

Punyashlok Ahilyadevi Holkar Solapur University, Solapur



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

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM NEW

Syllabus: Bachelor of Architecture

Name of the Course: B.Arch. Part II - Sem. – III & IV

(Syllabus to be implemented from JUNE 2022)

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 based on National Education Policy (NEP)

B.Arch. Second year - Semester III

Subject Code	subject category	Subject Title	Teaching scheme in periods						Examination Scheme						Credits				
			60 minutes/ lecture		Total periods /week	paper duration in hours	Theory		Practical/Viva-voce		Total	Credits							
			lectures per week	practical/ studio per week			ISE	ESE	ICA	ESE									
			L	P/S	Max.	Min.	Max.	Min.	Max.	Min.									
21 AR3-01	PC	Architectural Design- III	1	6	7														
21 AR3-02	BS & AE	Building Construction and Material- III	1	4	5														
21 AR3-03	BS & AE	Theory of Structure - III	2		2														
21 AR3-04	PC	History of Architecture- II	2		2														
21 AR3-05	PC	Architectural Graphics and Drawing- III	1	3	4														
21 AR3-06	EC/PAEC	Computer Technology in Architecture-I	1	2	3														
21 AR3-07	BS & AE	Building Services -I	2	1	3														
21 AR3-08	BS & AE	Climatology And Environment - I	2		2														
21 AR3-09	EC/PAEC	Elective III :A. Art Appreciation B.Vernacular Architecture C.Basic Accounting	2		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- Arofessional Ability Enhancement Courses , Number of subjects / Head - 09
Number of Theory Examination - 06
Number of Oral Examination - 03

EACH LECTURE / PRACTICAL /STUDIOS ARE OF 60 MINUTES DURATION .

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. Oral exam - Prograsive marks (ICA) to be awarded by the subject teacher . Oral/ viva - voce examination (ESE - Oral) shall be conducted by one internal and two external examiner appointed by the university

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

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

$$SGPA = \frac{\sum \text{Course Credits} \times \text{Grade Points for all the Courses in that Semester}}{\sum \text{Course Credits for all the Courses in that Semester}}$$

$$CGPA = \frac{\sum \text{Course Credits} \times \text{Grade Points for all Courses excluding those with F grades until that Semester}}{\sum \text{Course Credits for all Courses excluding those with F grades until that semester}}$$

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)	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)	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.

$$CGPA = 132 + 139 (\text{TOTAL SGPA SEM.I} + \text{SEM.II}) / 22+22 (\text{EARNED CREDITS}) = 6.15$$

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)	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)	7
SEM.II	21 AR2-01	8	55	7	B+	8X7 =56	SGPA = 139+56/30 = 6.50
		30				139	Sgpa = 6.50

$$CGPA = 180 + 195 (\text{TOTAL SGPA SEM.I} + \text{SEM.II}) / 30+30(\text{EARNED CREDITS}) = 6.25$$

CGPA = 6.25

B) (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

21AR3 – 01: ARCHITECTURAL DESIGN - III

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture (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

Objective:

To explore community spaces, their importance for livability of a city, how the spaces can be democratic, safe and enabling for the community. Introduction to design process through documenting an identified community, understanding through questionnaire the aspirations of the residents, understanding of the vehicular and pedestrian movements in the area, activities through the day and generating a design brief to provide for the community.

The objective is to encourage students to explore built and unbuilt spaces, their role in community building.

End semester outcome:

1. At the end of the semester students must be able to formulate a response to requirement of a community.
2. Students will be able to generate a program upon the needs of an identified community, articulate their response to definite situations and conditions through study models, 2D drawings and models

Course Outline:

1. Introduction to architecture as a tool to redefine community spaces
2. Introduction to space making, community spaces, minimum and optimum area requirements with respect to community activities; pedestrian and vehicular movements and circulation spaces, safe community spaces.
3. Concepts of volume and scale, proportion; application of principles of composition.
4. Introduction to understanding and analyzing requirements of a program through study models, questionnaires, drawing conclusions, inter- relation between various activities and spaces, design process; relationship between idea, concept, space- form and structure and functional requirements; various methods of idea generation with use of form, axes, multiple use of spaces, safe community spaces for people of all generations, differential abilities and genders.
5. Understand space planning based on activity, which will involve human and vehicular activity and movement.
6. Application of the above processes to designing spaces for particular requirements of a community.

Design assignment:

1. Study of community spaces through historical references, exploration of space making at a small scale, drawing architectural intervention required at a local community, identifying needs of the community through questionnaires, discussions and drawing conclusions, formation of a design program through consensus.
2. Study models, parallel studies, generation of design through ideation and space making.
3. Major Design Assignment: Design of community spaces like vegetable market, primary health center, co-operative bank, post office, community library, community hall etc.
4. Suggested project scale of area :300 -500sqm

Time bound design assignment:

1. Design - 8 hours and one day assignment of built up area of 150-200 sqmt
2. Example: local convenience store, play group and nursery, coffee shop with added activities etc.

Submission format:

1. Study documentation, reports and data collection in file form/drawing form.
2. Design portfolio.
3. Design Models, study models.

Reference Books:

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

21AR3 – 02: BUILDING CONSTRUCTION AND MATERIAL -III

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture (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

Objective:

To understand roofing systems using timber and to acquaint the students with construction practices pertaining to staircase, flooring and its alternatives and to know the impact of water leakage or seepage through the building and solutions

End semester outcome:

At the end of the course, the students would be able to appreciate the procedure involved and various materials that can be used in construction of roofs, flooring and staircases with greater understanding of details involved in joinery.

Course Outline:

Building Construction

1. Roof – Detailed Study of Timber Roofs and Coverings – Lean to Roof, Couple Roof, Closed Couple Roof & Collar Roof, King Post, Queen Post with different Covering Materials- Thatch, Tiles, G.I Sheets Etc.

2. Alternative roofing – Jack Arch, Madras Terrace, Stone Slab.

3. Flooring finishes including Toilet flooring - Method of construction and laying of flooring, Skirting, Dadoing, with various materials like Mud, Murrum, Stone, (Marble, Granite, Tandur, Kota,) other flooring like – Mosaic, Terrazo, Ceramic Tiles, Wooden Flooring, Polished Concrete, laying of paving –cast in situ, concrete tiles, interlocking blocks, clay tiles, brick and stone.

4. Waterproof treatment - Construction methods for water-proofing and damp proofing for walls, roofs, retaining walls, Toilet bocks, Balconies and Terraces.

5.Staircases- Types of staircase based on shape, materials used, method of construction Timber stairs– single and double stringer ,RCC stairs- waist slab, folded plate , stringer beam stairs, precast stairs, steel stairs- stringer stairs, folded type, spiral stairs, Fire escape stairs, Composite stairs – brick/stone, steel/timber, concrete/wood, steel/glass

6. Framed structure -Introduction to framed structure-terminology, framing and erection using RCC, Timber, steel and composite.

BUILDING MATERIAL:

- 1. Mortar** – Properties, Preparation, Mixing and Application of mortar and its types- cement, mud, surkhi
- 2. Flooring and Paving** –Types Properties, uses and market survey of Flooring materials and Paver blocks –Tiles, Timber, PVC, Stones, (Natural & Artificial), Asphalt
- 3. Water Proof Components** - Water Proofing elements, construction chemicals and additives, adhesives, plaster of Paris, gypsum, Polystyrenes, sealants.
- 4.Ferrous Metal-** Iron ore: types- pig iron, wrought iron and cast iron their properties and uses. Steel - properties, casting, heat treatment, mechanical treatment process of steel, market forms of steel, fire protection of structural steel . Steel alloys- properties and uses. Corrosion of ferrous metals (Causes, factors of corrosion and prevention).

Assignments:

1. Building Construction: Student will be given drawing work to represent detailing, specification, technology aspect of the topic they are studying.
2. Building Material: Student will study and will be taught different materials their properties, market forms, uses, way to use them, manufacturing process etc.

Submission format:

1. Journal with sketches to cover the course outline, Building Material and midterm tests
2. Study documentation, reports and data collection in file form/drawing form.
3. Students are expected to draft sketches, detailing and specifications in drawing format
4. Construction portfolio of above-mentioned point 3.

Reference Books:

1. Dr. B.C Punmia (2012) Building Construction (10th edition) Laxmi Publications.
2. W.B. McKay (2015) Building construction Vol. 1 (5th edition), Vol. 2 (4th edition) and Vol. 3 (5th edition).
3. Roy Chudley, Roger Greeno (2016), Construction Technology, 11th Edition Routledge
4. R. Barry, “Construction of Buildings” Vol 1. 1999 by Wiley-Blackwell
5. Francis K Ching ‘Building construction’, Wiley; 5th edition (February 17, 2014)

21AR3 – 03: THEORY OF STRUCTURE-III

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

Objective:

Students completing the course will have:

Ability to employ the knowledge of mechanics to understand the behavior of structure.

Ability to identify principal planes and find principal stresses.

End semester outcome:

Student will be able to conceptualize and understand various forces, Stresses acting on building

Course Outline:

1. Simple Bending

Moment of inertia and section modulus for various structural shapes. Theory of simple bending: $M/I=f/y= E/R$ application of flexural formula

2. Principal stresses and principal strains

Normal and shear stresses on any oblique plane; Concept of principal planes and principal stresses; Derivation of principal stresses, maximum shear stresses

3. Shear stresses

Shearing stresses in beams – distribution of shear stress over different sections (rectangular, circular I and T)

4. Soil

Concept of soil mechanics and its importance, different types of soils and their properties. Concept of consolidation and compaction Earth Pressure- Concept, Area of application, earth pressure at rest, active and passive condition.

5. Fixed and continuous beam

Concept of fixed and continuous beam. SFD and BMD of simple fixed and continuous beam.

Assignments:

Topic- wise Assignments, Topic- wise Presentations

Submission format:

Notes, assignments and midterm tests.

Study documentation, reports write up in file form.

Reference books:

1. Strength of Materials – Khurmi
2. Strength of Materials – A. P. Dongre
3. Strength of Materials – Ramamrutam and S Narayan.

21AR3 – 04: HISTORY OF ARCHITECTURE-II

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

Objective: To study the evolution of Hindu temple architecture, to study the evolution of Greek, Roman, Byzantine architecture through critical analysis of appropriate examples.

End semester outcome:

At the end of the course the students will be able to appreciate geographical, geological, social, cultural and political factors that influenced the architecture of respective eras. They will also understand the use of materials and structural/construction systems explored during the era.

Course Outline:

Indian architecture – Hindu temple architecture in India - Indo Aryan , Vesara And Dravidian Temple . Structural and Rock-Cut Temple

1. Gupta period -

Evolution of Hindu temple, e.g. early shrines at Udaigiri , Tigwa , Sanchi –Deogarh

2. Early Chalukyan Phase –

Ladkhan Temple and Durga Temple At Aihole, Papanath Temple and Virupaksha Temple At Pattadkal

3. Central Hindu Temple –

Rashtrakuta dynasty – Kailashanath Temple at Ellora, Hoysala Dynasty –Hoyasaleshwar Temple at Halebidu , Chennakeshwar Temple at Belur.

4. South Hindu Temples –

Chola Dynasty- Brihadeshwara Temple at Tanjore

Pallava Dynasty - Rathas and Mandapas , Shore temple at Mahabalipuram , Kailasanath temple and Vaikuntha Perumal Temple At Kanchipuram

Vijayanagar –Vitthal Temple, Hazara Rama Temple At Hampi

Pandya Dynasty- Aiyraatesvara Temple At Dharasuram, Tanjore

Nayakas - Minakshi Sundaram Temple at Madhurai.

5. Northern Hindu temples -

Orissan group –Lingraj Temple at Bhuvaneshwar, Sun Temple at Konark

Khajuraho group –Khanderiya Mahadeva temple at Khajuraho

Rajputana style – The temple surya, at Osia Marwar

Gujrat - Sun temple – Modhera

Jain Architecture – Choumuk Temple of Adinath at Ranakpur,

Deccan – Mankeshwar temple at Jhoga, Nashik

Western Architecture -

6. Greek -

Pre Greek (1600- 1050 BC) - Minoan & Mycenaean Architecture – e.g. Palace of King Minos in Knossos, palace of Tiryns
Classical Greece – e.g. Parthenon at Athens, Theatre Epidaurus, Agora at Athens.

7.Rome - Pre Roman (750- 100 BC) – Etruscan Architecture – e.g., Temple of Juno Sospita.
Classical Rome - e.g. Pantheon Rome, Basilica of Trajan Rome, Tharmae at Caracalla, Colosseum Rome.

8. Early Christian – e.g. Basilica of St. peter Rome

9. Byzantine Arch. – e.g. Hagia Sophia, St. Mark’s Venice

Reference Books:

1. History of Arch. In India – by Tadgell Christopher
2. Indian Arch. – Buddhist & Hindu Period – Percy Brown
3. Architecture of India – Buddhist & Hindu – Satish Grover,
4. History of Arch. – Bannister fletcher.
5. History of world civilization – J.E. swain,
6. World Architecture – G.K. Hiraskar,
7. History of fine Arts in India & west – Tomory Edith.

21AR3 – 05: ARCHITECTURAL GRAPHICS AND DRAWING -III

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture (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

Objectives:

To introduce the students to the fundamental techniques of Architectural drawings & to enhance their visualization skills and understand the principles of shades and shadows.

End Semester Outcome:

At the end of the semester, the students will be equipped with graphical skills which shall be useful in translating the graphical ideas into technically appropriate drawing presentations with sciography in perspective.

Course Outline:

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

Assignment and Submission:

The Classwork 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

21AR3 – 06: COMPUTER TECHNOLOGY IN ARCHITECTURE - I

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture (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

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.

End semester outcome:

Students will be accustomed to use computer as a drafting and presentation tool.

Course outline:

1. Introduction to Auto cad as a drafting, sketching and designing tool.
2. Introduction to basic commands -2D commands, viewports, dimensions, annotations.
3. Template set up , unit set up
4. Dimension style manager (annotative and standard)
5. Application of blocks
6. Drawing at different scale

Submission:

1. Time problem introduction; Classroom exercises such as measured drawing of studio (windows, doors and staircases included), architecture college/ campus (windows, doors and staircases included) etc.
2. Computer aided drawings of the 2D architectural projects/ assignments and presentation (SEM-I & SEM II)
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

21AR3 – 07: BUILDING SERVICES -I

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture (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

Objective:

To make students understand the scope of Plumbing. To introduce students to following Plumbing Services in low, mid rise buildings. Introduction to building water supply its importance and basic approach. Factors to be considered for water supply at the planning stage.

End semester outcome:

Students will gain knowledge of Systems for hot and cold water supply in the building . Sewage, Sullage & Storm water disposal within or from building premises.

Course Outline:

1. Water supply -

- 1. Principles and techniques of supplying water** - Importance and Necessity of water supply , Quality and Quantity of water , Sources of Water
- 2. Treatment of water (Introductory)**
 - 3.Conveyance of Water** -Concept of Pressure head , Flow through pipes , Tapping of water mains on street by means of Ferrule , Static water storage requirements (Fire Tank)
- 4.Collection and Storage systems** - Requirement, Storage of water in building premises , Sizing of Water tanks , Pumps and its applications
- 5.Distribution in buildings** - Pipes and piping network , Materials of Pipes , Joinery , Installation techniques , Various control valves and their applications
- 6. Pipe appurtenances** - Types of Taps, Faucets,water meter , fittings and advanced proprietary systems used in baths, kitchen and WC units , its Provisions, Installations and applications

7.Hot Water Supply- Systems of hot water supply using conventional and non-conventional energy sources, Solar thermal energy etc.

- Instantaneous and Centralized
- Direct system and In-Direct system
- Components and Equipment used for the same.

Information on other Circulation systems i.e. Ring system, up-feed/ down-feed systems, etc. and its application.

2. Sanitation -

1. Drainage-I (Vertical Drainage Systems)

1. Introduction to various sanitary fittings with necessary knowledge of provisions to be made and their Installations.
2. Sanitary fittings- abulation and soil fixtures like Wash basins, Sinks, Bathing units, Water Closets (Indian and European), Urinals
3. Selection criteria and variations in Installing and provisions to be made for same Assembling, combining and coordinating them in washing, bathing and WC units
4. Study of various Traps, with their working and applications and their installation.
5. Pipes and piping network.
 - a. Techniques of Vertical drainage system in shafts, ducts
 - b. Study of service Shafts, Ducts, Floors
 - c. Single and double stack systems with part and full ventilation.
 - d. Pipe materials, their classification and methods of Installation
 - e. Special fittings used for - Jointing and installations.
 - f. Anti-Syphonic system of ventilation in drainage system

2. Drainage-II (Horizontal Drainage System)

1. Techniques of underground drainage systems for waste water, effluents and sewage. Principle and concept of self-cleansing velocity in flow through pipes. Techniques in laying, leveling, planning, aligning, testing, inspection and maintenance
 - a. Invert levels, Gradients, Access point planning
 - b. Sewer Appurtances -Types of Chambers, manhole, Sumps, Channels, Shafts, service corridors, catch basins
 - c. Ventilation of drainage system.
 - d. Connection to Main Sewer Drain on Road side
2. Rainwater drainage system and surface runoff methods
 - a. Storm water drainage systems.
 - b. Invert levels, Gradients
 - c. Sedimentation tanks and catch basins
 - d. Rainwater harvesting methods

Assignment / submission :

1. Illustrative Sketches of Installations of Bathroom accessories and Sanitary ware showing
- water inlet connection and Drain provisions
- Preparing internal Water supply and Drainage layouts for Residential toilets, Kitchen and Public Toilets
- Preparing external water supply and drainage layouts for individual Bungalow with septic tank
3. Preparing external water supply and drainage of a building site having more than one building on the site and connectivity to City Municipal Supply and Drain
4. Visits to construction sites and preparing site visit reports, market survey and finding out latest trends and new materials

Referances :

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
7. Environment and Services - Peter Burberry

21AR3 – 08: CLIMATOLOGY & ENVIRONMENT-I

Teaching Scheme Per week		Credit	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

Objective:

To study and understand climate , terminology , elements of Climate , Climate parameters
Study of different Tropical climate .

End Semester Outcome-

Students will be able to understand terminology, elements , principles , types of climate and human needs of comfort.

Course Outline:

1. Climate-

1. Introduction to climate & Global climate factors.
2. Elements of Climate
3. Classification of Tropical climates
4. Site Climate - Micro climate & Macro climate

2. Comfort-

1. Thermal Comfort Factors
2. Thermal Comfort Indices
3. Effective Temperature-its use

3. Principles of Thermal Design-

1. Thermal quantities.
2. Heat exchange of buildings.
3. Periodic heat flow

Assignments/ Submission

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. Climatology & Environment - Manual (IIT)
5. IMD Data

21AR3 – 09: ELECTIVE – III

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

- A. Art appreciation
- B. Vernacular architecture
- C. Basic accounting

NOTE: Students are asked to select or choose any one of the above

The detail syllabus for the above subjects are given hereby

21AR3 – 09: A . Art Appreciation

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 Outline:

1. Intellectual - theoretic, discursive, analytic, critical aesthetics.
2. Visual - two and three dimensional, black and white & colour, DVDs and CDs on art films, films on artists, even feature films known for excellence in the visual.
3. Skills - techniques, technology, skills of doing things by hand, traditional crafts etc.
4. Visits to museums and art galleries, exhibitions.
5. Create awareness of various types of arts, appreciation and understanding of their relationship with Architecture.
6. Relationship between Visual Arts and Performing Arts.

Assignment/ submission-

- 1.The sessional works shall consist of study of models, photographs
- 2.Documentation of exercises to be done in A3 size portfolio.

Referances :

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

21AR3 – 09: B Vernacular Architecture

Objective:

Orientation of Study is diverted towards local Architecture of specific geographical region i.e. tropics (Hot and Humid) Architecture of the hot and dry arid hot & dry regions etc.

Emphasis shall be given for measure drawings of old structure (minimum 50 years old) or settlement within the region.

Course outline:

1.Introduction to the approaches and concepts to the study of vernacular architecture, history and organisation of vernacular buildings of different regions in the Indian context; with an understanding 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.

2.Methods of observation, recording, documenting and representing vernacular architecture with examples.

3.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 are part of this module.

4.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.

Assignment / submission : Notes and ppt

Reference Books:

1.Carter, T., & Cromley, E. C. Invitation to Vernacular Architecture: A Guide to the Study of Ordinary Buildings and Landscapes. Knoxville: The University of Tennessee Press. 2005

2.Cooper, I. Traditional buildings of India. Thames and Hudson Ltd, London, 1998

3.Oliver, P. Encyclopaedia of Vernacular Architecture of the World, Cambridge University Press, 1997

21AR3 – 09: C - Basic Accounting

Objective: This course provides an orientation in the field of accounting and basic accounting fundamentals.

Course Outline:

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.

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.

3. Final Accounts: Final Accounts without adjustments. Bank Reconciliation Statement: Bank transactions, Preparation of simple bank reconciliation statement.

4. Sources of raising of capital in corporate undertaking: working Capital and Long term Capital. Application of computers in accounting.

Assignment / submission: notes and ppt

Reference Books:

1. Managerial Accounting, Jawahar Lal, First Edition
2. Financial Accounting, Dr. R.K. Mittal & M.R. Bansal
3. Basic Accounting, Rajni Sofat & Preeti Hiro, Second Edition
4. Accounting for management, Bhattacharya & Deaden, Paperback Edition, Vikas 1986
5. Financial Accounting (Part I and Part II), R.L Gupta & V.K Gupta
6. Fundamental Accountancy, S.N. Maheshwari

21AR4 – 01: ARCHITECTURAL DESIGN - IV

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture (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 climate responsive design with Bio Climatic Responce. The objective is to encourage students to explore climate, human response to climate through day to day living and built form and envelope.

End semester outcome:

At the end of the semester students must be able to formulate a response to climate of a particular given site. Students will be able to generate a response to climate conditions of a given place across different climate zones through study of climate data, vernacular responses, contemporary responses, study models, 2D drawings and models.

Course Outline:

Introduction to Bio Climatic Design strategies as a tool to architectural design.

Design assignment:

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:

1. 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
2. Along with above focus ;architectural response, building services, material and architectural space making need to be consider
3. Study models, parallel studies, generation of design through ideation and space making
4. Introduction to multiple unit site planning aspect and designing spaces like schools resorts polyclinics, hostels, art gallery, city museum, motels, science center etc.
5. Suggested project scale of area :750 -1000sqm

Time bound design assignment:

Design - 12 hours and two day assignment of built up area of 300sqm

Example: Exhibition space, Primary school, Super market etc

Submission format:

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

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

21AR4 – 02: BUILDING CONSTRUCTION AND MATERIAL –IV

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture (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

Objective:

To acquaint the students with construction practices pertaining to RCC framing systems, and other building elements such as metal doors and windows (In Steel and Aluminum)

End semester outcome:

At the end of the course, the students would be able to appreciate the procedure involved and various materials that can be used in construction of RCC roofs, metal doors and windows with greater understanding of details involved in joinery.

Course Outline:

Building Construction

1.Framed structure –

1. Principles and methods of construction of RCC foundation – Shallow- Isolated, Combined, Raft.
2. Principles and methods of construction of RCC columns – Square, Round, Polygon and combined.
3. Principles and methods of construction of RCC beams –simple, cantilever, inverted etc.
- 4.Principles and methods of construction of RCC slab—one way, two way, cantilever, sloping, filler slab using filler materials (Mangalore tiles, burnt clay blocks, hollow concrete blocks , stabilized earth block , hollow mud blocks ,clay pots, coconut shells), waffle slabs, flat plate and slab, vaults and domes.
5. Formwork and reinforcement details.

2.Doors and windows –

1. Simple Mild Steel doors and windows, Steel doors for garages, and workshops, Collapsible gates and Rolling shutters.

Building Material-

1. **Cement** – Properties, Uses Types, Field Tests, Initial and Final Setting Time.
2. **Concrete** – Ingredients, Grades, Admixtures, Properties, Preparation, Mixing, Proportion and Application
3. **Reinforced Cement Concrete:** Form work, placing, and compaction, curing of concrete, sampling and testing of concrete. Construction joints, expansion joints, finish in concrete, chemical admixtures.
4. **Plastering-** Smooth, Rough, Textured, Grit Plaster Etc. Use Of Various Finishes like Lime, Cement, Plaster Of Paris, Buffing etc.

Assignments:

1. Building Construction: Student will be given drawing work to represent detailing, specification, technology aspect of the topic they are studying.
2. Building Material: Student will study and will be taught different materials their properties, market forms, uses, way to use them, manufacturing process etc.

Submission format:

1. Journal with sketches to cover the course outline, Building Material and midterm tests
2. Study documentation, reports and data collection in file form/drawing form.
3. Students are expected to draft sketches, detailing and specifications in drawing format
4. Construction portfolio of above-mentioned point 3.

References

1. Dr. B.C Punmia (2012) Building Construction Laxmi Publications.
2. W.B. McKay (2015) Building construction
3. Roy Chudley, Roger Greeno (2016), Construction Technology
4. S.C.Rangwala (2013) engineering materials ,Charotar Publishing pvt.ltd.
5. R. Barry, "Construction of Buildings" Vol 1., 1999 by Wiley-Blackwell
6. Francis K Ching 'Building construction', Wiley

21AR4 – 03: THEORY OF STRUCTURE-IV

Teaching Scheme Per week		Credit	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

Objective:

Students completing the course will have:

Ability to employ the knowledge of mechanics to understand the behavior of structure.

Ability to identify principal planes and find principal stresses.

End semester outcome:

Student will be able to conceptualize and understand various forces, Stresses acting on building

Course Outline:

1. **Arches and domes:** Concept of arches, three hinged arches and chimneys & domes.
2. **Axially loaded Columns and struts** Columns and struts, failure of column, types of end conditions, equivalent length of a column, Euler's Column Theory, Rankine's formula and IS code formula, calculations of critical load.
3. **Direct and Bending Stresses:** Direct and bending stresses, eccentric loading, columns with eccentric loading, Resultant Stress diagrams due to axial loads, uni axial, and biaxial bending; Concept of core of section for standard symmetrical sections. No tension condition
4. **Retaining walls:** Retaining walls for water and earth pressures with or without surcharge, Rankins formula, conditions of stability, maximum and minimum pressures at base, conditions of no tension, factors of safely against sliding conceptual effect of water logging.
5. **Masonry structures:** Introduction, Structural property and allowable stresses.
6. **Slope and Deflections of the Beam:** Concept and definition: cantilevered and simply supported with different loading, relation between slope, deflection and curvature. Simple problems with double integration method.
7. Introduction to Working and limit state method Concept of Working and limit state method.

Assignment / Submission - Assignments on each topic.

Reference Books:

1. Strength of Materials by R.K.Bansal, Laxmi Publications
2. Strength of Materials by Bhavikatti, Vikas Publications, New Delhi.
3. Strength of Materials by Ramamurtham, Dhanpatrai & Sons, New Delhi
4. Strength of Materials by R.S.Khurmi, S.Chand Publication, New Delhi
5. Mechanics of Structures (Part I) by S.B.Junnarkar, Charotar Book House, Anand.
6. Strength of Materials by R.K.Rajput, S.Chand Publication, New Delhi

21AR4 – 04: HISTORY OF ARCHITECTURE-III

Teaching Scheme Per week		Credit	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

Objective:

To study the evolution of Indian (Hindu) and western architecture. Study of Architectural Characters in general. Space and form structural system, building materials and constructions, solids and voids, color and texture overall architectural composition with reference to selected example in particular

End semester outcome:

Students will be able to read and take references from history and implement those architectural outcome in their design

Course Outline:

Indian Architecture – Rise and fall of Islamic architecture in India

1. Imperial style at Delhi -

Slave dynasty and Khilji Dynasty - Quwt-ul Islam – mosque, complex at Delhi

Tughlaq dynasty - , Tomb of Ghias-Ud Din Tughalaq, Khirki Masjid Delhi

Sayyid Dynasty – Tomb of Mubarak Shah Sayyid

Lodhi dynasty – Bara Gumbad , Shish Gumbad, Moth ki masjid

2. Provincial style – in Deccan region

Jami Masjid at Gulbarga, Ibrahim Rouza and Golgumbaz at Bijapur, Madrassa of Gawan Bidar

3. Mughal style – under various rulers

Humayun Tomb and Arab sarai , Fatehpur sikri , Akabars tomb at Sikandara , Tajmahal at Agra, Mughal Garden- Shalimar Bhagh at shrinagar

4. Colonial architecture under British rule in india -

1. Mumbai - example victoria terminas station at mumbai, Asiatic socity of Mumbai town hall
2. Delhi - layout of new Delhi - Rashtrapati Bhavan - Rajpat , Jan path , India gate new delhi. Parliament house
3. Kolkata – Victoria memorial

Western architecture –

1. Romanasque architecture – Pisa Cathedral, Campnile Pisa, Baptistry

2. Gothic - West minster abbey London. notre dame paris

3. Renaissance architecture - Church Of Saint Peter Rome (New) .Villa Rotunda By Palladio

Baroque Architecture – Saint Peters Piazza By Bernini

4. Modern Architecture - Industrial Revolution and Its Effects , New Building Material and Construction Technology ,New prototypes – Bridges . Factories Railway Stations
Schools of modern architecture – Bauhaus School, Chicago School of Art And Architecture

Submission: Files and sketches.

Reference:

1. History of Arch. In India – Tadgell christopher
2. Indian Architecture – Buddhist & Hindu period – satish grover
3. Architecture of India – Buddhist & Hindu - Percy Brown
4. History of Arch – Bannister fletcher
5. History of world civilization – J.E. swai
6. World Architecture – G.K. Hiraskar
7. A History of fine Arts in India & West – Tomy Edith.

21AR4 – 05: THEORY OF ARCHITECTURE

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

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.

End semester outcome:

At the end of the semester students must be able to theorize on the celebrated works of architecture. Will also help students analyze, understand and critically acclaim architectural works.

Course Outline:

- Introduction to Theory in Antiquity:** Marcus Vitruvius and his multi-volume work entitled De Architectura. Mayamata: Indian Treatise on Housing & Architecture.
- Introduction to Theory in Renaissance:** Leon Alberti, Andrea Palladio – Jacques Francois Blondel and Claude Perrault of French Academic Tradition.
 - 18th Century Theory: Ideas of Laugier, Boullée, Ledoux
 - 19th Century Theory: Concepts of Viollet Le Duc, John Ruskin, Quatremere de Quincy and Gottfried Semper
- Modern Movement Theory:** Ideas of Adolf Loos, Eero Saarinen, Erich Mendelsohn, Richard Neutra, Otto Wagner, Kenzo Tange.
- Post Modern:** Ideas on Post-Modern Classicism by Robert Venturi and Charles Jencks.
Deconstruction: Fundamental beliefs and philosophy and ideas of Peter Eisenman.
 - Ideas of Kenneth Frampton and Christopher Alexander
 - Ideas of Amos Rapoport, Geoffrey Broadbent-his design generation theories.
- Contemporary Significant Theory:** Ideas of Hassan Fathy and Laurie Baker, who pioneered the use of appropriate technology for building in Egypt and India respectively, especially by working to re-establish the use of mud brick (or adobe)/ bricks and tradition as opposed to modern architectural principles and materials Indian contemporary theorists: Charles Correa, Yatin Pandya, Kulbhushan and Meenaxi Jain, Gautam Bhatia.

Assignment/ Submission: Topic wise Assignments, notes.

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.

21AR4 – 06: COMPUTER TECHNOLOGY IN ARCHITECTURE -II

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture (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

Objectives:

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, 3D modelling, and vector graphics.

End semester outcome:

Students will be accustomed to use computer as a drafting, 3 D modelling and presentation tool

Course Outline:

1. Revision of Introduction to 2D drafting software: Using latest version of relevant CAD software:
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.
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.
3. Layout and layout scales, layout, printing and plotting
4. Attributes
5. Concept of 3D work and UCS
6. 3-dimensional drawings – primitives, mesh, surfaces, etc.
7. Introduction to sketch up tools, Introduction to shading and rendering
8. Introduction to Photoshop

Assignment / Submission:

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

21AR4 – 07: BUILDING SERVICES -II

Teaching Scheme Per week		Credit	Examination Scheme				
Lecture (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

Objective:

To introduce students to Building Services in low and midrise buildings and inculcate in them the understanding of integration of services in architectural design. The Building Services will include Lighting –Natural and Artificial , Electrification , Natural ventilation and mechanical ventilation Mechanical transportation systems in buildings

End Semester Outcome –

Application of above services in their design with drawings and detailing

Course Outline:

1. Lighting-Natural And Artificial -

1. Introduction to integrated design approach for day lighting to cover, Passive design strategies of siting, form, fenestration design, Choice of glazing material
2. Methods for predicting daylight i.e. daylight factor.
3. Introduction to different sources of light, their characteristics
4. lighting systems (Direct & Indirect) and their applications in building projects
5. Lumen Method for designing appropriate lighting as per NBC 2016

2. Electrification

1. Electrical installations in a building from the supply company mains to individual outlet
2. Points including meter board, distribution board, layout of points with load calculations.
3. Electrical wiring systems for small and large installations including different materials
4. involved
5. Electrical control and safety devices – switches, fuse, circuit breakers, earthing, Lightning conductors etc.
6. Introduction to alternative sources of energy such as Solar PV, Wind turbines etc. and integration in building design

3.Natural Ventilation And Mechanical Ventilation

1. Conditions of human thermal comfort
2. Factors affecting natural ventilation
3. Strategies to effect natural ventilation
4. Systems of mechanical ventilation
5. Components of mechanical ventilation systems
6. Mechanical ventilation - Schematic design
7. Passive heating and cooling techniques
8. Low energy mechanical cooling techniques

4. Air-Conditioning

1. Principles of air-conditioning systems
2. Components of air-conditioning systems
3. Types of air-conditioning systems

5. Mechanical Transportation Systems In Buildings:

1. Elevators: Types of Elevator systems, design considerations like Peak Handling capacity, Average Waiting Time, Lift speed etc.,
2. Architectural Requirements & Details for Elevator shaft - Elevator pit - Elevator Machine Rooms, Automatic Rescue Device for Elevators, Elevator car interiors, Possible Location and arrangements of Elevators in a building.
3. Escalators & Travellators: Applications, Traffic capacity, Location and arrangements of escalators and travellators, inclination factor

Assignments /Submission: File along with sketches

Reference Books

1. National Building Code of India 2016-Volume 2 , Bureau of Indian Standards
2. Building Services and Equipments by Ashok L. Chhatre
3. Building Services, By Mrs. Shubhangi Bhide
4. Building Construction Illustrated by Frances D K Ching
5. Basics Lighting Design Ed. by Bielefeld, Bert
6. Daylight in Architecture-Benjamin Evans
7. Lighting in Buildings-Hapkinsen H.D.Kajr
8. Lighting in Architectural Design -Derek Philip
9. Air Conditioning Principles and Systems – Edward G Pita
10. Environmental Science - B J Smith, G M Phillips, M Sweeney
11. Building Service Handbook – Fred Hall and Roger Greeno
12. Refrigeration and Air Conditioning – Arora Ramesh Chandra
13. Fundamentals of Air Conditioning Systems – Billy C Langley
14. Basic Refrigeration and Air Conditioning – P N Ananthanarayanan

21AR4 – 08: CLIMATOLOGY & ENVIRONMENT-II

Teaching Scheme Per week		Credit	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 Study the relation between built form & elements of Climate & behavioral response of built form in different climatic conditions & Design strategies responding to various climatic conditions.

End Semester Outcome –

Students will be able to implement Bioclimatic principles in their design

Course Outline:

1. Means of thermal control

1. Mechanical controls
2. Structural controls
3. Heat exchange of Buildings

2. Thermal Control-Design Strategies

1. Building Groups
2. Buildings
3. Building components

3. Natural Light and Lighting

1. Light –principles
2. Daylighting

Assignments /Submission: 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. IMD Data.

21AR4 – 09 : ELECTIVE -IV

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

- A. Photography
- B. Bamboo Architecture
- C. Foreign Language

NOTE: Students are asked to select or choose any one of the above

The detail syllabus for the above subjects are given hereby

21AR4-09 – A - PHOTOGRAPHY

Objective:

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

Outline:

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

Assignment / Submission : portfolio

Reference Books:

1. Schulz, Adrian. Architectural Photography: Composition, Capture, and Digital Image Processing, Rocky Nook, 2012.
2. McGrath, Norman. Photographing Buildings Inside and Out, Watson-Guption Publications, 1993.

21AR4-09 – B - BAMBOO ARCHITECTURE**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 its properties, bamboo emerges as a very suitable alternative, main properties, construction details and the major uses of bamboo etc.

Course Outline:

1. Bamboo as a building material
2. Bamboo selection, treatment, storing.
3. Main properties of bamboo, size, characteristics.
4. Joints tools used in bamboo construction
5. Construction details in bamboo- walls, wall panels, roof, furniture, doors, windows, 6. Advantages & disadvantages of bamboo.

Assignment/ submission : files , notes

Reference book:

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

21AR4-09 – C - FOREIGN LANGUAGE

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

Course Outline:

1. Chinese Language
2. French Language
3. German Language

Note- Any one language can be preferred.

Assignments/ Submission : Notes in form of file.