NOTIFICATION

No. 111/2023 Date : 14/08/2023

Subject : Implementation of new Syllabi of Semester III & IV of Bachelor of Architecture (B.Arch.) (CBCS) as per Council of Architecture norms.

It is notified for general information of all concerned that the authorities of the University have accepted to implement the new Syllabi of Semester III & IV of Bachelor of Architecture (B.Arch.) (CBCS.) as per Council of Architecture norms to be implemented from the academic session 2023-2024 onwards as per "**Appendix – A**" as given below:

Sd/-
(Dr.T.R.Deshmukh)
Registrar
Sant Gadge Baba Amravati University

"**Appendix A**"

SEMESTER : III

03ARC01 APPLIED MATERIALS

Objective: To develop understanding of building materials and its application in construction of various building elements. The subject also aims at introducing students with the various types of building finishing materials.

Unit I: Different types of furnishing and finishing materials for Interior and Exterior surfaces. Special finishes like aluminum based materials, anti-corrosive and water bound paints.

Unit II: Paving and Cladding materials-natural and artificial, its types, properties & behavior.

Unit III: Polymers and polymer based materials for walls, pipes, sanitary ware, glues and mastic. Polycarbonate and acrylic materials, its properties.

Unit IV: Manufactured timber based materials for interior such as plywood's, veneers, mica, laminates, etc. Types of materials useful for false ceiling, its properties.

Unit V: Material useful for different types of partitions. Aluminium, plastic, glass and different alloy and its application in the building industry.

Unit VI: Introduction to appropriate and cost effective building material. Viz; stabilized mud blocks, adobe, bamboo, terracotta, filler slab etc.

Sessional work: Test, assignment and Material survey report.

Reference Books :

1. S.C. Rangwala, Engineering Materials, Charotar publishing House, Anand, 1997.
2. R.K.Rajput , Engineering Materials.
3. Don. A. Watson, Construction Materials and processes, Mc Graw Hill Co. 1972.

03ARC02 BUILDING MATERIALS & CONSTRUCTION - III

Objective: To enable students about the learning in progression, starting from simple building elements, components, materials and construction techniques to develop strong sense of visualization.

Unit I : An introduction to timber floors and its specific application to various activities. Detail study of single joist, double joist and triple joist timber floors.

Unit II: Cement and its varieties, composition, properties and uses; brief study on manufacture of Portland cement; test for cement; mortars for various work.

Unit III: Concrete, its ingredients, manufacture & properties, ingredients suitability requirements for aggregates, grading of aggregates, role of water, reinforcement, admixtures in concrete, properties of concrete. Manufacturing of concrete and concreting, grades of concrete, mixing of proportions, placing, compactions, transporting, curing, testing of concrete, joints in concrete and concrete finishes.

Unit IV: Formwork and its importance to R.C.C. building elements such as column footing, columns, beams, arches, slabs. Comparative analysis of timber & steel formwork.

Unit V: Introduction and purpose of foundation. Brief introduction to types of shallow and deep foundation. Detail study of masonary foundation & R.C.C. footing foundations and its types.

Unit VI: Application of false ceiling materials such as asbestos sheets, soft boards, acoustic boards, plaster of paris etc; on timber, steel or aluminium framework.

Sessional work: Assignments, test, site visit and drawing on the above topics.

References:
1. S.C. Rangwala, Engineering Materials, Charotar Publishing House, Anand,1997
2. Arora, S.P. & Bindra, S.P., "A Text Book of Building Construction", Dhanpat Rai & Sons, New Delhi, 1994.
3. Barry R., "Construction of Building", Orient Longman lid, 1999.
4. Chudley R., "Building Construction Handbook", British library cataloguing, 2008.
5. Francis DK Ching, "Building Construction Illustrated", Van Nostrand Reinhold Ltd., 2001
6. W.B. Mckay Building Constrution, vol. 1,2,3, Longmans, U.K.1981.
7. Don A Watson, Construction Materials and Processes, McGraw Hill Co.,1972.
8. Punmia B.C., "Building Construction", Laxmi Publications Pv1. Ltd., 1995.

03ARC03 HISTORY OF ARCHITECTURE – III

Objective : We learn from the wisdom of our ancients. History of Architecture enrich the students by exploring our treasures of past, study the evolution of different architectural styles through different periods , understand the influence of geographical , topographical , climatic , social , cultural and economic condition on Architecture.

Unit I : Egyptian and Mesopotamian Architecture and its impact on social, economical and geographical conditions.

Unit II : Introduction to the western civilization and study of Greek civilization and its impact on Architectural development.

Unit III: Introduction to the Roman Architectural development and study of public buildings and spaces.

Unit IV: Brief study of Romanesque, Gothic, Byzantine and renaissance architecture.

Unit V: Evaluation of Islamic architecture with its functions and aesthetic elements at world Scenario. Rise of Islam in Arabia and resulting architecture: Dome of rock, Jerusalem, Ummayyad mosque Damascus, Great mosque & minaret of Samara, great mosque of cardoba Spain etc.

Unit VI: The architectural development of the mosque, the tomb, minaret (Tower), and other religious structures; method of construction and building elements. The rise of Persian style: Tomb of Ismail Samani Bukhara, Mosque at Zevera, Tomb of Zudeh at Mehmandust, Gumbad I Qabus, Madarsa of Ulugh Beg Samarqand. Etc.

Sessional work: Test, Assignments and drawing on the above topics.

References:
1. Sir Banister Fletcher, A History of Architecture, University of London, The Antholone press, 1986.
2. Percy Brown, Indian Architecture (Islamic period), Taraporevala and Sons, Bombay, 1983
3. Satish Grover, The Architecture of India (Buddhist and Hindu Period), Vikas Publishing Housing Pvt. Ltd., New Delhi, 1981
4. Christopher Tadgelli, The History of Architecture in India from the Dawn of Civilization to the end of Raj, Longman group, U.K.Ltd., London, 1990

03ARC04 CLIMATOLOGY

Objective: Understanding Climate as a determining factor for architectural design.

Unit I: (a) Understanding the Earth-Sun relationship, global trade wind pattern, Coriolis's effect and Formation of Climate and weather.
(b) Elements of climate with their measuring instruments along with graphical representation and understanding climate at different scales ie, global, regional, macro and micro.

Unit II: (a) Global Climate classification
(b) Climatic zones of India and its classifications
(c) Solar Geometry

Unit III: (a) Introduction to concept of Thermal Comfort factors, thermal comfort indices
(b) Introduction to concept of Thermal Comfort in buildings.

Unit IV: (a) Natural ventilation in and around the building
(b) Ventilation systems.

Unit V: Climatic elements and data collection equipments. Air temperature, inversion of temperature, thermal diffusivity, thermal conductivity, effective temperature. humidity its types, solar radiation and its effects on building surfaces, wind – study of diurnal and seasonal variations, wind eddies, stack effect, Precipitation- rain, water vapour, fog and snow.

Unit VI: Tropical climates and its types with characteristics.

Sessional work: Assignments, Tutorial and test on the above topics.

References:

1. O. H. keonigsberger, T.G. Ingersoll and others; Manual of tropical housing and building- Part-I; Longmans, London-1980
2. M. Evans; Housing, climate and comfort; Architectural press London-1980
3. B.G.Givoni; Man,climate,and architecture; Applied science, banking, Essex, 1982
4. Norbert Lechner; Heating, Cooling ,Lighting: Sustainable methods for Architects; .
5. S.Drake; The third skin architecture technology and environment; UNSW –press-2007.

03ARC05 ARCHITECTURAL STRUCTURE-II

Objective: To understand loading, structural elements and to analyze them.

Unit I: Strain energy in tension, compression and shear; tention member under impact load.

Unit II: Simple or pure bending theory. Theory of simple bending, section modulus, moment of resistance, distribution of bending stresses in solid, hollow sections and distribution of shearing stress on horizontal sections.

Unit III: Column and struts, Euler's theory of long column, Rankin theory.

Unit IV: Investigation of soil and foundation design.
(a) Relevance of the subject to architectural studies (b) Types of soil and their engineering properties. (Void ratio porosity, bulk density, moisture content, degree of saturation, liquid limit, plastic limit.) (c) Compaction and consolidation. (d) assessing load bearing capacity of soil. (g) criteria for selection of foundation type depending on different soil condition. (e) effect of water level, settlement of soil.

Unit V: Direct and bending stresses, eccentric loading on short column, middle third rule, chimneys.

Sessional Work: Assignments, Tutorial and test on the above topics.

References :

1. B.C.Punmia, Strength of Materials and Theory of Structures; vol I, Laxmi Publications, Delhi 1994.
2. S.Ramanmurtham, Strength of Materials – Dhanpatrai & Sons, Delhi 1990.
3. W.A.Nash, Strength of Materials – Schaums Series – McGraw Hill Book Company, 1989.
4. R.K.Bansal – engineering Mechanics and Strength of Materials – Lakshmi Publications, Delhi, 1990.

03ARC06 ARCHITECTURAL DESIGN STUDIO– III

Objective: To introduce architectural design as a process and as a final product; to understand fundamentals of space, form and order through basic perception of architectural skills.

Basic contents:

1) Introduction to the design assignment, their aims and objectives, scope, special emphasis and limitation. Application of planning and design standards for the proposed design project.
2) Planning and design data collection, area analysis, study and evolution of plan forms for each activity, grouping of activities, case study analysis and its presentations.
3) Major design project shall include house design, clinic, elementary school, restaurant with respect to planning & design aspect.

Sessional work: One major design project and one time project with other task and assignments.

Reference books:

1. Ching, F.D.R. : Form, Space and Order, Van Nostrand Rheinhold, New York (1979).
2. Parmar V.S.: Design Fundamentals in Architecture, Somoiya Publications, Bombay (1973)
3. Scott: Design Fundamentals Edward d Mills- Planning the Architects Hand Book – Bitterworth, London, 1985.
4. Watson,D (editor) Time –saver standards for Architectural Design: Technical data for professional practice, McGraw-Hill, 2005.
5. Neufert,P; Architects Data; Blackwell Science, 2000.
Agkathidis, A, Hudert, M and Schiling, G., "Form defining strategis: experimental architectural design". Wasmuth, 2007.

03ARC07 BUILDING MATERIALS & CONSTRUCTION STUDIO - III

Objective: To enable students about the learning in progression, to develop strong sense of visualization of building composition in the form of Drawings, sketches and study models.

Sessional work : Assignments and drawing on the above topics given in the subject 03ARC02 Building Materials & construction – III.

Viva Voce by external examiner at the end of Semester.

03ARC08 ARCHITECTURAL EXPRESSION & PRESENTATION SKILLS

Objective:
The main objective of this course is to develop the skill of students by Introducing fundamental techniques of Visual representation and to equip them with basic principles of representation which will enhance the quality of graphical language for architecture. This subject will also improve the skill of delivering and engaging crowd. To develop the presentation skills required for architecture students through different media for conveying their concepts & designs effectively to the viewer.
Outlines: By understanding their content, the student must concentrate on.

- Intent of presentation
- Analyzing Core subject/issue
- Focusing
- Emphasizing
- Selecting a Media that can best convey their idea
- Application with respect to time factor

Skills that need to be developed are:
Unit I: Introduction to Architectural Expression and Presentation: Architectural Expression of Form, Architectural Expression of Space, Architectural Expression of Building Elements, Architectural Expression of Colours. Architectural Expression of various natural and man made elements. Introduction to Architectural Presentation.

Unit II: Verbal and Textual : Using universally adopted architectural vocabulary to convey the idea with least amount of explanation but effectively conveying the matter exercises of 5-6 by each may be carried out by giving a detailed note on a matter with clarity of speech & grammar. Writing related to architecture with appropriate words and vocabulary. Writing concisely and effectively, making paragraphs & chapters etc. 4-5 exercises on different subject of architecture may be dealt.

Unit III: Graphical: making a graphical representation using different media such as pencil rendering, pen & ink rendering, colour rendering or any other media. Understanding colour combinations and their effects for presentation. Analytical diagrams, info graphics, flow charts, mind maps, posters, logo design.

Unit IV: Model: making of blocks and details models through different materials in short time & arranging them such that the purpose of making model is fulfilled.

Unit V: Digital: Introduction to windows and its applications. Introduction to Microsoft, Office, word, excel, Power point - setting of header & footer, font's text & height, line spacing, page insertion & its layout, references, merging of documents, insertion of formulas, linking of pages, slides presentation, slide master, slide show, etc, respectively, Photoshop, Corel Draw.

Unit VI: Architectural Vocabulary: introduction to computer aided 2D drafting Understanding the use of drawing tools, object editing, drawing objects, setting up of drawings of various simple architectural objects with complete text and dimensioning. Hatching utilities, assigned colour and line type, use of multiline, style, block, symbol Library for accurate drawings, incorporating the above said utilities.

Assignment:
Application of the above for one of the design problems dealt in the previous semester. Report writing on theory subject assignment, spead sheets for preparing formats of mark sheets, estimates & presentation based on above software, Cad drawing-Simple Objects, small building drawings.

Reference Books: [1 to 7]
1. 'Rendering with Pen & Ink', by Robert W.Gill.
2. Ching, F.D.R.: Form, Space and Order, Van Nostrand Rheinhold, New York (1979).
3. Artist Drawing Techniques, edited by Georgina Palffy, Penguin random house.
4. The Creative Callighraphy Source Book, Adrian Waddington.
5. Parmar V.S.: Design Fundamentals in Architecture, Somoiya Publications, Bombay (1973)
6. Contrast of Form, Geometric Abstract Art 1910-1980, by Magdalena Dabrowski.
7. Form Defining Strategies: Experimental Architecture Design by Asterios Agkathidis.

03ARC09 SURVEYING AND LEVELLING – LAB.

Objective: To Understand methods of survey, and documentation, Introduction to tools and equipment of Land surveying Introduction to modern methods of surveying.

Unit I: Importance of geomagnetic engineering techniques to architecture, field surveying, photographer, remote sensing, geographic information system and global positioning system.

Unit II: Types of maps, scales and uses, map sheet numbering, map projection, definition of surveying, principles, importance, classification, surveying equipment namely levels, compass, theodolites, tachometer, EDM, total stations and other instruments.

Unit III: Measurement of distance, angles, and directions; determination of elevation through spirit leveling, trigonometrically leveling, tachometric surveying and contouring.

Unit IV: Method of control establishment namely traversing, triangulation, plane table surveying and mapping. Introduction to GPS survey.

Sessional work : Organizing a survey camp for terrain mapping with its extension to AD studio. Assignments, test and tutorials on the above topics.

Practicals:

(a) Chain and compass surveying.
(b) Levelling
(c) Plain table surveying and preparation of map.
(d) Determination of height of a building.

Reference books:

1) Schofield W., Engineering surveying., Butterworth-Heinemam.,2007.
2) Chandra. A.M., Surveying., New Age publisher-2000.
3) Surveying & leveling, Shaha and Kale.
4) Surveying & Leveling Vol – I & II : T P Kanetkar

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SEMESTER: FOURTH

04ARC01 ARCHITECTURAL DESIGN – IV

Objective: To expose the students to the designing of multifunctional community buildings with emphasis on building bye laws, impact of culture, traditions, material and techniques.

Basic contents:

1) Introduction to the designing of multifunctional community buildings on an intermediate scale.
2) Importance of case studies, data collection, area analysis, evolution of plan forms, climatic oriented planning and design features, space utilization, building & site services, site analysis and site planning ,etc; in the Architectural design process.
3) Importance of culture, tradition, topography, climate and building bye laws in generating built form.
4) Major design project may include design of library, club, gymnasium, low rise apartment, low cost housing element, office cum shop, etc.

Sessional work: One major design project and one time project with other task and assignments.

Reference books:

1. Ching, F.D.R.: Form, Space and Order, Van Nostrand Rheinhold, New York (1979).
2. Parmar V.S.: Design Fundamentals in Architecture, Somoiya Publications, Bombay (1973)
3. Scott: Design Fundamentals Edward d Mills- Planning the Architects Hand Book – Bitterworth, London, 1985.
4. Watson, D (editor) Time –saver standards for Architectural Design: Technical data for professional practice, McGraw-Hill, 2005.
5. Neufert, P; Architects Data; Blackwell Science, 2000.
6. Agkathidis, A, Hudert, M and Schiling, G., "Form defining strategies: experimental architectural design". Wasmuth, 2007.

04ARC02 BUILDING MATERIALS & CONSTRUCTION- IV

Objective: The course will enable the learning in progression, starting from ferrous and non ferrous materials and construction techniques to develop strong sense of visualization.

Unit I: Ferrous metals, brief study of cast iron, wrought iron, pig iron and steel; its manufacturing process and properties. Steel door.

Unit II: Non ferrous metals and its various uses in building construction. Aluminium sections for door design. Use of Copper, Titanium in Architecture.

Unit III: Metal casements useful for windows and ventilators. Types of metal casements windows with fixtures, fitting and method of fixing. Metal casements useful for partitions fixtures, fitting and method of fixing.

Unit IV: Composition of Glass, brief study on manufacture, treatment, properties and uses of glass, (Types of glass and fixing.)

Unit V: Plastics: Thermoplastic and thermosets properties and architectural uses of plastics, structural plastics, fiber reinforced plastics and decorative laminates, plastic coatings, adhesives and sealants. Study of PVC, UPVC.

Unit VI: Study of Acoustical materials such as different fabrics & rugs, acoustical boards, panels, etc and its application.

Sessional work: In the form of reports, drawings, and models. Construction site visits are essential for practical exposure. Assignments and drawing on the above topics.

Viva Voce by external examiner at the end of Semester.

Reference Books:

1. S.C. Rangwala, Engineering Materials, Charotar Publishing House, Anand,1997
2. HUDCO - All you want to know about soil stabilized mud blocks, HUDCO Pub, New, Delhi, 1989.
3. W.B. Mckay Building Constrution, vol. 1,2,3, Longmans, U.K.1981.
4. Don A Watson, Construction Materials and Processes, McGraw Hill Co.,1972.

04ARC03 HISTORY OF ARCHITECTURE - IV

Objective: History of Architecture exposes the student to evolution of different architectural solutions through historical periods to understand the building materials, construction techniques, planning and designing features.

Unit-I: The Architecture of Nayaka's at Vijayanagar (Hampi), Solanki's at Gujarat.etc.

Unit-II: The evolution of Islamic architecture in India Delhi OR Imperial Style. Development of Architectural Style during the Rule of the slave, Khilji, Tuglag, Sayyid & Lodhi Dynasties- important examples for each period.

Unit-III: Provincial Style: Development of the Provincial Style of different regions- Punjab, Jaipur, Bengal, Gujrat, Malwa, The deccan (bijapur, Golconda, bidar and Gulbarga) – Important Examples for each style with building construction techniques and design elements.

Unit-IV: Mughal Style: Development of the Mughal Style under the different rulers – Humayun, Akbar, Jahangir & Shahjahan-Important Examples for each style with building construction techniques and design elements.

Unit-V: The evolution of Rajputana and Sikh architecture.

Unit-VI: The Maratha Architecture and Architecture of Forts

Sessional work: Assignments and drawing on the above topics.

References:

1. Sir Banister Fletcher, A History of Architecture, University of London, The Antholone press, 1986.
2. Percy Brown, Indian Architecture (Islamic period), Taraporevala and Sons, Bombay, 1983
3. Satish Grover, The Architecture of India (Buddhist and Hindu Period), Vikas Publishing Housing Pvt. Ltd., New Delhi, 1981
4. Christopher Tadgelli, The History of Architecture in India

04ARC04 LANDSCAPE DESIGN

Objective: The course aims to understand that landscape is an integral part of sustainable development as it blends man's technology into the natural surroundings. Further to study its role in preservation, improvement and enhancement of environment.

UNIT-I : Introduction : Landscape Architecture. Understanding man and nature land and landscape. Relationship of architecture, Landscape Architecture and urban landscape design.

UNIT-II :- Landscape traditions and garden design of India, China, Persia, Japan, Italy, France and England.

UNIT-III : Garden Design of the modern world and overview of modern garden design with case studies.

UNIT-IV: Man and nature, Basic Principles of landscape design and element. Types of landscape elements and its various uses.

UNIT-V: Characteristics of various types of plants and their suitability of landscaping, planting design and visual aspects of plant form. Selection of Plant Material for Landscape.

UNIT-VI: Site analysis: with respect to topography and existing features; slopes, drainage; sensitive areas and natural ecosystem; vegetation and tree survey etc. Green Practices such as Soil and water conservation, contour bundding, bandharas, tanks, etc. Water efficient landscaping; design to include existing site features.

Sessional work : Assignments and test on the above topics.

Reference Books:

1. Sylvia Crowe Sheila Haywood, The Gardens of Mughal India , Vikas Publishing House, Pvt. Ltd, India, Delhi,1973.
2. Garrett Eckbo, The Art the Home Landscaping, McGraw-hill Book Co., London, 1956.
3. Testsuro Yoshida, Gardens of Japan, Jr. Marcus G. Sims, 1963.
4. Time saver Standard for Landscape Design.

04AR05 ARCHITECTURAL STRUCTURE-III

Objective: Understanding of Basic Theory and principles of structural analysis and structural properties of elements.

UNIT-I : Fixed beams with concentrated load and uniformly distributed load (over complete span.)

UNIT-II: Continuous beams (without settlement) with uniform sections by three moments. Only vertical load and uniformly distributed load over whole span by theorem of three moments.

UNIT-III: Moment distribution method for symmetrical portal frames with symmetrical load. Only point load and uniformly distributed load over whole span.

UNIT-IV: Introduction to earth retaining structures/ walls, various types of retaining walls, key components of retaining walls.

UNIT-V: a) Design procedures for simple load bearing foundations.
b) Failure of foundations systems.
c) Ground improvement techniques.

Sessional work : Assignments and tutorials on the above topics.

Reference Books:

1. P.C.Punmia, Strength of Materials and Theory of Structures; vol I, Laxmi Publications, Delhi 1994.
2. S.Ramanmurtham, Strength of Materials – Dhanpatrai & Sons, Delhi 1990
3. W.A.Nash, Strength of Materials – Schaums Series – McGraw Hill Book Company, 1989
4. R.K.Bansal – engineering Mechanics and Strength of Materials – Lakshmi Publications, Delhi, 1990.

04AR06 ARCHITECTURAL DESIGN STUDIO – IV

Objective: To expose the students to the designing of multifunctional community buildings with emphasis on building bye laws, impact of culture, traditions, material and techniques.

Sessional work : Assignments and drawing on the above topics given in the subject 04AR01 ARCHITECTURAL DESIGN – IV. Viva Voce by external examiner at the end of Semester.

04AR07 BUILDING MATERIALS & CONSTRUCTION STUDIO – IV

Objective: The course will enable the learning in progression, starting from ferrous and non ferrous materials and construction techniques to develop strong sense of visualization.

Sessional work : Assignments and drawing on the above topics given in the subject 04AR02 Building Materials & construction – IV. Viva Voce by external examiner at the end of Semester.

04ARC08 COMPUTER GRAPHICS STUDIO- I

Objective : The prime objective of this course is to introduce the fundamental concepts of software and to develop basic skills in Application of Architectural software and rendering tools.

UNIT I: Advance computer aided 2D Drafting Advance command programming – concept of Layers, object properties, grouping and ungrouping of objects, blocks, dimension editing, use of multiline, style, symbol Library manipulation for accurate drawings, incorporating the above said utilities with generation of Architectural design.

UNIT II Productivity tools: Introduction to tools of productivity – blocks, slide facilities, scriptfiles, attributes Understanding concepts of view port, concept of object linking, and editing session.

UNIT III: Introduction to 3D Drafting : Introduction to 3D modeling technique and construction planes, drawing object, 3D surfaces setting up elevation and thickness, and use of dynamic projections. Solid modeling, with driving primitive command and Boolean operation. Use of region modeling solid modife.

UNIT IV: 3D Rendering and setting: Rendering and scene setting to create a photo realistic picture understanding material mapping, environment setting and image filing. Construction of any object or building using above said utilities.

Sessional Work: It includes assignments incorporating the use of CAD in form of drawings. Conversion of 2D drawing of previous semester to 3D using softwares like Autocad, Sketchup, revit, 3DS Max. etc. and presentations through photoshop, Corel draw, Power Point etc.

Viva Voce by external examiner at the end of Semester.

04ARC09 ILLUSTRATED CLIMATOLOGY

Objective: To understand the use of climate analysis tools and preparation of data charts / records for prevailing climate.

UNIT-I: Study of climate of different climatic zones and its responsive vernacular architecture.

UNIT-II: Climate Analysis Tools (Bio Climatic Chart, Mahoney's Table, Temperature Isopleths, Humidity, Temperature gauge ,Rain Guage, Wind vane, Cup anemometer, Solar radiation UV meter) for study of impact of Micro and Macro climatic conditions on the built and un-built spaces, simulation software, etc.

UNIT-III: Solar chart and its use, shadow angles, use of shadow angle protractor; types and design of shading devices. Heliodon & its use. Introduction to passive design strategies at various scales ie urban, building and building component scale. Study of U values for Traditional and contemporary materials with comparative charts.

UNIT-IV: Study of different Passive techniques in contemporary Scenario for varying case situations and case studies of 1GBC/ and TERI / Green buildings.

Sessional Work:

1. Charts, Graphical sheets/ drawings, designing of shading devices, different calibrations on each of the above topic.
2. Use of digital aid for simulation of building work. [**Sr.No.2 nahi**]
3. Workshop on Climate Responsive Built and Un-built Spaces using various tools.

Reference Books:

1. 'Climate Responsive Architecture', Arvind Krishnam.
2. Norbert Lechner; 'Heating, Cooling, Lighting: Sustainable methods for Architects'.
3. 'Urban Microclimate', Evyatar Erell.
4. 'Design with climate', Victor Olgyay, Aladar Olgyay.
5. 'Fundamentals of Environmental Studies', Mahua Basu and S.Xavier, Cambridge University Press, first edition [8th November, 2017]

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