freedom
9) Paramhansa Yogananda, Autobiography of a Yogi

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 Outcome:

- The student will be able to understand the iterative process of the architectural design of defining the problem, collecting information, analysing towards developing a solution after acquiring a feedback revisiting the design to improve.

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.

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.

Course Outcome:

- Student will gain knowledge on various Indian architecture styles as a response to the political and socio-cultural conditions in India at different time periods. The course sensitizes the analogy and appreciation of the then architectural, structural manifestations.

SYLLABUS

(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.

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.

Course Outcome:

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

- Understanding the method of executing of framework, shuttering and scaffolding.
- Understand what type of details would be needed for a particular RCC/PCC work and
- Understand planning and execution of staircase
- Analyse a design decision situation and come up with correct material choice and construction specification

SYLLABUS

(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.

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.

Course Outcome:

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

- Interact technically with water supply and sanitation experts.
- Design efficient water supply layouts with detail calculations.
- Design sanitation layouts.
- Design rain water disposal and rain water disposal drawings.

SYLLABUS

(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.

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.

Learning Outcomes:

- To understand the importance of water and its various sources.
- Identify the steps involved in conducting a water analysis and the consequences of using unclean water.
- Identify the processes that are involved in the treatment of water at the municipal level.
- To develop an understanding of the water distribution system at the urban level.
- Application of acquired knowledge in order to prevent water wastage.
- Evaluate the water requirements for residential, commercial, and industrial buildings in accordance with norms and standards.
- To design the necessary water supply for a variety of buildings.

- Identifying the integration of garbage collection and disposal at the Household level and all the way up to the city level.
- Develop a knowledge of the water distribution system at the municipal level.
- To apply knowledge acquired about water distribution systems to practise in residential and other small buildings.
- Designing water supply systems and plumbing layouts for homes and other small buildings
- Explore the numerous ways available to recycle household and municipal solid waste.

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.

Course Outcome:

- It equips the student with the basic understanding of climatic types in India and initiatives of Sustainable Habitat mission; introduces basic science of human comfort and energy efficiency in buildings; familiarize with the data, methods, principles, standards and tools for planning and designing for climate responsive built environment and human comfort.

SYLLABUS

(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.

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 –III

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.

Course outcome:

- The student will be in a position to estimate/access the minimum dimensions of columns required for a building and the stresses induced in a column section subjected to axial and biaxial loading.
- Understanding the effect of point load, uniformly distributed load on shear force and bending moment at a particular point on a beam.
- Behaviour of retaining walls due to different forces under different field conditions.
- Application of Plastic analysis to limit state design of beams subjected to bending in steel structures.

SYLLABUS

(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.

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.

Course Outcome:

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

- Grasp 2 D CAD drafting
- To transform sketches and manually drafted drawings into CAD drawings.
- Prepare presentation drawings with the help of computer software's.
- Visualize building / transform sketches and 2 dimensional CAD drawings to 3 dimensional building models and walkthrough.
- Execute photo realistic rendering of the building project.
- Prepare walkthroughs.

SYLLABUS

(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.

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

ETHICS

Course Objectives:

- To help students regulate their behaviour in a professional environment as employees.
- To make students aware of the impact of taking non-ethical engineering decisions.
- To understand that mind and desire control is needed for being ethical.
- To understand organizational culture and to adapt to varying cultures without compromising ethical values

Course Outcomes:

On completion of this course, students should be able

- Realize the importance of human values.
- Understand that excessive desires of the mind make a person unethical and restless, while fewer desires lead to peace and professional progress.
- Assess different types of risks involved in unethical practices. Know various means of protesting against unethical practices.
- Assess the benefits of restraining from unethical practices like bribery, extortion, nepotism, nexus between politicians and industrialists.
- Summarize case studies of ethical violations in Chernobyl meltdown, Challenger disaster, Ford Pinto design, Kingfisher Airlines financial misappropriation.

(Introduction To Terminology in Ethics)

Integrity, Honesty, Courage, Empathy, Personality, Character, Self-Confidence, Respect for Others – Work culture, social responsibility, Responsibilities as a citizen, Cooperation and commitment – Religion vs. Spirituality, Philosophy, Customs and practices – Self-interest, Fear, Deception, Ignorance, Ego, Uncritical acceptance of authority.

(Mind And Its Mysteries)

What is Mind? 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.

(Risk And Safety in Engineering)

Estimating risk – What is acceptable risk? – Architects liability, Changing legal rights of the employees by non-participation, by protest – Environmental laws and judicial intervention in related matters.

(Non-Ethical Practices in Vogue)

Conflict of Interest, Occupational crime – How multinational corporations influence government decisions, public policy – Architects as managers, advisors and experts, Architects as moral leaders – Problem of bribery, extortion, grease payments, nepotism – Nexus between politicians and industrialists. Case Study: Chinese Minister Sentenced to Death for Corruption.

(Case Studies –Variety of Moral Issues In Profession)

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

TEXT 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

FOURTH SEMESTER

ARC2201
ARCHITECTURAL DESIGN III

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, Office building, Apartment (S+G+2), 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:

The student will be able to acquire the design skills such analysis, synthesis, conceptualisation.

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.

Course Outcome:

The student will gain an in-depth knowledge of

- Modern Architectural philosophies in the evolution of innovative architectural forms and advent of new modern building materials.
- Indian architecture styles as a response to the political and socio-cultural conditions in India at different time periods.
- The course sensitizes the analogy and appreciation of the then architectural, structural manifestations.

SYLLABUS

(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.

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.

Course Outcome:

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

- Make a decision which type of construction detailing will be required for a given type of roofing depending on interior and exterior situation and make drawings for the same.
- Understand design and execute false ceiling with different materials.
- Understand and execute glass as material.
- Understanding different wall treatments and prepare detail drawings.

SYLLABUS

(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.

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.

Course Outcome:

- Understand the basics of acoustics.
- Develop capability to apply the fundamentals of acoustics in the design of building.
- Communicate with technical accuracy in a professional and an academic environment.

SYLLABUS

(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.

Learning Outcomes

- Comprehend the history of acoustics by understanding how Greeks and Romans built their acoustically good theatres for various activities.
- Application of different methods used in design for good acoustical buildings
- Understanding the basic mechanics of the human ear and hearing abilities.
- Identify that sound is produced by vibrations.
- Cognizant of the fact that sound propagation is dependent on the medium.
- Analyse the acoustic phenomena that occur in enclosed environments.
- Analyse the important phenomena and principles of sound propagation, and the ways they influence the building design.
- Designing spaces in such a way that speech privacy and good audibility can be achieved.
- Creating spaces to isolate and control noise and unnecessary sound waves.
- Application and uses of insulation and materials to achieve acoustically good space.
- Application of different methods for calculating and measuring acoustical performance of buildings.
- Examine the factors that contribute to a non-conducive acoustical environment caused by a building's design.
- Analyse the most prevalent acoustical flaws seen in auditoriums and other enclosed spaces, and design various methods for avoiding or correcting them.
- Identify the various types of noise, how they are transmitted, and the methods for isolating or controlling them.

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.

Course Outcome:

- To equip student with the principles of climatic control and to design sustainable habitat; Familiarize them with the green building concepts and rating system; Introduce them with building energy-simulation program.

SYLLABUS

(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.

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.

Course Outcome:

- The student acquires knowledge on the concept of limit state method of design for different reinforced concrete members from substructure to superstructure of a reinforced concrete building.

SYLLABUS

(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

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

Course Outcome:

With the successful completion of the course student should develop awareness and sensitivity to environment and ecology.

SYLLABUS

(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.

Learning outcomes:

- Define concepts of environment.
- Understand the structure and function of ecosystems.
- Identify and understand effects of human activities on environment.
- Identify India's biological diversity in relation to the physio-geographic regions.
- Evaluate the importance of biological diversity.
- Indentify and understand the local and global issues of environmental pollution.
- Sensitize towards the environmental problems in India.
- Understand global climate change and its impact.
- Explain various disasters and natural and climatic factors that impinge upon them.
- Apply environmental impact assessment.
- Specify the interaction between environment and economy.
- Understand energy resource management.
- Understand sustainable development strategies and barriers.
- Remember the environmental regulations by the government.
- Identify the various international conventions for environment.
- Understand the various national and local case studies related to environmental issues.

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

INDIAN TRADITIONAL KNOWLEDGE

(Non-credit mandatory courses)

Course Objectives:

- To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.
- To make the students understand the traditional knowledge and analyse it and apply it to their day to day life.

(Vastushastra)

In recent times, 'Vastushastra' has emerged as one of the major fields of discussion in the society. The word 'Vastushastra' brings a myriad of reaction from people in general and architects in particular. But technically, Vastu is meant as the Sanskrit equivalent of architecture or as the 'Indian System of Architecture' (Sthapatya). 'Sthapatya' has many aspects or fields of knowledge. It contains verses on planning of towns, villages, design of temples, halls, pavilions, and seats etc. It also has information on material specifications, brickwork, joinery and carpentry. Majority of the text is on architecture and construction. The remaining verses are on astrology, aayadi formulae, mandala diagrams, muhurta and other non-architectural aspects.

(Indian System of Architecture)

The chaos and confusion is mainly due to the prevailing ritualistic / mystic aspects of vastu as hyped by the media. This media hype has not only influenced public in general but also influenced architects to a major extent, as they are unaware about the technical aspects of the Indian System of Architecture. The objective here is to create awareness among architects regarding the Indian System of Architecture and equip them to design buildings as per Sthapatya (in sync with recent market trends & construction technologies).

(Legal framework and TK)

The Scheduled T1ribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016.

(Traditional knowledge and intellectual property)

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge.

Course Outcome:

At the end of the Course, Student will be able to:

- Identify the concept of Traditional knowledge and its importance.
- Explain the need and importance of protecting traditional knowledge.
- Illustrate the various enactments related to the protection of traditional knowledge.
- Interpret the concepts of Intellectual property to protect the traditional knowledge.
- Explain the importance of Traditional knowledge in Agriculture and Medicine

Assessment:

This is a self-learning non-credit mandatory course. The mode of conduct would primarily be through self-learning, and group discussions in small groups, power point presentation, video lectures, subject movies. One faculty will be nominated as a mentor for this course by the Head of the Department to see that students are actively participating in the course for 2 hrs every week.

TEXT BOOKS:

1) Traditional Knowledge System in India, by Amit Jha, 2009.

REFERENCES:

1) Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.
2) "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino.

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:

- The student will gain an understanding into the fundamental issues in architectural design and develop the skill to create architectural solutions for simple problems.

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.

Course Outcomes:

The course equips the students to understand the various planning processes and also imparts knowledge in the building byelaws and planning legislation. The course also gives an insight into sustainable urban planning concepts.

SYLLABUS

(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.

Learning Outcomes:

- Ability to understand morphology of settlements and their generating forces and characteristics.
- Familiarise with classification and influential factors shaping human settlements.
- Develop an understanding of administrative aspects of town planning.
- Develop an insight into the planning techniques.
- Familiarise with building bylaws and policies.

- Ability to understand planning principles.
- Identify and apply various traffic survey methods and principles.
- Develop an insight on the shift in planning concepts towards sustainable development.

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

SYLLABUS

(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:

- The historical perspective and awareness of ecological variables
- Ability to evaluate the site and design as per the requirements
- Creating a concept of landscape making use of elements of design, soft and hard landscape
- Give the construction details and develop the site given the site conditions.

Learning outcomes:

- Knowledge on the historical development in the field of landscape
- Understanding of the role of ecological variables in landscape design
- Evaluate the potential of the site and its development
- Create a design given the requirements of a site
- Identify the elements of design
- Create Plans of landscape development

- Knowledge of the plants and plant communities
- Apply the principles of design in planting design
- Knowledge on site grading and development
- Draw the construction details of the outdoor landscape elements

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

SYLLABUS

(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:

The students develop an understanding of

- Understand modular coordination
- Modern construction systems and techniques used in large scale buildings and other architectural projects.
- Understand design and use of tensile structures

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.

SYLLABUS

(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:

The students will understand the basics of electricity and wiring system; Electrical load calculations, fundamentals of Lighting and Lighting design; various types of ventilation systems. They will equip with understanding of various air conditioning systems and their applications. HVAC Load Calculations and prepare drawings for Electrical and HVAC for project execution.

Learning Outcomes

- Interact technically with electrical and illumination experts.
- Design efficient electrical layouts with their circuit diagrams.
- Design efficient illumination levels for various activities and spaces.
- Understand principles for designing of large-scale mechanical services.
- Understand BMS and their execution in building projects.
- Have capability interact technically with MEP experts.

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.

Course Outcome:

- 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.

SYLLABUS

(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.

Learning Outcome:

- Retrieve the advantages and disadvantages of steel as structural material and types of Rolled steel sections.
- Understand the Stress-Strain curve for mild steel and nomenclature in IS 800:2007.
- Calculate the strength of a Bolted connection and Welded Connection.
- Design a Bolted connection and Welded Connection and determine the efficiency of a joint.
- Determine the net sectional area and strength of a tension member connection.
- Design a tension member subjected to axial load and check its adequacy.
- Determine the Bending and Shear strength of beams and check for Web buckling, Web crippling.
- Design Laterally supported and Laterally unsupported beams and check for shear and deflection.
- 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.
- Understand the behaviour of column bases.
- Design 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.

PERSONALITY DEVELOPMENT

(Non-credit mandatory courses)

Course objective:

- The purpose of this course is to build confidence and inculcate various soft skills and to help Students to identify and achieve their personal potential.

Course outcome:

- The student develops 1. A sense of Confidence and a broader outlook of his personality.

SYLLABUS

Special Lectures and presentations on Student's self-learning activities such as Self-analysis, Time management, Creative chain storytelling, Vocabulary games, Attitude, Motivation, Article review, Team building exercise, Critical Thinking, Leadership Qualities, Puzzles, Movie Clip review etc.

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 outcome:

- The student will able to understand and design institutional buildings by correlating to development control and designing in urban context, integrating climate, institutional character, User behaviour and special requirements for physically challenged into site planning,.

SYLLABUS

- 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

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.

Course outcome:

- Students will be able to generate a set of detail working drawings / contract drawings for a building, from the substructure to the superstructure, that will be executed on the construction site.

SYLLABUS

(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.

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.

Learning Outcomes

- Develop the Submission/ Municipal Drawings for building permit approval applications.
- The Capacity to read and interpret architectural plans and specifications, so as to create working drawings for buildings.
- Create construction-ready drawings that clearly illustrate the overall building design.
- Identify the structural system to be implemented.
- Develop structural drawings for the designed structure.
- Design and Prepare drawings of doors, windows, openings with grills, and jali for the client's site execution.
- Develop drawings to create connections between floors, such as staircases and lifts, for execution on site.
- Design and develop landscaping detail drawings for site development for execution as required.
- Integrate all of the drawings that have been prepared for the purpose of execution.
- Develop drawings that are easily understood by the construction team at the site for good construction.

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.

Course Outcome:

- 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.

SYLLABUS

(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.

Learning Out comes:

- To understand different types of estimates and the techniques for preparing them.
- To evaluate the rates for a unit of work for executed of particular work.
- To know various type of specifications and manufactures specification.
- To learn how to write building specification for different items of work in construction.
- To understand and preparing contract, tenders notice procedures and
- To analysis and prepare rate analysis.

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 SERVICES

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

SYLLABUS

(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,

Learning Outcomes:

- Understanding causes of building decay/defects & failures, examining symptoms of various types and patterns of buildings disease, structural, non-structural finishes, etc.
- Student will learn causes of building failures, and decay and damage in buildings with reference to the influence of environmental elements
- Student will learn issues of maintenance and repair.
- Student will learn on how to select a most appropriate material and repair methodology is very important to achieve durable, effective and economic repairs.
- Student will learn various methodical approaches to Repairs in concrete and masonry structures
- Students will learn fundamentals of strengthening to various structural members such as for beam and columns.

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.

Course Outcome:

- Calculate the panel moment, column strip moment and middle strip moments and Design an interior panel, exterior panel of a flat slabs with Column Head and Column Drop.
- Design isolated circular footing and combined footings.
- Determine the moments and reactions in a reinforced concrete portal frame and design.
- Design a cantilever type retaining wall and check the stability.
- Differentiate Pre-tensioning and Post-tensioning and Calculate the bending stresses and losses of pre-stress.

SYLLABUS

(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.

Learning Outcome:

- Understand the behaviour of flat slabs and calculate the panel moment, column strip moment and middle strip moments.
- Design an interior panel, exterior panel of a flat slabs with Column Head and Column Drop.
- Understand the behaviour of combined footing and its use.
- Design isolated circular footing and combined footings.
- Analyse and determine the moments and reactions in a reinforced concrete portal frame.
- Design a single bay single storey reinforced concrete portal frame.

- Understand the difference between reinforced concrete Cantilever and Counter fort type retaining walls.
- Design a cantilever type retaining wall and check the stability.
- Understand the concept of Prestressed Concrete Structures and its application.
- Explain Pretentioning systems, Post-tensioning and Post-tensioning anchorages.
- Calculate the bending stresses due to prestressing force and bending moment along the span.
- Calculate the losses of prestress stresses in pre-tensioned and post-tensioned members.

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.

Course Outcomes:

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

- Apply BIM to Architectural Design: generate 2D & 3D outputs, schedules, bills using AUTODESK REVIT Architecture or similar BIM platform, in a presentable format.
- Apply workflow strategies for efficient use of integrating various BIM models into clash detection analysis models.
- Create complex geometries using Computational Design.

SYLLABUS

(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.

Learning Outcomes

- Application of BIM concepts
- Appreciative lifecycle of a building from planning, design, construction and operations.
- Application of BIM for building energy performance, simulation, construction and administration.
- The students shall prepare the following BIM output, in a presentable format, for the previous semester design project chosen
    a. Plans, Sections & Elevations
    b. Schedule of Openings & Finishes
    c. Bill of Materials
    d. Photo-realistic 3D rendering

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
6) Building Information Modeling – Willem Kymmell

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.

SELF-LEARNING

SYLLABUS

CONSTITUTION OF INDIA

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been

empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest courts in the world".

Course content

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21

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.

Course outcome:

- At the end of the semester students would be able to address and realize complex design issues of building typologies that have huge footfalls. They understand emergency responsive design, barrier-free design requirements and specific building services that need to be installed in respective building typologies.

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.

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?

SYLLABUS

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:

- By the end of this semester the student will be able to prepare all set of detail drawings including building services drawings for construction at a site.

Learning strategy

- Preparation of drawings with illustrations
- Site visit and case studies to know the various details
- Data collection from the market survey regarding construction material and detailing

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.

Course Outcomes:

- Understanding the scope and nature of urban design

- Its evolution and historical perspective
- Explaining the theories of urban design and identifying the components of urbanism
- Understanding on urban landscape
- Knowledge on attributes of sustainability
- Describing the implementation process
- With Knowledge of the best practices.

SYLLABUS

(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.

Learning Outcomes:

- Differentiating the roles of planning architecture and urban design
- Identify the components of urban space and their interdependencies.
- Describe the evolution of city form in the western context
- Describe urbanism in the Indian context
- Summarising the theories of urban design
- Categorising the determinants of urban form and articulation of spaces
- Understanding the Urban design interventions in the urban context
- Knowledge on urban landscape elements
- Explain the urban ecology
- Attributes and concepts in sustainability
- Understanding the concepts of urban design
- Understanding of institutional arrangements in control of development
- Knowledge on the planning instruments and policy
- Best practices in urban design
- Updating on the contemporary developments in the field of urban design

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.

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.

Course outcome:

- The course enhances the advanced Study on services required for a building.
- Students are familiarized with the Special Services in High rise Buildings, large scale projects.
- Understand BMS and their execution in building projects

SYLLABUS

(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.

Learning Outcomes

- Understanding the need for fire safety and protection in buildings.
- Develop plans for fire routes for safety of people in buildings as per National Codes.
- Analysing many different kinds of vertical transportation systems that are necessary for different types of buildings and its importance.
- Evaluate the quality and quantity of services required for vertical transportation systems.
- Analysing building automation design concerns and their impact on functional efficiency Automated building system components.
- Creating spaces by adding new security systems that provide better safety.
- Designing of buildings that are both environmentally friendly and sustainable.

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.

Course outcome:

- Analyse and design a RCC framed structure using standard Indian Codes.
- Analyse and design a truss using standard Indian Codes.

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.

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
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.

Course Outcomes

- The student understands the various practices of Conservation in India and the role of conservation architect in preservation, conservation and restoration of heritage buildings.

SYLLABUS

(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.

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
ELECTIVE-I –B
BARRIER FREE ARCHITECTURE

Course Objectives:

The objective of this course is to acquaint the students of architecture regarding the various provisions and design issues and:

- 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 endeavour 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.

Course outcome:

- Sensitization towards needs of differently abled people.
- Inculcate skills required for designing for barrier free built environments for physically challenged persons.
- Techniques involved in making such provisions.

- Be able to design barrier free buildings and also carry out building audit.

SYLLABUS

(Barrier Free Design)

Barrier Free Design – need & concerns; Definition and dimensions of Barrier – physical, psychological and social. Types of Disability; Blindness, Person with low vision, Cerebral Palsy, Hearing impairment, Leprosy cured person, Locomotor disability, Mental illness, Learning Disabilities (Dyslexia), Impairment Disabilities, Handicap, Rehabilitation, Person with Disability, Institution for persons – with disabilities. National Policy for provisions for elderly persons, Concept of equal opportunity, human rights, social justice and empowerment of physically challenged persons. Approaches towards Disability a Medical Model and Social Model.

(Universal Design)

Universal Design - principles and aspects; Study of Human - environment interaction system. History of development of barrier free initiatives taken across the globe.

Norms and standards for barrier free design. Study of standards as given in TSS, TCPO, CPWD, ADA etc., and others.

(Barrier free Design within buildings)

Design elements within buildings, site planning, parking, approach to plinth levels, corridors, entrance and exit, windows, stairways, lifts, toilets, signage, guiding and warning systems, floor materials.

(Barrier free Design outside the buildings)

Design elements outside the building – kerb at footpath, road crossing, public toilet, Public buildings and places like auditorium, parks, restaurants, railway station, bus stop, Markets, toilet booth, and signage.

Constitutional and statutory provisions to implement barrier free design; barrier free transportation; barrier free tourism; access audit and design solution to one building.

Introduction to how the modern day technology can aid in universal design/ built barrier free environment through audio and visuals.

REFERENCES:

1) Micheal J. Bednar. “Barrier Free Environments”, Dowden, Hutchinson and Ross, Ive 1977.
2) 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.
3) Unnati. “Design Manual for a Barrier – Free Built Environment”, Handicap International, December, 2004.

ARC4107
SOFT SKILLS

Course Objectives:

- To develop skills to communicate clearly.
- To aid students in building interpersonal skills.
- To enhance team building and time management skills.
- To Inculcate active listening and responding skills.

Course Outcomes: building and time management skills.
To inculcate active listen

- Make use of techniques for self-awareness and self-development.
- Apply the conceptual understanding of communication into everyday practice.
- Understand the importance of teamwork and group discussions skills.
- Develop time management and stress management.

SYLLABUS

(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.

Learning Outcomes:

- Acquisition of etiquette and skills that an engineer requires.
- Students will develop the acumen for self-awareness and self-development.
- Students will be able to communicate unmistakably.
- Students will be able to tackle real-life challenges

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.