Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited-2022
'B^{++}' Grade (CGPA 2.96)

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM STRUCTURE
2021 PATTERN

Syllabus: **Bachelor of Architecture Part- II**

Name of the Course: B. Arch. II year – Sem. III and IV

(Syllabus to be implemented June 2023)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

Choice Based Credit System structure of Second Year B.Arch with effect from(w.e.f). 2022-23

As per Council of Architecture ,New Delhi (COA) Guidelines

Scheme Of Teaching and Examination of B.Architecture Second year - Semester III

Subject Code	subject category	Subject Title	Teaching scheme in Periods / Week			Examination Scheme									
			60 minutes/ L/P/S			Theory						Practical/Viva-voce			Total	Credits
			Lectures / Week	Practical, Studio / Week	Total Periods /Week	Paper duration in hours	ISE		ESE		ICA		ESE			
			L	P/S	T		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.		
								50%		45%		50%		45%		
21 AR3-01	PC	Architectural Design- III	1	6	7	_	_	_	_	_	100	50	150	67	250	7
21 AR3-02	BS & AE	Building Construction and Material- III	1	4	5	4			100	45	50	25	100	45	250	5
21 AR3-03	BS & AE	Theory of Structure - III	2		2	3	30	15	70	31	_	_	_	_	100	2
21 AR3-04	PC	History of Architecture- II	2	_	2	3	30	15	70	31	_	_	_	_	100	2
21 AR3-05	PC	Architectural Graphics and Drawing- III	1	3	4	3	30	15	70	31	_	_	_	_	100	4
21 AR3-06	EC/PAEC	Computer Technology in Architecture-I	1	2	3	_	_	_	_	_	50	25	50	22	100	3
21 AR3-07	BS & AE	Building Services -I	2	1	3	3	30	15	70	31	_	_	_	_	100	3
21 AR3-08	BS & AE	Climatology and Environment - I	2	_	2	3	30	15	70	31	_	_	_	_	100	2
21 AR3-09	EC/PAEC	Elective III :A. Art Appreciation B.Vernacular Architecture C.Basic Accounting	_	2	2	_	_	_	_	_	50	25	_	_	50	2
		Grand Total					150		450		250		300		**1150**	**30**

Abbreviations: **L**- Lectures, **P**- Practicals , S- Studios , **ISE**- In Semester Exam., **ESE** - End Semester exam , **ICA**- Internal Continuous Assessment

Subject Categories : PC - Professional Core Courses ,BS & AE - Building Sciences and Applied Engineering , PE - Professional Elective , PAEC- Professional Ability Enhancement Courses , SEC - Skill

Number of subjects / Head - 09	Number of Theory Examination - 06	Number of Practical/Viva-Voce Examination - 03

Note :

1. Theory exam - ISE -Internal Tests - marks to be awarded by conducting Minimum Two Test by the subject teacher , ESE - University Theory examination
2. Practical/Viva-Voce exam - Prograsive marks (ICA) to be awarded by the subject teacher . Pratical/ Viva - Voce examination (ESE - Oral) shall be conducted by one internal and two external examiner appointed by the university

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

Choice Based Credit System structure of Second Year B.Arch with effect from(w.e.f). 2022-23

As per Council of Architecture ,New Delhi (COA) Guidelines

Scheme Of Teaching and Examination of B.Arch. Second year - Semester IV

Subject Code	subject category	Subject Title	Teaching scheme in Periods / Week			Examination Scheme										
			60 minutes/L/P/S			Theory					Practical/Viva-voce				Total	Credits
			Lectures / Week	Practical, Studio/Week	Total Periods /Week	Paper duration in hours	ISE		ESE		ICA		ESE			
			L	P/S	T		Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.		
								50%		45%		50%		45%		
21 AR4-01	PC	Architectural Design- IV	1	6	7	_	_	_	_	_	100	50	150	67	250	7
21 AR4-02	BS & AE	Building Construction and Material- IV	1	4	5	4		_	100	45	50	25	100	45	250	5
21 AR4-03	BS & AE	Theory of Structure - IV	2	_	2	3	30	15	70	31	_	_	_	_	100	2
21 AR4-04	PC	History of Architecture- III	2	_	2	3	30	15	70	31	_	_	_	_	100	2
21 AR4-05	PC	Theory of Architecture	3	_	3	_	30	15	70	31	_	_	_	_	100	3
21 AR4-06	EC/PAEC	Computer Technology in Architecture-II	1	3	4	_	_	_	_	_	50	25	50	22	100	4
21 AR4-07	BS & AE	Building Services -II	2	1	3	_	30	15	70	31			_	_	100	3
21 AR4-08	BS & AE	Climatology and Environment - II	2	_	2	_	30	15	70	31			_	_	100	2
21 AR4-09	EC/PAEC	Elective IV A.Photography B.Bamboo Architecture C.Foreign language	–	2	2	_	_	_	_	_	50	25	_	_	50	2
		_					150		450		250		300		**1150**	**30**
		Environmental Studies	As Per PAH solapur university Guidelines													

Abbreviations: **L**- Lectures, **P**- Practicals , S- Studios , **ISE**- In Semester Exam., **ESE** - End Semester exam , **ICA**- Internal Continuous Assessment

Subject Categories : PC - Professional Core Courses ,BS & AE - Building Sciences and Applied Engineering , PE - Professional Elective , PAEC- Professional Ability Enhancement Courses , SEC - Skill

Number of subjects / Head - 09 | Number of Theory Examination - 06 | Number of Practical/Viva-Voce Examination - 03

Note :

1. Theory exam - ISE -Internal Tests - marks to be awarded by conducting Minimum Two Test by the subject teacher , ESE - University Theory examination
2. Practical/ Viva-Voce exam - Prograsive marks (ICA) to be awarded by the subject teacher . Practical/ Viva - Voce examination (ESE - Oral) shall be conducted by one internal and two external examiner appointed by the university

Pass percentage shall not be less than 50% in aggregate of the total marks of the year .

Grade and Grade Point Average:

A grade assigned to each head based upon marks obtained by the student in examination of the course.

CONVERSION OF MARKS INTO GRADES SGPA				
Sr.No.	***Range of Marks***	***Grade***	***Grade Point***	***Description of Performance***
1	*80 onwards*	*O*	*10*	*EXCELLENT /OUTSTANDING*
2	*70-79*	*A+*	*9*	*VERY GOOD*
3	*60-69*	*A*	*8*	*GOOD*
4	*55-59*	*B+*	*7*	*FAIR*
5	*50-54*	*B*	*6*	*ABOVE AVERAGE*
6	*45-49*	*C+*	*5*	*AVERAGE*
7	*<45*	*F*	*0*	*FAIL*
8		*DR*		*DROPPED OUT*

CONVERSION OF AVERAGE GRADE POINTS INTO GRADES		
Sr.No.	***SGPA/CGPA***	***Grade***
1	*9.5-10*	*O*
2	*8.5-9.49*	*A+*
3	*7.5-8.49*	*A*
4	*6.5-7.49*	*B+*
5	*5.5-6.49*	*B*
6	*4.5-5.49*	*C+*
7	*<4.49*	*F*

Computation of SGPA and CGPA

1) The University adopts absolute grading system wherein the marks are converted to grades, and every semester result will be declared with semester grade point average (SGPA) and Cumulative Grade Point Average (CGPA). The CGPA will be calculated for every semester, except for the first semester.
2) The grading system with the letter grades and the assigned range of marks under absolute grading system are as given below:

Computation of SGPA and CGPA

1. The following expressions shall be used to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) respectively:

$$SGPA = \frac{\sum CourseCredits \times GradePointsforall the Coursesin that Semester}{\sum CourseCreditsforall the Coursesin that Semester}$$

$$CGPA = \frac{\sum CourseCredits \times GradePointsforallCoursesexcluding those with Fgradesuntil that Semester}{\sum CourseCreditsforallCoursesexcluding those with Fgradesuntil that semester}$$

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the grade cards.

Illustration for Computation of SGPA and CGPA

Sem. I

	(a) SGPA and CGPA Calculations: An Illustrative Example for one academic year						
Semester (Odd:I,Even:II)	**Course Number**	**Credits**	**Marks scored**	**Grade Points**	**Grade**	**Credit points**	**SGPA**
	1	**2**	**3**	**4**	**5**	**(2x4) 6 (2x4)**	**7**
SEM.I	**21 AR1-01**	**8**	**45**	**0**	**F**	**8X0 =0**	**SGPA = 132/30 = 4.40**
SEM.I	**21 AR1-02**	**6**	**48**	**5**	**C+**	**6x5 = 30**	
SEM.I	**21 AR1-03**	**2**	**50**	**6**	**B**	**2x6 = 12**	
SEM.I	**21 AR1-04**	**2**	**50**	**6**	**B**	**2x6=12**	
SEM.I	**21 AR1-05**	**4**	**50**	**6**	**B**	**4x6=24**	
SEM.I	**21 AR1-06**	**3**	**64**	**8**	**A**	**3x8 = 24**	
SEM.I	**21 AR1-07**	**3**	**53**	**6**	**B**	**3x6 = 18**	
SEM.I	**21 AR1-08**	**2**	**54**	**6**	**B**	**2x6 = 12**	**SGPA = 4.40**
		30 (*22)				**132**	

(22*): Total credits of the semester excluding the credits of the courses under F grade. Considered for

the calculation of CGPA of the two consecutive semesters under consideration.

Sem.II

	(a) SGPA and CGPA Calculations: An Illustrative Example for one academic year						
Semester (Odd:I,Even:II)	**Course Number**	**Credits**	**Marks scored**	**Grade Points**	**Grade**	**Credit points**	**SGPA**
	1	**2**	**3**	**4**	**5**	**(2x4) 6 (2x4)**	**7**
SEM.II	**21 AR2-01**	**8**	**43**	**0**	**F**	**8X0 =0**	**SGPA = 139/30 = 4.63**
SEM.II	**21 AR2-02**	**6**	**50**	**6**	**B**	**6x6 = 36**	
SEM.II	**21 AR2-03**	**2**	**54**	**6**	**B**	**2x6 = 12**	
SEM.II	**21 AR2-04**	**2**	**84**	**10**	**O**	**2x10=20**	
SEM.II	**21 AR2-05**	**4**	**50**	**6**	**B**	**4x6=24**	
SEM.II	**21 AR2-06**	**3**	**51**	**6**	**B**	**3x6= 18**	
SEM.II	**21 AR2-07**	**3**	**49**	**5**	**C+**	**3x5 = 15**	
SEM.II	**21 AR2-08**	**2**	**55**	**7**	**B+**	**2x7 = 14**	**SGPA= 4.64**
		30 (*22)				**139**	

(22*): Total credits of the semester excluding the credits of the courses under F grade. Considered for the calculation of CGPA of the two consecutive semesters under consideration.

CGPA = 132 + 139 (TOTAL SGPA SEM.I + SEM.II) / 22+22 (EARNEDCREDITS) = 6.15

CGPA = 6.15

If the Student secures letter grades as detailed below after reappearance to SEE, then the SGPA and CGPA shall be calculated as indicated below.

Sem. I

	(a) SGPA and CGPA Calculations: An Illustrative Example for one academic year						
Semester (Odd:I,Even:II)	**Course Number**	**Credits**	**Marks scored**	**Grade Points**	**Grade**	**Credit points**	**SGPA**
	1	**2**	**3**	**4**	**5**	**(2x4) 6 (2x4)**	**7**
SEM.I	**21 AR1-01**	**8**	**50**	**6**	**B**	**8X6 =48**	**SGPA = 132+48/30 = 6.00**
		30				**148**	**SGPA = 6.00**

Sem.II

	(a) SGPA and CGPA Calculations: An Illustrative Example for one academic year						
Semester (Odd:I,Even:II)	**Course Number**	**Credits**	**Marks scored**	**Grade Points**	**Grade**	**Credit points**	**SGPA**
	1	**2**	**3**	**4**	**5**	**(2x4) 6 (2x4)**	**7**
SEM.II	**21 AR2-01**	**8**	**55**	**7**	**B+**	**8X7 =56**	**SGPA = 139+56/30 = 6.50**
		30				**139**	**Sgpa = 6.50**

CGPA = 180 + 195 (TOTAL SGPA SEM.I + SEM.II) / 30+30(EARNEDCREDITS) = 6.25

CGPA = 6.25

2. **(b) CGPA Calculation of the Programme: An Illustrative Example**

SEMESTER	IST YEAR	IIND YEAR	IIIRD YEAR	IVTH YEAR	VTH YEAR	TOTAL
CREDITS OF THE SEMESTER	60	60	60	50	40	270
CGPA	6.25	7.50	6.50	8.00	10.00	38.5

CGPA = (60X6.25 +60X7.50+60X6.5+50X8+40X10) / 270 = 2015/270 = 7.46

CGPA = 7.46

B. ARCH. SEM.III

21 AR3 – 01: ARCHITECTURAL DESIGN – III

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	01	01	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	06	06	ISE	ESE	ICA	ESE	
Total	07	07	--	--	100	150	250

Course Objective:

- To introduce students with the fundamental concept of basic services and its integration in multifunctional planning in design process.
- To develop proficiency to integrate data collection and analysis of community level spaces in design.
- To learn design approach as a continuous process through function, technology and aesthetics of building.
- To develop acquaintance of knowledge gained in other subjects toward designing of spaces.

Course Outcome:

At the end of the semester, the students should be able to:

- Apply the fundamental concept of basic services and its integration in multifunctional planning in design process
- Apply acquainted knowledge to integrate data collection and analysis of community level spaces in design.
- Apply acquainted knowledge of design approach as a continuous process through function, technology and aesthetics of building.
- Apply acquainted knowledge gained in other subjects toward designing of spaces.

Course Curriculum:

Unit 1	**Major Design Problem**	Study of community spaces to create community spaces, minimum and optimum area requirements with respect to community activities; pedestrian and vehicular movements and circulation spaces, safe community spaces.
		Identifying needs of the community through data collection, discussions and drawing conclusions, formation of a design program through consensus.
		Programme analysis through study models, questionnaires, drawing conclusions, inter- relation between various activities and spaces, design process; relationship between idea, concept.
		Major Design Assignment: Design of community spaces like vegetable market, primary health centre, co- operative bank, post office, community library, community hall etc
		Suggested project scale of area :350sqm -500sqm
Unit 2	**Minor Design Problem**	**Minor Design Assignment: literature study and analysis** The student should be introduced with a design problem total built-up area of 150-250sq mt. Example: local convenience store, play group and nursery, coffee shop with added activities etc.
Unit 3	**Time bound Design Problem**	Design - 8 hours and one day assignment Drawing work of minor design assignment to be completed in time bound

Submission/Assignments:

- Study documentation, reports and data collection in file form/drawing form.
- Pre-Design Process Drawings
- Design portfolio.
- Design Models, study models.

Reference Books:

1. Anthony Di Mari and Nora Yoo, " Operative Design: A Catalogue of Spatial Verbs", BIS Publishers.
2. Bruno Munari,"Design as Art", Penguin UK, 25-Sep-2008
3. Charles George Ramsey and Harold Sleeper, " Architectural Graphic Standards", 1992, Wiley
4. Debkumar Chakrabarti, " Indian Anthropometric Dimensions for Ergonomic Design Practice", 1997
5. Frank Ching, James F. Eckler, "Introduction to Architecture", 2012, John Wiley & Sons, US
6. Frank D.K. Ching, " Architecture: Form, Space, and Order", 4th Edition, Sep. 2014, John Wiley & Sons
7. John Hancock Callender, " Time-Saver Standards for Architectural Design Data", 1982, McGraw-Hill
8. Neufert Architects' Data by Ernst Neufert
9. Francis D.K. Ching –Elements of Architecture
10. Walter Gropius – Total Architecture
11. Pramar V.S. – Fundamentals in Architecture

21 AR 3 - 02: BUILDING CONSTRUCTION AND MATERIAL- III

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	01	01	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	04	04	ISE	ESE	ICA	ESE	
Total	05	05	---	100	50	100	250

Course Objective

- To develop a fundamental understanding of openings in both trabeated and arcuate construction methodologies.
- To introduce principles of design of doors and windows.
- All types of heavy teakwood doors, windows and partitions joinery details.
- To introduce students to different types of floorings and method of lying flooring using different materials.
- To help students to understand the basic building elements, their function.
- To study and understand properties and uses of basic building materials.

Course Outcome:

At the end of semester students should be able to:

- To exhibit fundamental understanding of openings in both trabeated and arcuate construction methodologies.
- To select and choose different materials for design of doors and windows.
- Construction of all types of heavy teakwood doors, windows and partitions joinery details.
- To use relevant method of different types of floorings and method of lying flooring using different materials.
- To exhibit understanding of different properties and uses of basic building materials.

Course Curriculum: Building construction: -

SUPER STRUCTURE		
Unit 1	Staircase	Types of staircases based on materials used and construction technology RCC stairs- waist slab, central beam, Folded type. Precast stairs -stringer beam stairs. Metal stairs- stringer beam, central beam. Fire escape stairs- location and material used.
Unit 2	Wooden truss	Detailed study of timber roofs and different covering materials - Thatch, Tiles, Shingles, G.I Sheets etc. 1.Lean to Roof, Couple Roof, Closed Couple Roof & Collar Roof. 2.King Post truss, Queen Post truss.
Unit 3	Alternative roofing	Jack arch, Madras terrace.
Unit 4	Flooring And paving	Method of construction and laying of flooring, skirting, dado with various materials like Natural- Mud, Murrum. Natural Stone - Marble, Granite, Tandoor, Kota Other artificial flooring like – Mosaic, Terrazzo, Ceramic Tiles, Wooden Flooring, Polished Concrete. Laying of paving –cast in situ, concrete tiles, interlocking blocks, clay tiles, brick and stone.
Unit 5	Water proofing	Construction methods for water-proofing and damp proofing for walls, roofs, retaining walls, toilet blocks, balconies and terraces
STRUCTURAL SYSTEM		
Unit 6	Introduction to framed structure	Introduction to framed structure-terminology, framing and erection using RCC.

Building Material:

UNIT	TOPIC	DETAILS
Unit 1	Flooring and paving	a. Natural stones and processed floorings, Artificial flooring materials b. Paving materials: Properties, types, and application.
Unit 2	Water proofing material	a. Bitumen and use of bitumen felt. Asphalt, various types of asphalt. b. Other waterproofing materials etc.
Unit 3	Ferrous material	a. Types -pig iron, wrought iron, and cast iron, - their properties, and uses. b. Steel and steel alloys – i. Properties and uses ii. Market forms of steel iii. Fire protection of steel iv. Causes and prevention of corrosion of ferrous metals
Unit 4	Steel as reinforcement	i. Mild steel bars, deformed steel bars, ii. Grades of MS steel bars, physical requirements, iii. TMT bars, its features, prestressed reinforcement, d. Steel sheeting

Submission/Assignments:

Sheet work on

1. RCC stairs- waist slab, central beam, Folded type.
2. Precast stairs -stringer beam stairs.
3. Metal stairs- stringer beam, central beam.
4. Lean to Roof, Couple Roof, Closed Couple Roof & Collar Roof.
5. King Post truss, Queen Post truss.
6. Natural Stone - Marble, Granite, Tandoor, Kota including mud and murrum.
7. Other artificial flooring like – Mosaic, Terrazzo, Ceramic Tiles, Wooden Flooring, Polished Concrete.
8. Laying of paving –cast in situ, concrete tiles, interlocking blocks, clay tiles, brick and stone.
9. Construction methods for water-proofing and damp proofing for walls, roofs, retaining walls, Toilet blocks, Balconies and Terraces.
10. Introduction to framed structure-terminology, framing and erection using RCC.

Journal and sketches on building construction and material – types of stairs based on construction methodology, Fire escape stairs- location and material used. Jack arch, Madras terrace.

Report – Site Visit and Case Study**.**

Model – Stairs, Truss

ESE Weightage: Building Construction 60% and Building Material 40%

Reference Books:

1.Barry, R. (1999). The Construction of Buildings Vol. 2. 5th Ed. New Delhi: East-West Press.

2. Foster, J. and Mitchell, S. (1963). Building Construction: Elementary and Advanced, 17th Ed.London : B.T. Batsford Ltd.

3. McKay, W. B. (2005). Building Construction Metric Vol. I–IV. 4th Ed. Mumbai: Orient Longman.

4. Moxley, R. (1961). Mitchell's Elementary Building Construction. London: B. T. Batsford.

5. Rangwala,S.C.(1963). Building Construction: Materials and types of Construction.3rd Ed. New York: John Wiley & Sons.

6. Chudley, R. (2008). Building Construction Handbook. 7th Ed. London: Butterworth-Heinemann.

7. Sushil-Kumar, T. B. (2003). Building Construction. 19th Ed. Delhi: Standard Publishers.

8.Rangwala, S. C. (1963). Engineering Materials. 3rd Ed. New York : John Wiley and Sons

21AR3 – 03: THEORY OF STRUCTURE – III

Teaching Scheme per week		Credits	Examination scheme				
Lecture (L)	02	02	Theory exam		Practical/Oral exam		Total
Practical/Studio(P/S)	--	--	ISE	ESE	ICA	ESE	
Total	02	02	30	70	----	----	100

Course Objective:

To understand the concept of principal stress and strain, direct and bending stress, analysis of axially loaded columns and struts, analysis of fixed and continuous beams using shear force and bending moment diagrams and slope and deflection of beams

Course Outcome:

- By the end of the term, the students will also be able to
- To identify the principal planes and stress-concentrated points of a member.
- Analyze axially loaded columns, struts, cantilevered, simply supported beams and fixed and continuous beams.

Course Curriculum:

Unit-1	Principal Stresses and Strains	Concept of normal and resultant stress, Derivation of normal and resultant stress on an oblique plane subjected to uniaxial normal stress, bi-axial normal stress and shear stress, Concept of principal planes and principal stresses, Concept of maximum shear stress, Derivation of principal stresses and maximum shear stress on an oblique plane subjected to uniaxial normal stress, bi-axial normal stress and shear stress, Graphical method of determination of principal stresses – Mohr's Circle Method
Unit-2	Direct and Bending Stress	Concept of direct and bending stress, Concept of eccentric loading, Analysis of columns with eccentric loading, Resultant stress distribution diagrams due to axial loads, axial and bi-axial bending, Concept of core of section, Formula for core of section for standard symmetrical sections, No tension condition
Unit-3	Axially Loaded Columns and Struts	Concept of column and strut, Failure of column, Types of end conditions, Equivalent length of column, Euler's column theory, Rankine's formula, IS code formula, Calculations of critical load
Unit-4	Analysis of Fixed and Continuous Beams	Concept of fixed and continuous beam, SFD and BMD of fixed and continuous beams
Unit-5	Slope and Deflection	Concept of slope and deflection, Moment-curvature equation, Relation between slope, deflection and curvature, Concept of double integration method, Simple problems of cantilevered and simply supported beams with different loading
Unit-6	Frames and Trusses	Applications of frames and trusses, Terminology of truss members, Different geometry of trusses e.g. Howe truss, Fink truss, N girder, Concept of perfect frame, imperfect frame, deficient frame and redundant frame, Assumptions in analysis of trusses

Submission/Assignments:

Topic-wise assignments

Reference books:

1. Strength of Materials by Khurmi
2. Strength of Materials by A. P. Dongre
3. Strength of Materials by Ramamrutham and S. Narayan

4.

21 AR3 – 04: HISTORY OF ARCHITECTURE-II

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	02	02	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	--	--	ISE	ESE	ICA	ESE	
Total	02	02	30	70	--	--	100

Course Objective:

- To study the evolution of Indian temple architecture, classical Greek, Rome, early Christian and Byzantine architecture through critical analysis of appropriate examples.
- To discuss building materials and building construction technology, built form, structural system, building types, aesthetics and architectural compositions of buildings that flourished during the particular period.

Course Outcome:

At the end of semester students should be familiar:

- To the physical and aesthetic experience of the buildings with available resources, and materials to build during ancient classical Architecture.
- To develop understanding about evolution of different architectural periods through critical analysis of appropriate example
- To exhibit knowledge about construction technology built form during ancient period.

Course Curriculum:

Unit 1	Hindu temple architecture- under Gupta dynasty	Evolution of Hindu temple, e.g. Early shrines at Udaygiri, Udaygiri caves, Temple no. 17 - Sanchi, Parvathi temple at Nachnna Kuthara, Kankali Devi temple at Tigwa, Dashavatara temple at Deogarh.
Unit 2	Early Chalukyan period	Ladkhan temple and Durga temple at Aihole, Papanatha temple and Virupaksha temple at Pattadkal
Unit 3	South Hindu Temples/ Dravidian temples	Chola Dynasty- Brihadeshwara Temple at Tanjore
		Pallava Dynasty – Pandavas Rathas/mandapa & Shore temple at Mahabalipuram, Vaikuntha Perumal Temple at Kanchipuram
		Vijaynagar –Vitthal temple at Hampi
		Pandya and Nayaka Dynasty- Minakshi Sundaram Temple at Madurai.
Unit 4	Northern Hindu temples /Indo-Aryan temples/Nagara temples	Orissan group –Lingraj Temple at Bhubaneshwar, Sun Temple at Konark
		Khajuraho group –Khanderiya Mahadeva temple at Khajuraho
		Rajputana style – The temple Surya at Osia Marwar
		Gujarat style - Sun temple – Modera, Gujrat
		Jain Architecture – Chaumukh Temple of Adinatha at Ranakpur
		Deccan – Mankeshawar temple at Jhogda, Nashik.
Unit 5	Classical Greek architecture	Parthenon at Athens, Theatre Epidaurus, Agora at Athens.
Unit 6	Classical Roman architecture	Pantheon Rome, Basilica of Trajan Rome, Thermae at Caracalla, Colosseum Rome
Unit 7	Early Christian Architecture	Old Basilica of St. Peter, Rome
	Byzantine Architecture	Hagia Sophia, St. Mark's Venice

Submission/Assignments:

Journals with sketches,

A3 size sheets with sketches- preferably plans and sections- of various buildings discussed in the above units.

Models of examples studied in above theory in group work.

Reference Books:

1. “Indian Architecture, Buddhist and Hindu Period” by Brown, Percy
2. “Architecture of India – Buddhist and Hindu” by Grover Satish
3. Bannister Fletcher, "History of Architecture", CBS Publishers, 1992
4. Henri Sterling, "Architecture of the world - Greece", Herron Books 1994,
5."Architecture of the world - The Roman Empire", Taschen Pub., 1997.
6. James Stevens Curl," Classical Architecture", W. W. Norton & Company; Reissue edition, 2003. Robert Adam, “Classical Architecture", Harry N. Abrams; 1st edition, 1991
7. Indian architecture Hindu, Buddhist, Jain and Islam by V.L.N. Murthy

21 AR 3 – 05: ARCHITECTURAL GRAPHICS AND DRAWING -III

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	01	01	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	03	03	ISE	ESE	ICA	ESE	
Total	04	04	30	70	--	--	100

Course Objective:

- To introduce the students to the fundamental techniques of Architectural drawings & to enhance their visualization skills and understand the principles of shades and shadows & to enhance their visualization skills by viewing at different angles.
- Introduction of views –isometric, oblique, axonometric, perspective-one /two/three point.
- To learn to draw perspective views of complicated objects, building, interior, parts, pedestals etc.

Course Outcome:

At the end of the semester, the students should be able:

- To be equipped with graphical skills which shall be useful in translating the graphical ideas into appropriate technical drawings presentations with sociography in conventional direction by considering sun's position & in perspective.
- To be equipped with use of wide and normal lenses, advanced photography techniques.

Course Curriculum:

Unit 1	Introduction to perspective drawing	Principles of one point, two point, and three-point perspective of simple Geometric objects
		Perspective of interior and exteriors and building parts etc.
Unit 2	Introduction to sociography	Study of shade and shadows.
		To understand the principles of drawing shade & shadow with source of light being sun.
Unit 3	Perspective sciography	Perspective Sociography of simple and combination of geometrical object.
		Sciography of building components in plan, elevation and in perspective.
Unit 4	Introduction of photography	Use of wide and normal lenses.
		Advance photographic technique.

Submission/Assignments:

Sheetwork portfolio pertaining to the above topics.

Reference Books:

1. Engineering Drawing – By N.D. Bhat
2. Construction and Design Manual Drawing for Architects by Natscha Meuser
3. Architectural Graphics By D.K.Ching

21 AR3 – 06: COMPUTER TECHNOLOGY IN ARCHITECTURE – I

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	01	01	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	02	02	ISE	ESE	ICA	ESE	
Total	03	03	--	--	50	50	100

Course Objective:

- To develop and train students to use computers and digital media as tools to explore, develop, evaluate and present architectural ideas.
- To equip the student with a range of digital tools and techniques in 2D drafting and vector graphics.
- To acquaint student's computer application particularly in architecture

Course Outcome:

At the end of semester students should be able to:

- Students will be accustomed to use computer as a drafting and presentation tool.
- Use Computer operations principles and image editing through a graphical composition, computer aided 2D drafting through simple exercises.

Course Curriculum:

Unit 1	Introduction Auto – Cad	Introduction to AutoCAD as a drafting, sketching and designing tool.
Unit 2	Introduction to basic commands	2D commands, viewports, dimensions, annotations.
Unit 3	Set ups	Template set up, unit set up
Unit 4	Dimensioning	Dimension style manager (annotative and standard)
Unit 5	Blocks	Application of blocks
Unit 6	Scale	Drawing at different scale
Unit 7	Layers	Introduction to layers

Submission/Assignments:

1. Classroom exercises such as measured drawing of studio (windows, doors and staircases included), architecture college/ campus (windows, doors and staircases included) etc. by Time problem
2. Computer aided drawings of the 2D architectural projects/ assignments and presentation
3. Files & notes.

Reference Books:

1. A first course in Computer – Sanjay Saxena
2. AutoCAD 2012 – Kogent Learning Solutions
3. Thousand AutoCAD Tips and Tricks – George O. Head

21 AR3 – 07: BUILDING SERVICES -I

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	02	02	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	01	01	ISE	ESE	ICA	ESE	
Total	03	03	30	70	--	--	100

Course Objective:

- To make students understand the importance and scope of water supply (Hot and old) and drainage system
- Its application and integration in residential design premise.

Course Outcome:

By the end of term, the student should be able to:

- To design water supply and drainage layout with calculations and sizing for a residential premise.

Course Curriculum:

Unit 1	**Domestic Water supply**			
	Distribution system	a. Water distribution system for town / cities, b. layout of water distribution system for town /city		
	Plumbing system	a. Types of water supply or service pipes, b. Types of pipe fittings (special) in plumbing system c. Types of pipe joints in plumbing d. Tapping of water from water mains (ferrule connection)		
	Water Storage Tanks	Components and designing (capacity and sizing) of Underground (UGT) and Overhead (OHT) water storage tanks		
	Water Pumps	Centrifugal pump & Submersible pump only		
	Water supply system in multi-storeyed (G+2) Residential building	a. Hydro pneumatic system, b. Pumping and Gravity system c. Combined system		
	Types of Valves	a. Ball valve, b. Globe valve, c. Gate valve,	d. Float valve e. Foot valve, f. Butterfly valve,	g. Angle valve, h. Pressure relief valve
	Market survey only	Taps, Shower roses, Wall mixer and Basin mixer		
	Rain water harvesting	Introductory only without types		
Unit-2:	**Domestic Hot Water supply**			
	Individual methods of Hot water supply	a. Instant water heaters, b. Storage type water heaters		
	Centralised Hot water supply system	a. Direct system, b. Indirect system		
	Hot water Piping layout	a. Up-feed system b. Down-feed system		
	Safety features and Insulating materials.	a. Temperature of hot water, b. Insulation of hot water supply systems, c. Safety features: Danger of expansion, Vacuum formation, Expansion pipe.		
		Gas and Solar water heaters		
Unit - 3	**Domestic Drainage system**			
	Type of Traps	P-trap, S-trap and Q-trap		
	Market survey only	Sanitary Fixtures and fittings		
	Drain and Waste disposal pipes	a. According to function b. According to method of manufacturing		

	Horizontal drainage system: Components	a. Pipes: Horizontal flow underground drainage pipes, b. Bottle Trap,	c. Nahani (Floor) trap, d. Gully trap, e. Inspection chamber	f. Intercepting chamber, g. Manhole
	Vertical Drainage system	a. Components: a. i. Pipes: Soil pipe, waste water pipe, Anti siphonage pipe, Rainwater pipe a. ii. Fittings(special) used in vertical drainage. b. Anti siphonic action to be explained to understand use of anti-siphonage pipe, c. Vertical drainage pipe systems		
	Septic Tank	Designing of septic tank with plan and section with all components.		

Submission/Assignments:

- Report of Site visits and Market Survey.
- Handwritten notes with sketches file submission.
- Water supply and drainage layout for a small residential project not more than G+2. on sheets

Reference Books:

1. NBC 2016 Vol 2, Part 9, Sections (1, 2, 3)
2. Handbook on Water supply and Drainage - BIS SP 35 1987
3. Building Services Handbook - Fred Hall & Roger Greeno.
4. Sanitation, Drainage and Water Supply - Mitchell.
5. IPC 2018 (International Plumbing Code)
6. Plumbing – Design &Practise – S G Deolalikar

21 AR3 – 08: CLIMATOLOGY & ENVIRONMENT-I

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	02	02	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	--	--	ISE	ESE	ICA	ESE	
Total	02	02	30	70	--	--	100

Course Objective:

- Study relation between built form & elements of Climate.
- Study behavior of built form in different climatic conditions & Design responding to climate.
- Study different climate & elements of climate.
- Micro climate & macro climate, Micro climate analysis, Bio Climate Designs & Bio climatic chart

Course Outcome:

At the end of the semester students should be able:

- Exhibit understanding of various elements of climate & Global climate.
- To impart knowledge regarding Micro climate & macro climate, Micro climate analysis
- Students will be able to use Bio Climate Designs & Bio climatic chart, Sun dial & Sun path dial
- Students will be able to understand Thermal Design - Heat exchange of building

Course Curriculum:

Unit 1	**Climate**	Introduction to climate &Global climate factors.
		Elements of Climate and Measurements tools.
		Classification of Tropical climatic regions in Indian subcontinent
		Site Climate - Micro climate & Macro climate; along with Micro climate analysis
Unit 2	**Comfort**	Thermal Comfort Factors; body's heat production and losses
		Thermal Comfort Indices; psychometric charts and bioclimatic charts
Unit 3	**Principles of Thermal Design**	Thermal quantities.; heat flow rates, Conductivity, Radiation Convection, Radiation calculations
		Analysis Techniques of buildings. - Internal Heat Gains and External Heat Gains, Heat Losses in Building.

Submission/Assignments:

1. File along with sketches
2. 10 min PPT presentation on any climate responsive building (case study) Book /Live or any topic from the syllabus

Reference Books:

1. Climate Responsive Architecture – Arvind Krishna
2. Hand book: Solar Passive Architecture – M Emanuel levy
3. Manual of Tropical Housing and Building – O H Koenigsberger.
4. Sun Wind and Light – MARK DeKAY and G Z Brown

21 AR3-09: ELECTIVE- III

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	--	--	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	02	02	ISE	ESE	ICA	ESE	
Total	02	02	--	--	50	--	50

The student will opt for any one of the following courses

A. **Art Appreciation**
B. **Vernacular Architecture**
C. **Basic Accounting.**

The detail syllabus for the above subjects is given hereby

A. ART APPRECIATION

Course Objective:

- Vocabulary and principles of art, perception and representation, categories of art in terms of media and technique
- Appreciating art through the study of art production in the west from the beginnings to the birth of modern art, context for new directions in art in the late 19th and early 20th century
- Art production in India over history, contemporary art from India and its appreciation.

Course Outcome:

- The student will be able to interpret, appreciate and articulate processes of artistic production, themes, socio-cultural and aesthetic issues that artists examine in their work
- The role and influence of western ancient and medieval art in societies, histories and world cultures.
- Appreciate and understand Indian art and its context

Course Curriculum:

Unit 1	Intellectual appreciation	Theoretic, discursive, analytic, critical aesthetics.
Unit 2	Visual appreciation	two and three dimensional, black and white & color, art films, films on artists, feature film.
Unit 3	Skills	Techniques, handicrafts, traditional crafts etc.
Unit 4	Relationship between Visual Arts and Performing Arts.	Visits to museums and art galleries, exhibitions.
		Create awareness of various types of arts, appreciation and understanding of their relationship

Submission/Assignment:
Audio- visual presentations
Journals with sketches

Reference Books:

1. Vastushatra and ancient technological treatise- by Reena Patra
2. How to read art-understanding and interpreting paintings by - Liz Rideal
3. Art matters by Pamela Gordon
4. Art that changed the world by DK

A. VERNACULAR ARCHITECTURE

Course Objective:

- To instill sensitivity towards the less explored field that is concerned with Architectural building traditions/practices that are cost effective, ecologically sensible and culturally relevant.

Course Outcome:

- Students acquire a working vocabulary that can help them describe vernacular architecture in meaningful ways.
- Develop an understanding of grass root principles of indigenous architecture that has evolved over time in response to environment, climate, culture, economy and basic human needs.
- Understanding of variations in built forms and their environmental performance across different climatic and geographical regions of India and adaptations of vernacular architecture in contemporary buildings.

Course Curriculum:

Unit 1	Introduction	Introduction to the approaches and concepts to the study of vernacular architecture
		History and organization of vernacular buildings of different regions in the Indian context
		Study of forms, spatial planning, cultural aspects, symbolism, colour, art, materials of construction and construction techniques.
		Study of factors that shape the architectural character and render the regional variations of vernacular architecture-geographic, climatic, social, economic, political and religious aspects, local materials and skills available in the region etc.
Unit 2	Documentation	Methods of observation, recording, documenting and representing vernacular architecture with examples.
Unit 3	Verbal presentations:	Study and documentation of vernacular architecture of selected building typologies. Rigorous documentation, accuracy in measuring, collating the recorded information and drawing them up in specified formats and scales
Unit 4	Study of contemporary vernacular practices	A critical review of the relevance and application of vernacular ideas in contemporary times
		An appraisal of architects who have creatively innovated and negotiated the boundaries of tradition while dynamically responding to the changing aspirations and lifestyles of the world around.

Submission/Assignment format:

- Journals with sketches,
- A3 size sheets with drawings of details
- Models of examples studied – preferably in groups

Reference Books:

1. Brunskill, R. W. (1987). Illustrated Handbook of Vernacular Architecture. Castle Rock: Faber & Faber.
2. Carmen, K. (1986). VISTARA – The Architecture of India. The Festival of India Publications.
3. Cooper% and Dawson%. (1998). Traditional buildings of India. London: Thames & Hudson.
4. Jain, K. and Jain, M. (1992). Mud Architecture of the Indian Desert. Ahmadabad: Aadi Centre.
5. Kenneth, F. (1983). Towards a Critical Regionalism
6. Pramar, V. S. (1989). Haveli-Wooden Houses and Mansions of Gujarat, Ahmadabad : Mapin Publishing.
7. Tillotsum, G. H. R. (1989). The tradition of Indian Architecture: Continuity, Controversy and Change since 1850. Delhi : Oxford University Press.

B. BASIC ACCOUNTING

Course Objective:
This course provides an orientation in the field of accounting, accounting rules and prepare financial statements

Course Outcome:
Conceptually define accounting and bookkeeping
Identify the accounting rules required for business enterprises
Apply the accounting rules in determining financial results
Prepare financial statements

Course Curriculum:

Unit 1	Basic Accounting Concepts	Background of Accounting, Introduction, importance and scope, Accounts Types and classification; basic terms-Capital, Income, Expenditure, Expenses, Assets, Liabilities and application to Problems., Accounting Equation, Double Entry System. Generally accepted accounting principles
Unit 2	Journal and Ledger	Journal and recording of entries in journal with narration; Ledger-Posting from Journal to respective ledger accounts. Basic concepts of purchase book, sales book and cashbook. Trial Balance: Need and objectives; Application of Trial Balance; different types of errors escaped, trial Balance preparation.
Unit 3	Final Accounts	Final Accounts without adjustments. Bank Reconciliation Statement: Bank transactions, Preparation of simple bank reconciliation statements.
Unit 4	Sources of raising of capital in corporate undertaking	Working capital and Long term capital.

Submission/Assignment:
Journals with examples

Reference Books:
1. Managerial Accounting, Jawahar Lal, First Edition
2. Financial Accounting, Dr. R.K. Mittal & M. Bansal 3. Basic Accounting, Rajni Sofat & Preeti Hiro, Second Edition
3. Accounting for management, Bhattacharya & Deaden, Paperback Edition, Vikas 1980
4. Financial Accounting (Part I and Part II), IL Gupta & VK Gupta
5. Fundamental Accountancy, S.N. Maheshwari.

B.ARCH. SEM.IV
21 AR4 – 01: ARCHITECTURAL DESIGN - IV

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	01	01	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	06	06	ISE	ESE	ICA	ESE	
Total	07	07	--	--	100	150	250

Course Objective:

- To introduce students with the fundamental concept of climatology, its different types and zones.
- To study the various climate-based design strategies and method to adopt in design and detailing process
- To learn the design process and generate design approach trough function, technology, aesthetics, user comfort considering knowledge gained in previous semester
- To learn design process for medium complex function, low rise multi-functional projects.

Course Outcome:

At the end of the semester students must be able to:

- Apply the fundamental concept of climatology, its different types and zones.
- Use the relevant applications of various climate-based design strategies and method to adopt in design and detailing process.
- Design and generate design approach trough function, technology, aesthetics, and user comfort considering knowledge gained in previous semester.
- Exhibit understanding in design process for medium complex function, low rise multi-functional projects.

Course Curriculum:

Unit 1	**Design Problem**	Design based on Bio Climatic Design strategies as a tool to architectural design.
		Students are expected to study historical presidents, site context with respect to climate, site response matrix, and respond to given design programme.
		Suggested Design Methodology:
		Climate responsive case study (Vernacular and Contemporary), Climate analysis, and Site response matrix with the help of site model and sun dial, programme analysis, Climatic zoning.
		1. Design based on Study models, parallel studies, generation of design through ideation and space making
		2. Site planning aspect and designing spaces like schools, resorts, polyclinics, hostels, art gallery, city museum, motels, science centre etc.
		3. Suggested project scale of area: 600-850sqm
Unit 2	**Minor Design Problem**	**Minor Design Assignment: literature study and analysis** The student should be introduced with a design problem total built-up area of 300sqm. Example: Exhibition space, Primary school, Super market etc
Unit 3	**Time bound design assignment**	Design - 12 hours and two-day assignment Drawing work of minor design assignment to be completed in time bound

Submission/Assignments:

Study documentation, reports and data collection in file form/drawing form.

- Pre-Design Process Drawings

- Design portfolio.
- Design Models, study models.

Reference Books:

1. Anthony Di Mari and Nora Yoo, " Operative Design: A Catalogue of Spatial Verbs", BIS Publishers.
2. Bruno Munari,"Design as Art", Penguin UK, 25-Sep-2008
3. Charles George Ramsey and Harold Sleeper, "Architectural Graphic Standards", 1992, Wiley
4. Debkumar Chakrabarti, "Indian Anthropometric Dimensions for Ergonomic Design Practice", 1997
5. Frank Ching, James F. Eckler, "Introduction to Architecture", 2012, John Wiley & Sons, US
6. Frank D.K. Ching, " Architecture: Form, Space, and Order", 4th Edition, Sep. 2014, John Wiley & Sons
7. John Hancock Callender, "Time-Saver Standards for Architectural Design Data", 1982, McGraw-Hill
8. Neufert Architects' Data by Ernst Neufert
9. Francis D.K. Ching –Elements of Architecture
10. Walter Gropius – Total Architecture
11. Pramar V.S. – Fundamentals in Architecture
12. Climate Responsive Architecture – Arvind Krishna
13. Hand book: Solar Passive Architecture – M Emanuel levy
14. Manual of Tropical Housing and Building – O H Koenigsberger.
15. IMD Data.
16. Site Planning by Kevin Linch, Gary Hack

21AR4 – 02: BUILDING CONSTRUCTION AND MATERIAL –IV

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	01	01	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	04	04	ISE	ESE	ICA	ESE	
Total	05	05	---	100	50	100	250

Course Objective:

- To help students to understand the construction of framed structure and incorporation of basic building elements, their function, position
- To enable students to understand construction with specific reference to RCC frame structure.
- To develop analytical and logical sequence in thinking, through site visit & material study.
- To develop strong sense of designing windows and doors using metal as a building material.

Course Outcome:

At the end of semester, the students should be able to exhibit understanding:

- Of the basic components of buildings construction systems,
- Of techniques and methodology with specific reference to R.C.C construction method,
- And use of metals for door, windows and as reinforcement in RCC structure.

Course Curriculum:

Building Construction:

SUB STRUCTURE		
Unit 1	RCC shallow foundations	a. Principles and methods of construction of RCC foundation – Shallow- Isolated, Combined, Raft.
SUPER STRUCTURE		
Unit 2	Scaffolding, shuttering, formwork, strutting	a. Assembly and removal of scaffolding, shuttering, formwork, strutting for RCC work
Unit 3	RCC column	a. Principles and methods of construction of RCC columns – Square, Round, Polygon and combined.
Unit 4	RCC beam	a.Principles and methods of construction of RCC beams –simple, cantilever, inverted.
Unit 5	RCC slab	a .Principles and methods of construction of RCC slab—one way, two way, cantilever, sloping, waffle slabs, filler slab using filler materials (Mangalore tiles, burnt clay blocks, hollow concrete blocks, stabilized earth block, hollow mud blocks, clay pots, coconut shells), flat plate and slab,
Unit 6	Metal doors, windows and fixing details of MS Grill on different types of frames.	a. Simple Mild Steel doors and windows, b. Steel doors for garages, and workshops, Collapsible gates and Rolling shutters.

Building Material:

UNIT	**TOPIC**	**DETAILS**
Unit 1	Ceramic Materials	a. Tiles, Terracotta, Earthenware, Stoneware, b. Properties of ceramics. c. Uses of ceramics

Unit 2	Concrete	a. Ingredients, b. Grades c. Admixtures, d. Properties, e. Preparation, Mixing, Proportion f. Application
Unit 3	Reinforced Cement Concrete	a. Chemical admixtures. b. Placing, and compaction, curing of concrete. c. Testing of concrete. d. Finish in concrete. e. Construction joints, expansion joints.
Unit 4	Plastering	a. Material mixing and its application b. Types of various finishes using lime, cement, Gypsum mortar, buffing etc. c. Internal and external - smooth, rough, textured, etc.

Submission Format :

Sheet work on

1. Scaffolding, Shuttering, Formwork, Strutting for RCC work
2. RCC foundation – Shallow- Isolated, Combined, Raft.
3. RCC columns – Square, Round, Polygon and combined.
4. RCC beams –simple, cantilever, inverted.
5. RCC slab—one way, two -way, cantilever, sloping, waffle slabs, flat plate and slab,
6. Filler slab using filler materials (Mangalore tiles, burnt clay blocks, hollow concrete blocks, stabilized earth block, hollow mud blocks, clay pots, coconut shells),
7. Simple Mild Steel doors and windows.
8. Steel doors for garages, and workshops, Collapsible gates and Rolling shutters.
9. 10. MS Grills -fixing details on different types of frames.

Journal and sketches on building construction and material

Filler slab using filler materials (Mangalore tiles, burnt clay blocks, hollow concrete blocks, stabilized earth block, hollow mud blocks, clay pots, coconut shells),

Report – Site Visit and Case Study.

Model – Reinforcement details, doors, windows, partitions.

ESE weightage – Building Construction -60% Building Material - 40%

Reference Books:

1.1.Barry, R. (1999). The Construction of Buildings Vol. 2. 5th Ed. New Delhi: East-West Press.
2. Foster, J. and Mitchell, S. (1963). Building Construction: Elementary and Advanced, 17th Ed. London: B.T. Batsford Ltd.
3. McKay, W. B. (2005). Building Construction Metric Vol. I–IV. 4th Ed. Mumbai: Orient Longman.
4. Moxley, R. (1961). Mitchell's Elementary Building Construction. London: B. T. Batsford.
5. Rangwala, S. C. (1963). Building Construction: Materials and types of Construction. 3rd Ed. NewYork : John Wiley Sons.
6. Chudley, R. (2008). Building Construction Handbook. 7th Ed. London: Butterworth-Heinemann.
7. Sushil-Kumar, T. B. (2003). Building Construction. 19th Ed. Delhi: Standard Publishers.
8. 8.Rangwala, S. C. (1963). Engineering Materials. 3rd Ed. NewYork : John Wiley and Sons

21 AR4 – 03: THEORY OF STRUCTURE – IV

Teaching Scheme per week		**Credits**	**Examination scheme**				
Lecture (L)	02	02	Theory exam		Practical/Oral exam		Total
Practical/Studio(P/S)	--	--	ISE	ESE	ICA	ESE	
Total	02	02	30	70	----	----	100

Course Objective:

To help students to understand analysis and design of steel structural members by limit state method using IS 800-2007. (The students are allowed to carry steel tables and IS 800-2007 with themselves in exam halls)

Course Outcome:

By the end of the term, the student will be able to analyze and design members in steel structures like tension member, compression member, beam, truss and connections using IS 800-2007.

Course Curriculum:

Unit-1	Introduction	Common steel structures, Advantages and disadvantages of steel structures, Types of steel, Properties of structural steel, Rolled steel sections, Special considerations in steel design, Loads, Load combinations, Structural analysis, Design philosophy
Unit-2	Principles of Limit state design	Design requirements as per IS 800-2007, Limit states, Actions (Loads) as per IS 800-2007, Design strength, Deflection limits as per IS 800-2007, Other serviceability Limits, Stability Checks
Unit-3	Bolted Connections	Riveted connections, Bolted connections, Classification of bolts based on type of load transfer, advantages and disadvantages of bolted connections, terminology, IS 800-2007 specifications for spacing and edge distances of bolt holes, Types of bolted connections, Types of actions on fasteners, Assumptions in the design of bearing bolts, Principles observed in the design, Design tensile strength of plates in a joint, Design strength of bearing bolts, Design procedure with bearing type bolts subjected to shearing forces using IS 800-2007, Efficiency of a joint
Unit-4	Design of Tension member	Design strength of axially loaded tension member, Design procedure using IS 800-2007
Unit-5	Design of Compression member	Buckling class of cross-section, Slenderness ratio, Design compressive stress and strength as per IS 800-2007, IS tables for design stress, Shapes of compression members, Design of compression member (excluding lacing, battening, and other connections) using IS 800-2007
Unit-6	Design of Steel beams	Types of beams, Plastic moment carrying capacity of a section, Classification of cross-sections, Design procedure of Laterally supported beams as per IS 800-2007, Bending strength of laterally supported beams, Shear strength of laterally supported beams, Deflection limits as per IS 800-2007
Unit-7	Design of Steel roof trusses	Types of roof trusses, Selection of trusses according to span, Estimation of gravity loads and wind loads, Analysis of roof trusses and Design of at least two members

Submission /Assignments:

Topic-wise assignments

Reference Books:

a) Limit state Design of steel structures by S. K. Duggal
b) Design of steel structures (limit state method) by S. S. Bhavikatti
c) IS 800-2007 General Construction in Steel – Code of Practice
d) IS 875 Part – III 2015 Design load other than Earthquake – Code of Practice
e) Steel Table by R. Agor

21 AR4 – 04: HISTORY OF ARCHITECTURE-III

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	02	02	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	--	--	ISE	ESE	ICA	ESE	
Total	02	02	30	70	--	--	100

Course Objective:

- To study the evolution of Indo- Islamic architecture, Indian colonial architecture, Romanesque, Gothic, Renaissance and Baroque architecture through critical analysis of appropriate examples.
- To discuss building materials and building construction technology, built form, structural system, building types, aesthetics and architectural compositions of buildings that flourished during the particular period.
- To study the effects of industrial revolution on society and buildings.

Course Outcome:

At the end of semester students should be familiar:

- Evolution of different architectural periods through critical analysis of appropriate example
- About construction technology built form Indian Islamic architecture, Indian colonial architecture, Romanesque, Gothic, Renaissance and Baroque architecture through critical analysis of appropriate examples

Course Curriculum:

Unit 1	Hindu Islamic architecture Imperial style at Delhi-	Slave dynasty and Khilji Dynasty - Quwwat-Ul Islam – mosque, complex at Delhi
		Tughlaq dynasty - Tomb of Ghias-Ud Din Tughlaq, Khirki Masjid Delhi
		Sayyid Dynasty – Tomb of Mubarak Shah Sayyid
		Lodhi dynasty – Shish Gum bad.
Unit 2	Provincial style – in Deccan region	Ibrahim Rauza and Gol Gumbaz at Bijapur,
		Jami Masjid at Gulbarga
		Madrassa of Gawan Bidar
Unit 3	Mughal style – under various rulers	Humayun Tomb and Arab Sarai ,
		Fatehpur Sikri – layout, monuments – Diwan-e am, Diwan-e Khas, Hiran Minar , mosque complex , Jodha Bai's palace , Birbal's house , Anup Talao
		Shahjahan - Taj mahal at Agra,
		Mughal Garden- Shalimar Bagh at Srinagar
Unit 4	Colonial architecture under British rule in India	Mumbai - Victoria terminus station at Mumbai, Asiatic Society of Mumbai town hall
		Delhi - layout of new Delhi - Rashtrapati Bhavan - Rajpath, Janpath, India gate New Delhi.
		Parliament house – New Delhi
		Kolkata – Victoria Memorial
Unit 5	Western architecture	Romanesque architecture – Pisa Cathedral, Campanile Pisa, Baptistry
		Gothic - Notre dame Paris
		Renaissance architecture in Europe - Church of Saint peter Rome (new), Villa Rotunda by Palladio
		Baroque architecture – saint peters piazza by Bernini
Unit 6	Modern Architecture	Industrial Revolution and Its Effects social, political, economic, New Building Material and Construction Technology, New prototypes – Bridges Factories Railway Stations.

Unit 7	Schools of modern architecture	Bauhaus School at Dessau, Chicago School of Art and Architecture

Submission/Assignment:

- A3 size sheets with sketches- preferably plans and sections- of various buildings discussed in the above units.
- Models of examples studied in above theory in group work.

Reference Books:

1. "Indian Architecture, Buddhist and Hindu Period" by Brown, Percy
2. "Architecture of India – Buddhist and Hindu" by Grover Satish
3. Bannister Fletcher, "History of Architecture", CBS Publishers, 1992
4. Henri Sterling, "Architecture of the world - Greece", Herron Books 1994,
5., "Architecture of the world - The Roman Empire", Taschen Pub., 1997.
6. James Stevens Curl," Classical Architecture", W. W. Norton & Company; Reissue edition, 2003. Robert Adam, "Classical Architecture", Harry N. Abrams; 1st edition, 1991
7. Indian architecture Hindu, Buddhist, Jain and Islam by V.L.N. Murthy

21AR4– 05: THEORY OF ARCHITECTURE

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	03	03	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	--	--	ISE	ESE	ICA	ESE	
Total	03	03	30	70	--	--	100

Course Objective:

To acquaint the students with architectural theory from antiquity to the present and to identify issues which shaped the approach to architectural design in a particular context and age.

Course Outcome:

At the end of the semester students should be able:

- To familiarized with the theories and treatise by eminent architects from antiquity to modern period.
- To understand and critically acclaim architectural works.

Course Curriculum:

Unit 1	Introduction to Theory in Antiquity	Marcus Vitruvius and his multi-volume work entitled De Architectural
		Mayamata - Indian Treatise on Housing & Architecture
Unit 2	Theory in Renaissance	Andrea Palladio, Claude Perrault of French Academic Tradition
		Ideas of Laugier
		Concepts of Viollet Le Duc, John Ruskin, Gottfried Semper.
Unit 3	Modern Movement Theory	Erich Mendelsohn, Kenzo Tange.
Unit 4	Post Modern	Robert Venturi
Unit 5	Deconstruction	Philip Johnson
Unit 6	Regionalism	Kenneth Frampton and Christopher Alexander
Unit 7	Contemporary architecture	Ideas of Hassan Fathy and Laurie Baker
		Charles Correa, Yatin Pandya

Submission/Assignment:

- Topic wise Assignments
- Submission format:
- Notes, assignments and midterm tests.

Reference Books:

1. Broadband, Geoffrey. Design in Architecture- Architecture and the Human Sciences, John Wiley & Sons Ltd, 1977
2. Chakrabarti Vibhuti. Indian Architectural Theory and Practise: Contemporary Uses of Vastu Vidya, Routledge
3. Palladio, Andrea. The Four Books of Architecture
4. Frampton, Kenneth. Towards a Critical Regionalism, Essay 1983
5. Ruskin, John. The Seven Lamps of Architecture
6. Alexander, Christopher. A Pattern Language
7. Rapoport, Amos. House Form and culture, Prentice- Hall, 1969
8. Correa, Charles. A place in the Shade, Hatje Cantz Verlag, 2012
9. Pandya, Yatin. Concepts of Space in Traditional Architecture, Vastu- Shilpa Foundation,2014
10. Jain, Kulbhushan. Thematic Space in Indian Architecture, Indian Research Press. 2002
11. "A moment in Architecture" and Other Books by Gautam Bhatia

21 AR4 – 06: COMPUTER TECHNOLOGY IN ARCHITECTURE -II

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	01	01	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	03	03	ISE	ESE	ICA	ESE	
Total	04	04	--	--	50	50	100

Course Objective:

- To acquaint students computer application particularly in architecture to explore, develop, evaluate and present architectural ideas.
- To equip the student with a range of digital tools and techniques in 2D drafting, 3D modelling, and vector graphics, their optimum application and use in the profession.

Course Outcome:

At the end of semester students should be able to:

To use Computer operations principles and image editing through a graphical composition, computer aided 2D drafting and 3D modeling through simple exercises; rendering of a building to create a photo realistic image

Course Curriculum:

Unit 1	Revision of introduction to 2D drafting software:	Using latest version of relevant CAD software:
Unit 2	Introduction and application of layers	Understanding layers, paper space Vs model space, line weights, print set up and Modelling of Walls, Doors, Windows, Stairs etc.
Unit 3	2D drafting	Presentation of time problem; plan, sections, elevations of a floor of a single storied building of II / III semester architectural design studio project.
Unit 4	Layout and Scale	Layout and layout scales, layout, printing and plotting, page set up manager
		Attributes
Unit 5	3-D modelling	Concept of 3D work applications in sketch-up with 3D commands
Unit 6	Photoshop	Introduction to Photoshop, introduction to shading and rendering

Submission /Assignment:

3D-presentation drawings with the use of above software's shall be done as a sessional work.

Reference books:

AutoCAD 2012 –in simple steps-Kogent learning solutions

21 AR4 – 07: BUILDING SERVICES -II

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	02	02	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	01	01	ISE	ESE	ICA	ESE	
Total	03	03	30	70	--	--	100

Course Objective:
To make students understand the importance and scope of Artificial Lighting, Electrification, Mechanical Ventilation, Air Conditioning and Lift and Escalator and their applicability in building design.

Course Outcome:
By the end of term, the student should be equipped to design Electrical layout with Lumen calculations and make necessary arrangements in plans while designing for Air conditioning.

Course Curriculum:

Unit 1	**Artificial Lighting**		
	Artificial lighting terminologies	a. Light, b. Light output (Luminous Flux)	c. Light Level (Illuminance) , d. Brightness (Luminance) , e. Glare
	Systems of Lighting	a. Direct, Indirect and Diffuse light, b. Characteristics of good illumination	c. Luminaire (Light Fixtures) and its components d. Market survey on types of luminaires and lamps.
	Sources of light(lamps) and their characteristics	Incandescent, Halogen, Fluorescent, Sodium discharge, CFL, Metal halide, Neon (cold cathode) and LED	
	Interior Lighting	Interior lighting required for different spaces of a residential bungalow with different possible arrangements for Ambient and Decorative lighting.	
	Lumen Calculation for any type of user for a room not less than 12m x 6m.	Plan to the scale of 1:100 showing type and number of fixtures calculated and arranged for Longitudinal and Transverse spacing considering space- height ratio as per required lux.	
Unit-2:	**Electricity**		
	Electricity	a. Generation, Transmission and Distribution of AC (Alternate Current) power supply system, b. Single phase AC supply	c. Three phase AC supply d. Earthing for safety
	Types of wiring system with advantages and disadvantages	a. Cleat wiring, b. Batten wiring, c. Casing-Capping wiring	d. Conduit wiring system (surface and concealed)
	Electrical safety and Safety devices	a. Points to be remembered for electric safety. b. Safety devices: Switches, Electric fuse, Circuit breaker and Lightning conductor.	
	Renewable sources of energy (Introductory)	a. Wind Turbine energy b. Solar energy	
	Electrical Layout of a small Bungalow.	Plan to the scale of 1:100 Electrical layout design with legends.	
Unit- 3	**Mechanical Ventilation**		
	Mechanical Ventilation	a. Benefits of Mechanical Ventilation, b. Components of Mechanical ventilation system: Fans, Louvers, Dampers, Dehumidifiers, Silencers, Air filters and Dust collectors.	

	Systems of Mechanical Ventilation	a. Supply Ventilation (Hot or Mixed climates) , b. Exhaust Ventilation (Cold climates) , c. Balanced Ventilation (For all climates)
Unit-4	**Air Conditioning**	
	Introduction to Air Conditioning	a. Functions of AC, b. Principles of AC, c. Principles of Comfort AC, d. Components of AC Indoor components: Evaporator or cooling coil, Expansion valve, Cooling fan or blower, Air filter, Drain pipe, Louvers or fins. Outdoor components: Compressor, Condenser, Condenser cooling fan Refrigerant pipes, e. Working of AC (Refrigerant cycle) showing by schematic sketch.
	Types of Air conditioners	a. Window AC, b. Split AC c. Packaged AC
	Central Air conditioning plant (chilled water only) for Summer AC only.	Explanation on working through Section taken from a room with AHU room of G+2 building with Central AC plant showing all its components.
Unit-5:	Lifts and Escalators (Introductory only)	Types of lifts, Different arrangements of Escalators

Submission /Assignments:

1.Report of Site visits and Market Survey.
2.Handwritten notes with sketches file submission.
3.Lumen Calculation (Plan 1:100) for any type of user for a room not less than 12m x 6m.
4.Electrical Layout (Plan 1:100) of a small Bungalow with legends.

Reference Books:

1.National Building Code of India 2016-Volume -2, Bureau of Indian Standards
2. Building Services and Equipment by Ashok L. Chhatre
3. Building Services, By Mrs. Shubhangi Bhide
4. Basics Lighting Design Ed. by Bielefeld, Bert
5.Lighting in Architectural Design -Derek Philip
6. Air Conditioning Principles and Systems – Edward G Pita
7. Environmental Science - B J Smith, G M Phillips, M Sweeney
8. Building Service Handbook – Fred Hall and Roger Greeno

21 AR4 – 08: CLIMATOLOGY & ENVIRONMENT-II

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	02	02	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	--	--	ISE	ESE	ICA	ESE	
Total	02	02	30	70	--	--	100

Course Objective:

- To introduce students study of the relation between built form & elements of climate
- To study behavior of built form in different climatic conditions & design responding to climate.
- Thermal control -Passive Design Strategies
- Day lighting - Lighting principle/ factors, Day lighting Designing in buildings

Course Outcome:

Students should be able to:

- Study of design-built form in different climatic conditions & Design responding to climate.
- Exhibit understanding of Thermal Control -Passive Design Strategies.
- Apply the concept of Day lighting - Lighting principle/ factors, Day lighting Designing in buildings.

Course Curriculum:

Unit 1	**Thermal Design Strategies**	a. Building groups scale
		b. Building scale
		c. Building part scale
		d. Design technique and sizing of bioclimatic strategies.
Unit 2	**Natural Light and Lighting**	a. Light: The nature of light, Transmission, Reflection, Coloured light, Munsell system.
		b. Daylighting- Sources of light, Climate and light, Day light factor, Design variable, Day light in tropics

Submission / Assignments:

File along with sketches, 10 min PPT presentation on any climate responsive building (case study) Book /Live OR Any Climatic strategy OR any topic from the syllabus

Reference Books:

1. Climate Responsive Architecture – Arvind Krishna
2. Hand book: Solar Passive Architecture – M Emanuel levy
3. Manual of Tropical Housing and Building – O H Koenigsberger.
4. Sun Wind and Light – MARK DeKAY and G Z Brown

21 AR4-09: ELECTIVE -IV

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture/ week - L	02	02	Theory Exam		Practical oral exam		Total
Practical/Studio -P/S	--	--	ISE	ESE	ICA	ESE	
Total	02	02	--	--	50	--	50

The student will opt for any one of the following courses

A. Photography
B. Bamboo Architecture.
C. Foreign language.

The detail syllabus for the above subjects is given hereby-

A. PHOTOGRAPHY

Course Objective:
To impart the skills of taking aesthetically appealing and creative architectural photographs through the use of appropriate cameras/ lenses and lighting conditions.

Course Outcome:
- The ability to work in experimental and manipulative techniques, candid and contrived imagery, documentary photography, archival processing, and interpretive studies.
- A familiarity with and command of materials, equipment, and library resources related to the study of photography.
- The ability to work and study independently.
-

Course Curriculum:

Unit 1	Introduction to architectural photography.	Various types of compositions framing, silhouette photography.
Unit 2	Use of various cameras, lenses and accessories, handling of equipment	SLR, DSLR cameras, lenses for different focal lengths for various contexts
		Use of wide angle, normal, tele, zoom, macro, close up lenses.
		Filters- UV, Skylight, colour filters, special effect filter.
Unit 3	Controls in photography Study of contemporary vernacular practices	Shutter speeds-slow, normal and high and their various applications.
		Apertures- use of various apertures to suit different lighting conditions and to enhance depth of fields.
		Selection of ISO rating to match various lighting conditions.
		Optimizing selection of shutter speed, aperture and ISO.
		Twilight and night photography.
Unit 4	Various uses of photography	Documentation, presentations, competitions, lectures, etc.
Unit 5	Creative uses	Creative photography/ photo renderings, for special effects using software.
		Play of light and shadows to achieve dramatic pictures.
		Effects of seasons, inclusion of greenery, foliage, clouds, human scale etc.
Unit 6	Professional Photography	Architectural photography as a profession, laws on photography.

Submission/Assignments:
Portfolio

Reference Books:

1. Schluz, Adrian. Architectural Photography: Composition, Capture and Digital Image Processing. 2012. Rocky Nook
2. Mc. Garth, Norman. Photographing Buildings Inside and Out. 1993. Watson- Guptill Publications.

B. BAMBOO ARCHITECTURE

Course Objective:
As a substitute building material, which is renewable, environment friendly and widely available due to its rapid growth, its adaptability to most climatic conditions and due to its properties.
Main properties of bamboo, construction details and limitations of use of bamboo.

Course Outcome:

- The student should be able to identify the different types of bamboo along with their application in different forms.
- The student would be capable to work out bamboo connections using various tools and techniques and develop scientific temperament and research attitude.

Course Curriculum:

Unit 1	Introduction	Bamboo as a building material
		Bamboo selection, treatment, storing
		Main properties of bamboo, size, characteristics.
		Joints and tools used in bamboo construction
Unit 2	Construction details in bamboo	Construction of walls, wall panels, roof, furniture, doors, windows
Unit 3	Scope and limitation of bamboo as a material	Advantages & disadvantages of bamboo.

Submission /Assignments:
Journals with sketches,
A3 size sheets with drawings of details
Models of examples studied – preferably in groups

Reference Books:

1. Marcus D. Design with nature
2. Rebecca Reubens. Bamboo from Green design to Sustainable Design
3. Bamboo design guide and 59 case studies.

C. FOREIGN LANGUAGE

Language- Chinese, French, German or Any Other

Course Objective:

To inculcate in students the ability to speak, read and write the language while each language offers a wide array of opportunities.

Course outcome:

To have a working knowledge of the language
To be able to appreciate to a greater extent the nuances of communication in the language

Course Curriculum:

Unit 1	Introduction to the language	An awareness of some aspects of the culture of the target language countries/communities
Unit 2	Basic language skills	Basic knowledge of pronunciation, intonation and spelling rules
		Knowledge of basic vocabulary and expressions
		Knowledge of basic morphology and basic grammatical structures
		Knowledge of how to use dictionaries and other resources, including digital ones
Unit 3	Communication skills	Formative assessment in the classroom
		Class-based tests in listening, reading, spoken interaction, spoken production and writing.

Submission/Assignment:

Journals with exercises

Reference Books:

Learner's' Language books as per choice of language