



# SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited A++ Grade by NAAC | 12B Status by UGC | Approved by AICTE

[www.sathyabama.ac.in](http://www.sathyabama.ac.in)

## School of Building and Environment

### Department of Architecture

#### 1.1.3 Courses having focus on employability/ entrepreneurship/ skill development in 2022- 2023

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| SARA5132 | BUILDING ENERGY CODES AND STANDARDS | L | T | P | Credits | Total Marks |
|----------|-------------------------------------|---|---|---|---------|-------------|
|          |                                     | 2 | 1 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To understand the importance and basics of ECBC and SP41.
- To devise the applicability of the methodologies prescribed in the codes
- To comprehend the compliance approaches

**INTRODUCTION****6 Hrs.****UNIT 1**

National policies on sustainable and energy efficient development, The Energy Conservation (Amendment) Act, 2010, National policies on sustainable and energy efficient development. Introduction and Guidelines of ECBC – Energy Efficiency Performance levels, Energy Performance Index, Compliance approaches – prescriptive method, whole building performance method (Energy simulation), Compliance requirements, Building Envelope – Fenestration, opaque construction, Daylighting, building envelope sealing, Roof - Skylights, Building envelope trade off method.

**UNIT 2 ECBC – COMFORT SYSTEMS AND CONTROLS****12 Hrs.**

Ventilation - Minimum Space Conditioning Equipment Efficiencies -Unitary, Split, Packaged Air-Conditioners, Variable Refrigerant Flow, Air Conditioning and Condensing Units Serving Computer Rooms. Controls – Temperature control, air conditioning control, occupancy control, fan controls. Piping and duct work. System Balancing. Condensers, Service water heating, cooling towers, Economizers, Variable Flow Hydronic Systems, Energy recovery. Low-energy Comfort Systems. Lighting and controls, electrical and renewable energy systems. Calculation of energy requirements of a proposed and standard design

Suggestive Assignment – Manual calculation – lighting, fenestration efficiency calculation and lighting power allowance calculation.

**UNIT 3 FUNCTIONAL EFFICIENCY OF BUILDINGS – HEAT INSULATION AND VENTILATION****12 Hrs.**

SP41 – Climate, Thermal comfort, Shading devices, energy requirement for cooling and heating. Heat Insulation - introduction, terminology, requirements, heat transmission through building sections, thermal performance of building sections, orientation of buildings, building characteristics for various climates, thermal design of buildings, influence of design parameters, mechanical controls. Ventilation - introduction, terminology, ventilation requirements, minimum standards for ventilation, ventilation design, energy conservation in ventilating systems.

**UNIT 4 FUNCTIONAL EFFICIENCY OF BUILDINGS – LIGHTING****9 Hrs.**

Lighting –standards, general, illumination requirement, day lighting analysis, supplementary artificial lighting design, artificial lighting design, energy conservation.

Suggestive Assignment – Work out examples on thermal insulation, method of calculating solar load on vertical surfaces of different orientation, orientation on the basis of solar road

**UNIT 5 COMPREHENSIVE LEARNING****6 Hrs.**

Arriving at Comfort band and passive strategies for a particular city using Mahoney table, calculating overheated period and deriving the shadow mask for fenestrations

**Max. 45 Hours****COURSE OUTCOME:**

- CO1** Explore about the national policies on sustainable and energy efficient development
- CO2** Understand the prescriptive method and whole building performance method.
- CO3** Analyse the available comfort systems and controls.
- CO4** Categorise the various parameters in heat insulation and ventilation.
- CO5** Acquire knowledge about the lighting requirement.
- CO6** Integrate the aspects learnt in the codes for effective application in design

**TEXT / REFERENCE BOOKS**

1. Bureau of Energy Efficiency, G. o. (2017). Energy Conservation Building Code. New Delhi: Bureau of Energy Efficiency.
- Standards, B. o. (1987). SP.41 Handbook on Functional requirements of buildings. New Delhi: Bureau of Indian Standards.
2. Standards, B. o. (2016). National Building Code . India: ureau of Indian Standards.

| SARA5234 | SUSTAINABLE WATER MANAGEMENT | L | T | P | Credits | Total Marks |
|----------|------------------------------|---|---|---|---------|-------------|
|          |                              | 3 | 0 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To understand the traditional knowledge of managing water in various contexts.
- To familiarize the fundamentals of technology for effective water management.
- To comprehend the strategies to reduce water consumption in buildings.

**UNIT 1 WATER MANAGEMENT – HISTORICAL PERSPECTIVE****9 Hrs.**

Traditional community wisdom regarding water management from different climatic zones of the world - Traditional Architecture of wells in Rajasthan, Gujarat, Tamil Nadu– Stepped Wells, Baoris, Tankas, etc.

**UNIT 2 WATER MANAGEMENT – MACRO LEVEL****12 Hrs.**

**Management of the water cycle as a single system** - Management of water supply, sanitation and drainage - Social imperatives, environmental considerations and economic challenges - **Technological options for water management, recycling, reuse, conservation and treatment** - Planning of settlements and large campuses based on principles of sustainable watershed development with water as a priority resource.

**UNIT 3 WATER MANAGEMENT – MICRO LEVEL****9 Hrs.**

**Design for water conservation – Building and products** - Designing building services, plumbing and sanitary design for effective water reuse, recycling, and recharge - Strategies for water pricing and its regulation - Rain water harvesting techniques – Basic Concepts, piping techniques and pit design for groundwater recharge wells.

**UNIT 4 STRATEGIES TO REDUCE WATER CONSUMPTION IN BUILDINGS****9 Hrs.**

Low flow plumbing fixtures for water efficient appliances - Rain water harvesting - Reuse of grey water for non-potable uses - Wetlands for natural waste water treatment, **use of wetlands for natural storm water and vegetated roof tops, (natural) renewable power source such as photo voltaic, solar hot water fuel cells etc.**

**UNIT 5 COMPREHENSIVE LEARNING****6 Hrs.**

Submission of reports by interviewing those involved in rainwater harvesting and water management system. Critically analyse water management strategy adopted in any particular case study.

**Max.45 Hours****COURSE OUTCOME:**

- CO1** Understand the basic concepts on the ways to manage water in different climatic zones specific to Indian context.
- CO2** Summarize the importance of water management from the social, environmental and economic perspectives.
- CO3** Construct knowledge of incorporating sustainable principles of watershed development in large campuses.
- CO4** Ability to analyze the various methods to reduce, recycle and recharge water at the building level.
- CO5** Criticize the fundamentals of renewable power sources.
- CO6** Develop a strategy that can be achieved from practical knowledge in the water management system.

**TEXT / REFERENCE BOOKS**

1. (Ed.), K. N. (2006). *Water Resources Management: Realities and Challenges*, ..2006. India: Eastern Book Corpn.
2. Athavale, R. (2003). *Water Harvesting And Sustainable Supply In India*. India: Rawat Publication.
3. Dr B C Punmia, A. K. (2011). *Water Supply Engineering, Water safety in buildings*. Geneva: World Health Organization,.
4. Honore(Ed.), G. (2002). *Principles and Practices of Integrated Watershed Management in India*,. -: Indo-German Bilateral Project.
5. Iyer, R. R. (2009). *Water and the laws in India*. Chennai: Sage Publications India Pvt. Ltd.,.
6. Jain, S. K. (2007). *Hydrology and Water Resources of India, Water Science and Technology Library, Vol. 57, . New York: Springer.*
7. John Briscoe, R. M. (2007). *Handbook of Water Resources in India: Development, Management, and Strategies* . Chennai : )Oxford University Press.
8. Singh, P. (2008). *Rainwater Harvesting: Low cost indigenous and innovative technologies*. India: Macmillan Publishers.

**WEBSITES**

1. [http://www.unepfi.org/fileadmin/publications/water/chief\\_liquidity1\\_India.pdf](http://www.unepfi.org/fileadmin/publications/water/chief_liquidity1_India.pdf)
2. <http://wrmin.nic.in>
3. [http://www.unicef.org/india/Final\\_Report.pdf](http://www.unicef.org/india/Final_Report.pdf)

| SARA5333 | GREEN BUILDING RATING SYSTEMS | L | T | P | Credits | Total Marks |
|----------|-------------------------------|---|---|---|---------|-------------|
|          |                               | 3 | 0 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To get a complete overview of various kinds of green building rating systems and application in the industry.
- To understand the purpose, benefits and application of green building rating system.
- To enable students to evaluate the type of green rating system most suitable for a particular project

**UNIT 1 INTRODUCTION TO GREEN RATING SYSTEMS****9 Hrs.**

History of green Rating systems- LEED, GRIHA, BREEAM, IGBC- Need and use of green rating systems - Structure of the rating systems- Design parameters that affect Green building ,Market response to various rating systems

**UNIT 2 GREEN RATING SYSTEMS IN INDIA****12 Hrs.**

In-depth study of the requirements of IGBC, LEED and GRIHA rating systems - Cross comparisons between the various requirements, their intents and ability of a project to meet the requirements - Other rating systems such as Eco House, Green Mark, Pearl, Living Building Challenge, **Selection of the appropriate rating system for project.**

**UNIT 3 APPLICATION OF RATING SYSTEM REQUIREMENTS****9 Hrs.**

**Applying the Green rating systems in a project – Calculations involved in rating system, Role of Green building consultant- Determining the various green points- Green Accreditation examination and the procedure to apply**

**UNIT 4 THE FUTURE OF RATING SYSTEMS****9 Hrs.**

Upcoming rating systems- Auditing after rating, Material certifications and stewardships, Audit - Green Audit, Energy modeling and energy auditing in green building ratings - **Consultancy scope and services for green rating systems.**

**UNIT 5 COMPREHENSIVE LEARNING****6 Hrs.**

Exploring and documenting case studies on Green Buildings **highlighting various techniques and strategies adopted to achieve credits for LEED and GRIHA rated buildings. Preparing document for evaluating important credits that can be adopted to achieve**

**Max.45 Hours****COURSE OUTCOME:**

- CO1** Understanding of the various green rating systems and practices across the globe and Indian Context
- CO2** Critically inquire the merits and demerits of Green rating Systems, Material Certification & stewardship, and their necessity
- CO3** Understanding Green Rating Systems application in projects and analytical knowledge of various green points required for projects towards achieving Green Rating
- CO4** Appraising the role of a green building consultant and the process of Green accreditation examination.
- CO5** Analyzing and evaluating the basics of energy modelling and auditing.
- CO6** Outlining the consultancy scope and services for green rating systems.

**TEXT / REFERENCE BOOKS**

1. Micheal Bauer, Peter Mosle, Micheal Schwarz (2010), Green building guide book for Sustainable Architecture, Springer
2. Sam Kubba, (2012). Handbook of Green building design and construction, Elsevier Inc
3. Reeder, L. (2010). *Guide to Green Building Rating Systems: Understanding LEED, Green Globes, Energy Star, the National Green Building Standard, and More.* (Wiley Series in Sustainable Design).
4. Yudelson, J. (2007). *The Green Building Revolution.* Island Press.

**WEBSITES**

1. [www.usgbc.org](http://www.usgbc.org)
2. [www.igbc.org](http://www.igbc.org)
3. [www.grihaIndia.org](http://www.grihaIndia.org)
4. [living-future.org/lbc](http://living-future.org/lbc)

| SARA5301 | CONSTRUCTION OPERATIONS<br>MANAGEMENT | L | T | P | Credits | Total Marks |
|----------|---------------------------------------|---|---|---|---------|-------------|
|          |                                       | 3 | 0 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To acquire vital competencies in production, operations & distribution management, leading to an improvement in job skills.
- Apply concepts of operations management such as Warehouse Planning, Operations & Supply Chain Strategies, and New Product Development.
- Learn to create a balance between operations and supply expertise and general business knowledge by disseminating new techniques in the area of operations management.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                 |               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------|
| <b>UNIT 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>OPERATIONS PLANNING</b>      | <b>9 Hrs</b>  |
| Introduction to OM, facilities and capacity planning plant lay-out design SLP, ALDEP, CORELAP, learning curves and location analysis; Production shop - types, assembly line, and theory of constraints; Material requirement planning (MRP) - master production schedule (MPS), bill of material (BOM), and planning process; Aggregate planning - medium term capacity management, manipulation of demand and supply, chase and level strategies; Business Economics. |                                 |               |
| <b>UNIT 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>OPERATIONS SCHEDULING</b>    | <b>12 Hrs</b> |
| Operations scheduling - job order scheduling, heuristics for decision rules, Decision Analysis & Modelling, Moore's, Johnson's procedure, Economic Common Cycle Scheduling (ECC scheduling).                                                                                                                                                                                                                                                                            |                                 |               |
| <b>UNIT 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>INVENTORY MANAGEMENT</b>     | <b>9 Hrs</b>  |
| Introduction to inventory management - ABC analysis, Economic Order Quantity (EOQ) Models and its variants, inventory control under uncertainty; Logistics Management, Supply Chain Management, Warehouse Management, Value Engineering Concepts.                                                                                                                                                                                                                       |                                 |               |
| <b>UNIT 4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>PRODUCTIVITY</b>             | <b>9 Hrs</b>  |
| Productivity and work-study - time study, Just in Time (JIT), Kanban System, method study, wage incentive plans, work sampling; Break even analysis; Forecasting.                                                                                                                                                                                                                                                                                                       |                                 |               |
| <b>UNIT 5</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>CONSTRUCTIVE ASSIGNMENTS</b> | <b>6 Hrs</b>  |
| ABC analysis for a small project and logistics planning with application of relevant concepts.                                                                                                                                                                                                                                                                                                                                                                          |                                 |               |

**Max. 45 Hours****COURSE OUTCOMES**

|            |                                                                                                                        |
|------------|------------------------------------------------------------------------------------------------------------------------|
| <b>CO1</b> | Interpret the planning of operations as per demand and supply.                                                         |
| <b>CO2</b> | Predict the flow of materials and effectively take decisions for streamlining operations.                              |
| <b>CO3</b> | Skillfully plan and control the process of transformed resources as they move through supply networks, and operations. |
| <b>CO4</b> | Demonstrate the application of the strategic concepts from the perspective of an organization or business unit level.  |
| <b>CO5</b> | Assess productivity with different methods and analysis.                                                               |
| <b>CO6</b> | Analyze and evaluate business operations using basic quantitative analysis techniques.                                 |

**TEXT / REFERENCE BOOKS**

1. Stephen P. Adams, E., Ebert, R. (1994). *Production and operations management*. Delhi: Prentice Hall of India.
2. Bedi, K. (2004). *Production and operation management*. New Delhi : Oxford University Press.
3. Buffa, E., Sarin, R. (2007). *Modern production / Operations management*. New Delhi : John Wiley & Sons.
4. Chase, R., Jacobs, R. and Aquilano, N. (2012). *Operations Management or Competitive Advantage*, New Delhi : Tata McGraw -Hill.
5. Goldratt, E., Cox, J. (1992), *The Goal*. Barrington: North River Press.
6. Krajewski, L., Ritzman, L. (2005). *Operations management-Strategy and analysis*. New Delhi : Pearson Education.
7. Mahadevan, B. (2015). *Operations Management: Theory and Practice*, New Delhi : Pearson India Education Services Pvt. Ltd.
8. Panneerselvam, R. (2012). *Productions and Operations Management*, New Delhi: PHI Learning Pvt. Ltd.
9. Stevenson, W. (2012). *Operations management*. New York : McGraw-Hill.

| SARA7304 | INFRASTRUCTURE DEVELOPMENT AND MANAGEMENT | L | T | P | Credits | Total Marks |
|----------|-------------------------------------------|---|---|---|---------|-------------|
|          |                                           | 3 | 0 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To introduce the basic concepts related to large scale infrastructure development activities
- To develop awareness and expertise in effective management of infrastructure developments projects with the knowledge in planning, management and effective delivery of large scale infra projects.

|               |                                       |              |
|---------------|---------------------------------------|--------------|
| <b>UNIT 1</b> | <b>INTRODUCTION TO INFRASTRUCTURE</b> | <b>9 Hrs</b> |
|---------------|---------------------------------------|--------------|

Overview of infrastructure, Introduction to infrastructure business – Study of various types of infrastructure sectors – Energy ( oil and gas, renewable energy, thermal power, hydroelectric power, nuclear power)- building infrastructure - transportation ( highways, railways, water ways, airways) power and telecom sectors – Rural, Urban infrastructure and irrigation sectors ( dam channels and canals etc.), players and phases in infrastructure projects.

|               |                                      |               |
|---------------|--------------------------------------|---------------|
| <b>UNIT 2</b> | <b>PROJECT FINANCE AND APPRAISAL</b> | <b>12 Hrs</b> |
|---------------|--------------------------------------|---------------|

Infrastructure Project Feasibility – Appraisal and Due Diligence; Life cycle perspective of Infrastructure; Project Implementation approach - Project Finance and public private partnerships (PPP's) – Special Purpose Vehicle ( SPV ), VGP's; Cash Flow projections, Net Present Value (NPV), Internal Rate of Return (IRR) - social cost benefit assessment of infrastructure – short run cost functions; budget and revenues from usage - Life cycle costs, taxes and finance; Long run investment decisions and cost functions; Decision Analysis.

|               |                                            |              |
|---------------|--------------------------------------------|--------------|
| <b>UNIT 3</b> | <b>FINANCIAL INSTITUTIONS AND POLICIES</b> | <b>9 Hrs</b> |
|---------------|--------------------------------------------|--------------|

Government policies and regulations; 5 year plan and impact on infrastructure development - Infrastructure institutions – Infrastructure financing; means; investment norms and regulations.

|               |                                     |              |
|---------------|-------------------------------------|--------------|
| <b>UNIT 4</b> | <b>PROJECT STRUCTURING AND RISK</b> | <b>9 Hrs</b> |
|---------------|-------------------------------------|--------------|

Infrastructure Project Management; Project Planning and Management; Strategic Planning; Risk & Sensitivity Analysis techniques; Typical DPR structures - Construction and Economic risks; Political and Social Risks; Project Life cycle, approaches project formulation and structuring, elements of Bids Process Management and risk management.

|               |                                 |              |
|---------------|---------------------------------|--------------|
| <b>UNIT 5</b> | <b>CONSTRUCTIVE ASSIGNMENTS</b> | <b>6 Hrs</b> |
|---------------|---------------------------------|--------------|

Analysing and presenting various types of infrastructure projects for a hypothetical situation with the financial proposal and the execution strategy. List and present the various financial institutions with their investment strategies for the infrastructure projects

**Max. 45 Hours**

**COURSE OUTCOMES:**

|            |                                                                                                                                                                |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CO1</b> | Familiarizing the various types of infrastructure projects and their nature compared to building projects.                                                     |
| <b>CO2</b> | In-depth understanding on project financing appraisal process for infrastructure projects                                                                      |
| <b>CO3</b> | Analysing the project finance strategies for different types of projects with decision-making analysis as a process.                                           |
| <b>CO4</b> | Knowledge on the various types of financial institutions and their policies on funding infrastructure projects.                                                |
| <b>CO5</b> | Understanding and application of various planning and management techniques to mitigate risks in the execution of infrastructure projects.                     |
| <b>CO6</b> | Comprehensive understanding of planning, bidding, funding and execution of infrastructure projects through case study and analysing the investment strategies. |

**TEXTS / REFERENCE BOOKS**

1. Prof.Ashish H. Makwana, Prof. Yogesh K. Alwani, Prof.Kunal. P. Shukla, Dr.Jayeshkumar and R.Pitroda, Infrastructure Engineering and Management, LAP Lambert Academic Publishing, 2008.
2. Donald Coffelt and Chris Hendrickson, Fundamentals of Infrastructure Management, 2017. Pittsburgh, Pennsylvania, USA.
3. S. Goodman and M. Hastak, Infrastructure planning handbook: Planning, engineering, and economics, McGraw-Hill, New York, 2006.
4. Grig N.S., "Infrastructure Engineering and Management", Wiley – Interseience,1988.
5. P. Chandra, Projects planning, analysis, selection, financing, implementation, and review, Tata McGraw-Hill, New Delhi, 2009.
6. Alvin S. Goodman and MakarandHastak, ASCE Infrastructure Planning, Engineering and Economics, second Edition.,McGraw-Hill Professional,2015.
7. Hendrickson, C. and Mathews, H.S.,2011. Civil Infrastructure Planning, Investment and Pricing. Pittsburgh. PA: Carnegie-Mellon University
8. India Infrastructure Reports (latest as available) from various agencies such as CRISIL, Knight Frank, EY and PWC.
9. Department of Commerce, Ministry of commerce and Industry, Government of India. Sectorwise report from India. Brand Equity Foundation (IBEF); Available at <http://www.ibef.org/industry.aspx>

|                |                              |          |          |          |                |                    |
|----------------|------------------------------|----------|----------|----------|----------------|--------------------|
| <b>SDE9302</b> | <b>MODEL MAKING WORKSHOP</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>Credits</b> | <b>Total Marks</b> |
|                |                              | <b>1</b> | <b>0</b> | <b>3</b> | <b>3</b>       | <b>200</b>         |

**COURSE OBJECTIVES:**

- Modelmaking and carpentry as techniques for design
- Models as a way of representation and experimentation

**MODULE 1 INTRODUCTION****20Hrs**

To introduce the tools, techniques and finishes used in carpentry using different materials (wood, metal, terracotta, paper and board, thermocol, soap/wax, POP, recycled materials). Introducing the techniques of planning, sawing, chiselling & jointing in timber, Selection of timber for different kinds of joints.

**MODULE 2 TOOLS & MACHINERY****30 Hrs.**

Introduction to hand tools – classification, nomenclatures and uses. Material working machines types, sizes, parts and their functions and operations and safety precautions and maintenance. Practical techniques- Sawing, Chiselling, Boring, Joining, Widening, Fixing, Fitting, Carving

**MODULE 3 FINISHES****10 Hrs.**

Surface & finishing- sanding, staining, varnishing, polishing, etc. materials & methods. Painting surfaces with various types of finishes. Surface finish materials- Putty, Wax, Sawdust, Colour powders, POP, etc; Laminated sheets, OST sheets, Block boards, Sun mica, Veneers, etc.

Exercises to Hand-on Product designs through carpentry, glass painting & other model making techniques. 3D sculptures involving platonic solids, wooden sculptures applying different types of carpentry joints, design and execution of POP made objects such as: cornices, moldings, brackets, etc., Metal and terracotta sculptures.

**Max. 60 Hours****TEXT / REFERENCE BOOKS**

1. Haun, L. (1999). Carpentry. United Kingdom: Taunton Press.
2. Taylor, J. D. (1996). Tools of the Trade: The Art and Craft of Carpentry. United States: Chronicle Books.
3. Jannsen, (1973). Constructional Drawings & Architectural models, Karl Kramer Verlag Stuttgart.
4. Smith W.H., (1982). The art of making furniture in miniature, E.P.Dutton Inc., New York.

| SDE9402 | COMPUTER APPLICATIONS I | L | T | P | Credits | Total Marks |
|---------|-------------------------|---|---|---|---------|-------------|
|         |                         | 0 | 0 | 6 | 3       | 100         |

**COURSE OBJECTIVES:**

- To provide the student of Interior Design a foundation in the techniques of drafting using computer as a tool.
- To introduce computer operation principles and explore image editing through a visual composition using graphics.
- To impart training in computer aided 2D drafting and 3D modelling.
- To expose the students to visual composition using computer tools.

**UNIT 1 2D DRAWING OUTPUT IN AUTOCAD****30 Hrs.**

Understanding the use of various drawing tools and object editing, setting up units, scales, limits, drawing tools, drawing objects, object editing and text, dimensioning in CAD. Transparent overlays, hatching utilities, line type, line weight and colour, Multiline, Polyline, etc. Styles, blocks and symbol library in ACAD, File management, retrieving data, attributes, Layout and plotting.

**UNIT 2 PRODUCTIVE TECHNIQUES USING COMPUTER TOOLS****10 Hrs.**

Introduction to tools of productivity – Blocks, slide facilities, script files and attributes. Understanding concepts of View port, concept of object linking and editing session.

**UNIT 3 INTRODUCTION TO 3D MODELLING****30 Hrs.**

Importing AutoCAD drawing File, Introduction to software interface; Basic Tools for Editing and Creating 3d models- Material application, using material editor, material browser, mapping textures, Lighting, cameras and render effects, environment mapping, fogs and atmospheres.

**UNIT 4 INTRODUCTION TO IMAGE EDITING****20 Hrs.**

Basic Tools for Editing and Creating Graphics in image editing software - Layers (layer styles opacity-adjustment layers) Basic Retouching (Colour, manipulations, Levels, Curves, Seeing Colour accurately, Patch tool, Cropping, Reading palettes, Dust and scratches) - Advanced Retouching (smoothing skin, smoothing wrinkles, special colour effects: black and white, sepia, grainy). Software Interface, creating and saving images, tool box and tools, special effects.

**Max. 90 Hours****COURSE OUTCOME:**

- CO1** Possess the skills and techniques for editing and creating graphics.
- CO2** Visualize complicated forms
- CO3** Understand in producing photo realistic image of 3D forms
- CO4** Demonstrate effective communication of drawings through software techniques
- CO5** Understanding the work flow/design process through Autocad, 3D, and image editing software
- CO6** Apply the knowledge of Computer application for development of projects

**TEXT / REFERENCE BOOKS**

1. Watt A., (1989). Fundamentals of Three-Dimensional Computer Graphics, Addis Wesley, Massachusetts
2. Tikoo, S., (1999) AutoCAD 2000: A Problem-Solving Approach, Thomson Learning.
3. Mccelland D., (2007) Photoshop 7 Bible Professional Edition, Wiley John & Son INC, New York

| SDE1502 | ESTIMATION AND COSTING IN INTERIORS | L | T | P | Credits | Total Marks |
|---------|-------------------------------------|---|---|---|---------|-------------|
|         |                                     | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To have a detailed understanding of the business principles, practices & procedures for Interior Designers.
- To know of the various facets of design formation and management, professional ethics and organizations, certification and licensing issues, design liability, project management, and portfolio development.

**UNIT 1 INTRODUCTION****8 Hrs.**

Estimation – definition, purpose, types of estimate, and procedure for Estimating the cost of work in order to implement an interior design project or to make products related to interior design like furniture, artefacts etc. Specification – Definition, purpose, procedure for writing specification for the purpose of calling tenders, types of specification. Specification for different item related to interior design project – woodwork for furniture window frames & pelmets, partitions etc. also of materials like steel aluminium glass of various kind. Wall panelling & false ceiling of materials like aluminium, steel, wood, electrical, plumbing, airconditioning & firefighting equipment.

**UNIT 2 RATE ANALYSIS & ESTIMATION FORMAT****6 Hrs.**

Rate Analysis – definition, method of preparation, quantity & labour estimate for woodwork, steelwork, Aluminium work, glass & its rate for different, thickness & sections, finishing (enamel paint, duco paints, melamine, DU coats, Hand polishing, veneering and laminating) for walls & ceilings. Electrical & plumbing products, wiring, ducting etc., and laying of tiles & wall panelling in the estimate format of the project.

**UNIT 3 DETAILED ESTIMATE****6 Hrs.**

Detailed Estimate – data required, factors to be considered, methodology of preparation, abstract of Estimate, contingencies, labour charges, bill of quantities, different methods of estimate for interior design works, methods of measurement of works.

**UNIT 4 COSTING OF FIXTURES & FITTINGS****8 Hrs.**

Cost of the following items: electrical fitting like, luminaries, fan, cables, switches etc., tiles in skirting & dado, cement plaster, joinery in wood, steel & aluminium, painting to walls – cement paint, oil paints, distemper acrylic emulsion, enamel paint painting to joinery, varnishing, French polishing plumbing equipment like piping, shower panels, cubicles, tubs, Jacuzzis, taps, motors, fountains, false ceiling of aluminium panels, steel & wooden frame work, thermocol etc. wall panelling of ceramic tiles & other tiles of materials suitable for the same, partitions made of materials like aluminium wood, steel etc.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Demonstrate comprehensive understanding through accompanying assignments, group discussions, and site visits.

**Max. 30 Hours****COURSE OUTCOME:**

- CO1** Prepare the Estimate in order to foresee the cost of the work to implement an interior design project.
- CO2** Understand the tools and techniques used to monitor / control project cost.
- CO3** Analyse concepts, selection and application of construction processes, materials and finishes including introduction to codes, working drawings and model building.
- CO4** Understand the rate analysis of different work items and the factors affecting rate of an item
- CO5** Prepare detailed specification writing for materials and works used in the built environment.
- CO6** Write specification for works designed for special situation, like non-conventional use of materials

**TEXT / REFERENCE BOOKS**

1. Allison, D. (2014). Estimating and Costing for Interior Designers: A Step-by-Step Workbook. Philippines: Bloomsbury Academic.
2. Rangwala S.C., Rangwala K.S., (1990). Elements of Estimating and costing, Charoter publishing House, Anand, India
3. Kesavan, R. (2004). Process, Planning And Cost Estimation. India: New Age International (P) Limited.
4. Dodsworth, S., Anderson, S. (2015). The Fundamentals of Interior Design. United Kingdom: Bloomsbury Publishing.
5. Riggs R., (1995). Materials and Components of Interior Architecture - 4th Edition, Prentice Hall Professional Technical

| SDE9502 | COMPUTER APPLICATIONS II | L | T | P | Credits | Total Marks |
|---------|--------------------------|---|---|---|---------|-------------|
|         |                          | 0 | 0 | 6 | 3       | 100         |

**COURSE OBJECTIVES:**

- To enhance the visualizing skills of the students by exposing them to the latest modelling software.

**UNIT 1 VISUALIZATION TECHNIQUES****20 Hrs.**

Photorealistic Visualization Rendering objects by observation, Rapid sketching techniques; Visual compositions of objects

**UNIT 2 MATERIALS AND LIGHTING****20 Hrs.**

Using material editor, material browser, mapping textures, Lighting, cameras and render effects, environment mapping, fogs and atmospheres. Interaction with Light Highlights, shadow and reflection study of objects; Direct and indirect illumination;

**UNIT 3 ADVANCED 3D SOFTWARE****20 Hrs.**

An overview of GUI, types of modeling, transforming objects, Compound objects, modifiers & modifier stack. Lathing, displacement, lofting, Boolean operations using standard and compound primitives, modeling with lofts, low polygon modeling and nurbsmodeling.

**UNIT 4 ADVANCED ILLUSTRATION AND PHOTO MONTAGE****30 Hrs.**

Image Processing Migration of forms and Image manipulation, Manipulation of lighting, exposure and colour of rendered images, Creating cutouts of humans, buildings and objects to add to context of renders, Creating photo montages using cutout images using layers and special effects to enhance the rendered image.

**Max. 90 Hours****COURSE OUTCOME:**

- CO1** Develop the ability to quickly visualize ideas
- CO2** Ability to do visual design explorations
- CO3** Ability to create compelling visuals of ideas before they come to reality for every stakeholder's proper understanding
- CO4** Create various effects in atmosphere using lighting effects and material mapping
- CO5** Experiment with forms, rendering and presentation techniques
- CO6** Construct photo montages alongside 3d render to effectively communicate their design ideas

**TEXT / REFERENCE BOOKS**

1. McKim R., (1980). Experiences in Visual Thinking, Brooks/Cole Publishing Company.
2. Missal S., (2003) Exploring Drawing for Animation (Design Exploration Series), Thomson Delmar Learning.
3. Ching, F. D. K., Juroszek, S. P. (2019). Design Drawing. United States: Wiley.
4. Porter T., (1991). Design Drawing techniques for architects, graphic designers and artists, Oxford Architectural Press.
5. Dalley T., (1980). The complete guide to illustration & design, Phaidon, Oxford.

| SDE3601 | COMMERCIAL AND RETAIL INTERIORS | L | T | P | Credits | Total Marks |
|---------|---------------------------------|---|---|---|---------|-------------|
|         |                                 | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To learn about the importance, techniques, and design applications for commercial and retail interiors.

**UNIT 1 INTRODUCTION****4 Hrs.**

Introduction to commercial interior space design- types of commercial interior spaces – factors influencing designing of commercial interior spaces – materials used in designing commercial interior spaces. Collection of materials used for designing interior space. Application of codes, accessibility guidelines, and policies and procedures. Concepts, themes, ambience and aesthetics in designing commercial and retail interiors.

**UNIT 2 COMMERCIAL ART****8 Hrs.**

Concept of commercial art – Meaning and Definition, Development of commercial art. Art in Commercial space Designing and planning space for various commercial purposes – Restaurants and Hotels. Public utility services – Airport, Educational Institutions, Hospitals, Shopping complex, Exhibition, Schools, Malls, Universities and Trade Fairs.

**UNIT 3 COMMERCIAL DISPLAYS****8 Hrs.**

Commercial display and Techniques – Interior Display – general Arrangement, principles and factors, types and merchandise display, types of lighting arrangements in commercial buildings. Window display – meaning and concept, Basic principles and techniques, types of window display, window arrangement.

**UNIT 4 CONTEMPORARY TRENDS****6 Hrs.**

Study of user types, user behaviour concepts relevant to commercial interiors. Functional aspects related to circulation and integration of different spaces. New trends in commercial Architecture- design in commercial building. Basic concepts of commercial buildings. Features of Departmental stores and Shopping complex.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Demonstrate comprehensive understanding through accompanying assignments, group discussions, and site visits.

**Max. 30 Hours****COURSE OUTCOME:**

- CO1** Analyse Commercial interior space design using different materials
- CO2** Develop art in commercial space designing and planning based on various purposes.
- CO3** Identify the role of lighting in commercial displays and techniques involved
- CO4** Understand the Concept of window display and window arrangement
- CO5** Synthesize various user behaviour concepts relevant to retail and commercial space.
- CO6** Discuss the Recent trends in commercial architecture.

**TEXT / REFERENCE BOOKS**

1. Gupta, C.B., Dr. Nair, Rajan (2003), Marketing Management, Sultan Chand & Son, New Delhi.
2. Joseph, D.C., Jules, P. and Martiv, Z. (1992), Time saver standards for Interior Design and space Planning, New York.
3. Nair, R. (2002), Marketing, Sultan Chnd and Sons Publisher, New Delhi.
4. Pattanchetti, C.C. Reddy, P.N. (1995), Marketing, Rainbow publishers, Coimbatore.

| SDE 3801 | ENERGY EFFICIENT INTERIORS | L | T | P | Credits | Total Marks |
|----------|----------------------------|---|---|---|---------|-------------|
|          |                            | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To sensitize students about need for environmental design
- To study the various factors involved in environmental and sustainable buildings
- To understand functional approaches in designing sustainable and energy efficient interiors.

**UNIT 1 CONTROL OF ENVIRONMENT****6 Hrs.**

Environment control – meaning of environment, importance of environment control, advantages, elements to be controlled in the interiors – Temperature, air quality, sound, sanitation, light. Passive strategies and technologies.

**UNIT 2 HVAC AND LIGHTING****8 Hrs.**

Ventilation – Definition, importance, Types of ventilation – Natural and mechanical Guidelines for natural ventilation. Heating – Need for room heating, types of heating system – central, radiant, forced air; solar system – Active solar system and passive solar system. Air conditioning – Meaning, Principles, need for conditioning, air conditioning applications, Humidity control, types of air conditioning - central air conditioning, and packaged. Eco lighting - Introduction, types, materials and application of LED and solar. Recommended level of illumination, guidelines for lighting design, lumen method of design

**UNIT 3 SUSTAINABLE MATERIALS****8 Hrs.**

Study of sustainable materials available and its application in the building construction. Certification systems and certification authority-IGBC, GRIHA, BEE. For E.g. Mud bricks, AAC, fly ash blocks, UPVC, WPC boards, paints, glass etc.

**UNIT 4 CASE STUDIES****4 Hrs.**

Study of existing case studies of green buildings, adapting the principles of sustainable designs to interior design projects, involving market survey, user reviews and experts opinion. Detail study of techniques, methods and limitations involved in designing green spaces, using renewable energy.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Demonstrate comprehensive understanding through accompanying assignments, group discussions, and site visits.

**Max. 30 Hours****COURSE OUTCOME:**

- CO1** Understand passive design strategies and technologies to help control the quality of interior environment
- CO2** Gain knowledge about the various types of heating and cooling systems that consume less energy
- CO3** Classify the various low energy materials used in interior construction
- CO4** Review the various rating and certification systems for sustainable design
- CO5** Analyse sustainable design principles and techniques used in various green space case studies.
- CO6** Understand tools, materials and techniques adopted in green buildings.

**TEXT / REFERENCE BOOKS**

1. Abbaszadeh, S, L. Zagreus, D. Lehrer, and C. Huizenga, (2006) "Occupant Satisfaction with Indoor Environmental Quality in Green Buildings", University of California, Berkeley, Center for the Built Environment.
2. Michael J, (1997) "Biodiversity and Conservation", Routledge Taylor & Francis Group, 2nd edition.
3. Miles Keeping, David Shiers, (2017) "Sustainable Building Design: Principles and Practice", WileyBlackwell, 1st edition.
4. Susan M Winchip, (2011) "Sustainable Design for Interior Environment", Fairchild Publication, 2nd revised edition.
5. Koeinsberger, O.H. and others, (2003) Manual of Tropical Housing and Building. OrientLongman, Chennai.
6. Markus, T.A and Morris. E.N. (1986) Buildings. Climate and Energy, Pitman Pub Ltd., London.

| SARA1603 | SPECIFICATION AND ESTIMATION | L | T | P | Credits | Total Marks |
|----------|------------------------------|---|---|---|---------|-------------|
|          |                              | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To introduce the importance of specification for quality control in design and construction.
- To help the students in the preparation of bill of quantities for estimation and budgeting in construction projects.
- To comprehend the rate for different items of work for costing and valuation of the construction projects.

**UNIT 1 INTRODUCTION TO SPECIFICATION****4Hrs.**

Definition – Classification of Specification - Necessity and importance of specification. Specification writing - Principles of Specification writing. Important aspects in the design of specification – Differences between Brief and detailed Specification for 1st class, 2nd class, 3rd class building.

**UNIT 2 INTRODUCTION TO QUANTITY ANALYSIS****8 Hrs.**

Introduction to Quantity analysis – Basic understandings of Unit measurements for various items of work – Mix proportions – Rules adopted for taking out of quantities. Methods adopted in quantity analysis. Deriving detailed quantity for various items of work for a single-story building like earthwork excavation, brick work, PCC, RCC works, wood works, iron and steel works, plastering, painting, flooring, weathering course etc. with different methods.

**UNIT 3 ESTIMATION****8 Hrs.**

Types & purpose of estimation - Approximate estimate of buildings - Bill of quantities - Factors to be considered - Principles of measurement and billing, contingencies, measurement of basic materials like brick, wood, concrete and unit of measurement for various items of work. Deriving detailed estimates for various items of work for a single storied building along with the specification of the materials and BOQ.

**UNIT 4 COSTING AND VALUATION****6 Hrs.**

Introduction to rates for main items of work using current market rates for materials, labour, plants, tools and equipment, transportation, handling, storage and contractor's profit – Construction technology involved. Preparing rate analysis for P.C.C, R.C.C, brick work, stone work, plastering and finishes - Deriving construction cost as per BOQ. Introduction to Valuation of the properties - terms and values - Depreciation and its types - Types, methods and purpose of valuation.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Preparation of Bill of quantities with the specification of 1st class construction for a single storied residential building. Arriving construction cost for a single storied residential building along with detailed estimation. Detailed specification and estimation for an apartment building with Stilt + Four floors from earth work excavation till the completion of project in MS excel to be submitted as portfolio.

**Max. 30 Hours****COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Acquire knowledge on the specification writing for any construction projects.
- CO2** Familiarize students on the need and importance of bill of quantities for arriving project budgeting.
- CO3** Explore different methods of estimation and preparation of detailed estimation for the Construction project
- CO4** Comparative analysis on the item rates for the different materials, hierarchy of labours, hiring equipment's etc.
- CO5** Evaluating the project cost with the detailed estimation and rate analysis.
- CO6** Skill to prepare a valuation report for a constructed building with depreciation factor.

**TEXT / REFERENCE BOOKS**

- Chakraborti, M. (2006). Estimating, Costing, Specification & Valuation In Civil Engineering .
- Dutta, B. N. (2016). Estimating and Costing in Civil Engineering (Theory & Practice). UBS Publishers' Distributors Pvt Ltd.
- Rangawala. (2017). ESTIMATING, COSTING AND VALUATION [ PROFESSIONAL PRACTICE and quantity surveying ] . Charotar Publishing House Pvt. Ltd.
- Singh, G. S. (2013). Estimating Costing & Valuation. Standard Publishers Distributors

**WEBSITES**

- <http://www.dasoftn.in/wp-content/uploads/2017/03/TN-Building-Practice-Vol-II-Chapter-XI-C-General-Conditions-of-Contracts.pdf>
- <https://www.tnhighways.gov.in/pdf/REVISED%20SOR%202017-18-APPD.pdf>

| SARA5431 | ENVIRONMENTAL IMPACT ASSESSMENT<br>TECHNIQUES | L | T | P | Credits | Total Marks |
|----------|-----------------------------------------------|---|---|---|---------|-------------|
|          |                                               | 3 | 0 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To introduce the various aspects of environmental impact assessment.
- To understand the components and impacts of EIA and socio-economic systems.
- To give an insight to sectoral EIA in diverse contexts.

**UNIT 1 INTRODUCTION****9 Hrs.**

Historical development of environmental impact assessment (EIA) - EIA in project cycle, legal and regulatory aspects in India – Types and limitations of EIA – Cross sectoral issues and terms of reference in EIA – Public Participation in EIA - EIA process, screening, scoping, setting, analysis, mitigation.

**UNIT 2 COMPONENTS AND METHODS****10 Hrs.**

Matrices – Networks – Checklists – Connections and combinations of processes - Cost benefit analysis – Analysis of alternatives – Software packages for EIA – Expert systems in EIA – Prediction tools for EIA – Mathematical modelling for impact prediction – Assessment of impacts: air, water, soil, noise, biological — Cumulative Impact Assessment – Documentation of EIA findings, planning, organization of information and visual display materials – Report preparation - EIA methods in other countries.

**UNIT 3 IMPACT ON SOCIO-ECONOMIC SYSTEMS****10 Hrs.**

Definition of social impact assessment - Social impact assessment model and the planning process - Rationale and measurement for SIA variables - Relationship between social impacts and change in community and institutional arrangements - Individual and family level impacts - Communities in transition - Neighborhood and community impacts, selecting, testing and understanding significant social impacts - Mitigation and enhancement in social assessment - Environmental costing of projects.

**UNIT 4 SECTORAL EIA****10 Hrs.**

Ethical and Quality aspects of environmental impact assessment, sectoral EIA -EIA related to the following sectors – Infrastructure, construction and housing, mining, industrial, thermal power, river valley and hydroelectric, coastal projects- Nuclear Power, hill area development and CRZ -EIA for coastal projects.

**UNIT 5 COMPREHENSIVE LEARNING****6 Hrs.**

To make a report on the role of government and government agencies in emphasizing the adoption of EIA

**Max.45 Hours****COURSE OUTCOME:**

- CO1** Explore about the legal and regulatory aspects overview of EIA in India.
- CO2** Understanding of the components, methods, tools and documentation involved in EIA.
- CO3** Analyse the impact of socio-economic systems and an insight to EIA methods in other countries.
- CO4** Acquire knowledge about the various parameters in social impact assessment with examples.
- CO5** Categorizing the ethical and quality aspects of EIA.
- CO6** Identify the aspects and issues related to various sectoral EIA ranging from micro to macro level.

**TEXT / REFERENCE BOOKS**

1. book, E. A. (1998). *Guidelines for environmental assessment of energy and industry projects*,. Vol. III: World Bank.
2. D.P., L. (2003). *Environmental Impact Assessment – Practical solutions to recurrent problems*,. New Jersey: Wiley-Interscience.
3. J. P. (1999). *Handbook of Environmental Impact Assessment*, . London: Blackwell Science - Vol., I and II.
4. L.W, C. (1996). *Environmental Impact Assessment*,. New York: McGraw Hill,.
5. Nick Harvey, B. C. (2012). *Environmental Impact Assessment: Procedures and Practices*,. USA: Oxford University Press.

**WEBSITES**

1. <https://www.cbd.int/doc/nbsap/EIA/India.pdf>
2. <http://coe.mse.ac.in/Guidelines.asp>
3. [http://www.planning.nsw.gov.au/rdaguidelines/documents/emp\\_guideline\\_publication\\_october.pdf](http://www.planning.nsw.gov.au/rdaguidelines/documents/emp_guideline_publication_october.pdf)
4. [http://www.gpcb.gov.in/pdf/Nuclear\\_Power\\_Corpo\\_of\\_India\\_Exe\\_Summ\\_Eng.pdf](http://www.gpcb.gov.in/pdf/Nuclear_Power_Corpo_of_India_Exe_Summ_Eng.pdf)
5. [http://www.tnpcb.gov.in/pdf/EIA\\_Perambalur\\_%20SEZ%20Eng.pdf](http://www.tnpcb.gov.in/pdf/EIA_Perambalur_%20SEZ%20Eng.pdf)
6. <https://www.env.go.jp/earth/coop/coop/document/10-eiae/10-eiae-2.pdf>

| SARA5201 | PROJECT PLANNING AND CONTROL | L | T | P | Credits | Total Marks |
|----------|------------------------------|---|---|---|---------|-------------|
|          |                              | 3 | 0 | 0 | 3       | 100         |

### COURSE OBJECTIVES:

- To understand Project planning control of project realization processes.
- Develop awareness on network analysis, scheduling and costing in project planning process and introduce comprehensive planning in complex projects.

|               |                         |              |
|---------------|-------------------------|--------------|
| <b>UNIT 1</b> | <b>NETWORK ANALYSIS</b> | <b>9 Hrs</b> |
|---------------|-------------------------|--------------|

Work break down structure-assessing duration - Project scheduling, Job layout, Bar charts, Milestone charts, Network schedule, time limited and resource-limited schedule, schedule hierarchy. Activity Definition and Sequencing, The critical path method - Calculations for critical path scheduling – PERT vs CPM; Duration estimating – PERT, CPM, Network elements, Time Estimates, Activity float and schedules.

|               |                   |               |
|---------------|-------------------|---------------|
| <b>UNIT 2</b> | <b>SCHEDULING</b> | <b>12 Hrs</b> |
|---------------|-------------------|---------------|

Schedule development, Resource oriented scheduling – Scheduling with resource constraints –

Use of Advanced Scheduling Techniques-Scheduling with uncertain durations., Control – Factors affecting work scheduling, forecasting inputs and outputs, schedule hierarchy- Relevance of construction schedules, management through networks- Purpose of work scheduling, Bar chart method of work scheduling, Scheduling the network plan, Line of Balance technique of scheduling repetitive projects.

|               |                            |              |
|---------------|----------------------------|--------------|
| <b>UNIT 3</b> | <b>COSTING AND CONTROL</b> | <b>9 Hrs</b> |
|---------------|----------------------------|--------------|

Cost planning: Cost Estimating Process, Inputs, Tools & Techniques classification of costs, financial forecasting, budgeting- BOQ-unit rate costing standards of resources, work-package standard cost, standard 'S' curve forecasting tool

Cost control, Cost accounting system, cost control preliminaries, Control approach, revenue or sales control, direct cost control, indirect cost control, project budgetary control systems, control responsibility, risk cost management

Project time control, Time progress monitoring methodology, what if analysis, reviewing time progress, time-cost relationship, Time -Schedule control, Time reduction techniques, work progress reviewing procedure.

|               |                                                    |              |
|---------------|----------------------------------------------------|--------------|
| <b>UNIT 4</b> | <b>COMPREHENSIVE PLANNING FOR COMPLEX PROJECTS</b> | <b>9 Hrs</b> |
|---------------|----------------------------------------------------|--------------|

Project definition-Objectives-Strategy-Technology and design-External factors, finance and duration – Political and social issues-Planning and control, environmental, and economic factors – Attitudes-Implementation – Organization-Contract Strategy –Strategic issues for enterprises working on multiple projects with thrust on high-rise constructions - Project closeout - Learning from past experience -Releasing people and equipment -Recognizing and rewarding people - Some guidelines for future projects -Questions for getting started.

|               |                                 |              |
|---------------|---------------------------------|--------------|
| <b>UNIT 5</b> | <b>CONSTRUCTIVE ASSIGNMENTS</b> | <b>6 Hrs</b> |
|---------------|---------------------------------|--------------|

Prepare work breakdown structure for the project and basis the understanding on the project execution sequence. List the sequential activities and workout the time required for accomplishing each task and activities. Develop a resource allocation data and optimise the timeline using the resource balancing techniques. Apply crashing techniques to reduce the timeline on the project while doing the tracking as a part of project control.

**Max. 45 Hours**

### COURSE OUTCOMES:

- CO1** Familiarizing on the work breakdown structure in a construction project and imparting knowledge on project scheduling.
- CO2** In-depth understanding on project scheduling with required inputs, tools and techniques applied and outputs achieved.
- CO3** Practical application of CPM, PERT analysis in time scheduling through network diagram of construction activities.
- CO4** Knowledge on the relationship between cost and time, the pros and cons of cost overrun and cost under run and the techniques adopted for cost control.
- CO5** Application of crashing in a construction project to understand the various costs involved and cost overrun through calculations and analysis.

- CO6** Understanding the comprehensive planning involved in complex projects through various parameters and creating a detailed schedule for a construction project.

### TEXTS / REFERENCE BOOKS

1. Chitkara, K.K. Construction Project Management, Planning, Scheduling and Controlling, 3rd Edition, Tata McGraw Hill Publishing Co., New Delhi, 2014
2. Calin M. Popescu, ChotchaiCharoenngam, Project planning, Scheduling and Control in Construction: An Encyclopaedia of Terms and Applications, John Wiley, New York, 1995
3. JuriSutt , Manual of Construction Project Management for owners and clients, John Wiley and Sons, 2011
4. Willis., E.M., Scheduling Construction projects, John Wiley and Sons, 1986
5. George J. Ritz, Sidney M. Levy, Total Construction Project Management, Second Edition, McGraw-Hill Professional, 2013
6. Project Management Institute, A Guide to the Project Management Body of Knowledge (PMBOK Guide), Project Management Institute, Incorporated, 2013
7. Harold Kerzner, Project Management: A Systems Approach to Planning, Scheduling and Controlling, 10<sup>th</sup> Edition, Wiley India Pvt. Ltd., 2013
8. Jonathan F. Hutchings, Project Scheduling Handbook (Civil and Environmental Engineering), CRC Press, 2003
9. Peter Fewings and Christian Henjewe, Construction Project Management, An Integrated Approach, 3<sup>rd</sup> edition, Swales & Willis Ltd, Exeter, Devon, UK, 2019.
10. Saleh Mubarak, Construction Project Scheduling and Control, Willey & Sons, 2015.

| SARA2302              | COMPUTER AIDED<br>ARCHITECTURAL GRAPHICS - I |                       | L                        | T | P     | Credits | Total Marks |
|-----------------------|----------------------------------------------|-----------------------|--------------------------|---|-------|---------|-------------|
|                       |                                              |                       | 1                        | 0 | 2     | 2       | 100         |
| Continuous Assessment | End Semester Examination                     | Min Pass Marks        |                          |   |       |         |             |
|                       |                                              | Continuous Assessment | End Semester Examination |   | Total |         |             |
| 70                    | 30                                           | 35                    | 15                       |   | 100   |         |             |

**COURSE OBJECTIVES:**

- To expose the students to various aspects of computer applications used in Architectural Design and Construction.
- To provide students with the digital skills necessary to efficiently undertake Architectural assignments.
- To develop a proficiency in using computers as a tool for systematic research through analysis and validation and presentation of completed design works

**MODULE 1 INTRODUCTION****4 Hrs.**

Introduction to various computer aided tools used in Architecture, Advantages and Disadvantages of each - 2D Vector vs Raster graphics- 3D modeling for exploration and presentation- Tools used for converting 2D to 3D - List of techniques used in the field, Possibilities & Importance of each.

**MODULE 2 2D DRAFTING TOOLS****16 Hrs.**

Introduction to CAD Interface - Basic Understanding of coordinates - Model & Paper space - Understanding drawing commands using mouse and keyboard - Setting up limits and Understanding of Function keys - Exploring drawing unit settings (Imperial & Metric)- Line types: Multiline, Polyline, etc. - Line Styles: Dashed, Dotted, etc. - Understanding of Line Weights, Transparent Overlays, hatching utilities - Use of Color - Styles, Blocks and Symbol Library - Annotations & Dimensions - Control of Drawing - Plot and publish settings - Resources and References

**MODULE 3 3D MODELLING****20 Hrs.**

Introduction to Sketchup Interface- Importing 2D drawing file into Sketchup - Adjusting Sketchup Settings - Creating and Editing Shapes and Forms - Creating Extrusions, Sweeps and Revolves - Layering, Grouping and Components - Creating textures - Applying materials to objects - Creating and saving styles - Creating plans and sections from 3d model –Geo locating model - Save and Export options - Extensions and Plug-in- Resources and References

**MODULE 4 VISUALIZATIONS FOR PRESENTATIONS****16 Hrs.**

Importance of presentations in Architecture - Use of Visuals and Process Diagrams in Architecture - Tools used for presentations - Introduction to Photoshop- Interface and Tools- Composing an Image- Artistic vs Technical- Importing and rendering 2d drawings- Textures and tiling- Layer management and Overlaying- Creating depth in 3 dimensional visuals: Lighting, Shadows and Reflections- Masking and cutting- Adding people, trees, sky, objects- Styles and effects- Techniques of Photo Montage Visualizations- Post production corrections- Save formats- Resources and References

**MODULE 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Draft Recreate 2D drawings of the previous semester's-built form in AutoCAD and create a 3D Sketchup model for the same. Represent in presentation format using Photoshop as a tool and submit as a portfolio for the end semester viva voce.

**Max. 60 Hours****COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Achieve proficiency in the basic computer skills relevant in the architectural profession
- CO2** Construct 2D orthographic projections in CAD
- CO3** Visualize design concepts in-the-round and make simple and complex 3D objects
- CO4** Retrieve and present drawings and visualizations appropriately for multiple usages across various platforms
- CO5** Develop diagrams and visuals to express architectural ideas and concepts.
- CO6** Process images and create photo montages for presentation visualizations.

**TEXT / REFERENCE BOOKS**

1. AutoCAD Architecture User's Guide. (2011). Autodesk, Inc.
2. Grabowski, R. (2001). The Illustrated AutoCAD 2002 Quick Reference. Cengage Learning.
3. SketchUp Hands-on: Student Coursebook. (2016). 3dvinci.
4. Tickoo, S. (1999). AutoCAD 2000: A Problem Solving Approach. Delmar Learning; 1 edition .
5. Watt, A. (1991). Fundamentals of three-dimensional computer graphics. Computers and Geosciences.

| SARA2402              | COMPUTER AIDED<br>ARCHITECTURAL GRAPHICS - II |                       | L                        | T | P | Credits | Total Marks |
|-----------------------|-----------------------------------------------|-----------------------|--------------------------|---|---|---------|-------------|
|                       |                                               |                       | 1                        | 0 | 2 | 2       | 100         |
| Continuous Assessment | End Semester Examination                      | Min Pass Marks        |                          |   |   |         |             |
|                       |                                               | Continuous Assessment | End Semester Examination |   |   | Total   |             |
| 70                    | 30                                            | 35                    | 15                       |   |   | 100     |             |

**COURSE OBJECTIVES:**

- To create 3 dimensional visualizations for effective representation of architectural design
- To develop advanced proficiency in software for architectural design, presentation and building information management.

**MODULE 1 COMPUTER RENDERING FOR VISUALIZATIONS****20 Hrs.**

Computer Rendering as a technique for Visualizations- Photorealistic vs Stylized Visuals - Introduction to V-Ray - 5 Step Render Workflow - Framing: Photographic Composition - Lighting: V-ray lights, Sun and Professional lighting - Materials: Creation, Properties and Setup - Final Render: Settings for Interiors and Exteriors, Day and Night, Render Elements - Post Production: Corrections and Techniques - Exploring Global Settings, Camera, Environment, Output, Indirect Illumination, VFB channels

**MODULE 2 INTRODUCTION TO 3D MASSING****4 Hrs.**

Introduction to Revit - Building Information Modelling - Interface- Working with a Project- Navigation between Views, Basic Drawing and Editing- General Drawing Tools

**MODULE 3 EDITING AND MODIFYING TOOLS****16 Hrs.**

Basic Modifying Tools Setting up Levels and Grid - Creating Levels- Importing CAD files- modifying walls - Adding Interior Walls, Doors and Windows - Loading Families - Creation and modifying on Floors - Roof -Stairs -Ramp -Ceiling -Railings

**MODULE 4 COMPONENT TOOLS****16 Hrs.**

Setting up Sheets - Placing and Modifying Views - Printing Sheets, Annotation - Working with Dimensions - Working with Text - Adding Detail Lines and Symbols, Tags and Schedules - Adding Tags- Rooms and Room Tags - Working with Schedules - Creating Legends, detailing in Revit - Setting up Detail Views - Creating and Annotating - Details -Keynoting and Keynote - Legends - Patterning.

**MODULE 5 CONSTRUCTIVE LEARNING****4 Hrs.**

Draft the previous semester-built form in Revit and create a 3D model for the building and represent over all into presentation format with computer render visualizations submitted as portfolio at end semester viva voce.

**Max. 60 Hours****COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Create photorealistic and stylized imagery of architectural objects through computer rendered perspectives
- CO2** Apply efficient workflows for modeling, texturing, lighting and rendering processes required to create architecture visualizations
- CO3** Utilize Revit software for conceptual form finding and massing exercises.
- CO4** Articulate the purpose of BIM and how it is applied in the Autodesk Revit software.
- CO5** Implement representation of objects in architecture model, and work with elevation, section, and 3D views.
- CO6** Generate customizations and templates for repetitive modelling functions.

**TEXT / REFERENCE BOOKS**

1. Eddy Krygiel, P. R. (2012). Mastering Autodesk Revit 2013 Architecture. Sybex.
2. Lisa DaNae Dayley, B. D. (2013). Photoshop CC Bible. John Wiley & Sons.

Employability

| SAR1402 | SPECIFICATION AND ESTIMATION | L | T | P | Credits | Total Marks |
|---------|------------------------------|---|---|---|---------|-------------|
|         |                              | 2 | 0 | 0 | 2       | 100         |

## COURSE OBJECTIVES

- To introduce the fundamentals of specification and estimation in construction of buildings
- To understand and apply techniques, methods to determine the cost involved for various works
- To compare and analyse the various technologies and innovations
- To interpret valuation reports through case studies

### UNIT1 SPECIFICATION AND SPECIFICATION WRITING

6 HRS.

Necessity & importance of specification, Types of Specification - Specification writing, Principles of Specification writing - Important aspects of the design of specification - sources of information - Classification of Specification - Brief Specification for 1st class, 2nd class, 3rd class building - Detailed specification for earthwork excavation, plain cement concrete, Reinforced concrete, first class and second class brickwork, Damp proof course, ceramic tiles/marble flooring and dado, woodwork for doors, windows frames and shutters, cement plastering, painting & weathering course in terrace.

### UNIT 2 ESTIMATION

10 HRS.

Types & purpose of estimation - Approximate estimate of buildings - Bill of quantities - Factors to be considered - Principles of measurement and billing, contingencies, measurement of basic materials like brick, wood, concrete and unit of measurement for various items of work - abstract of an estimate - Deriving detailed quantity estimates for various items of work of a building like earthwork excavation, brick work, plain cement concrete, Reinforced cement concrete works, wood work, iron works, plastering, painting, flooring, weathering course for a single storied building.

### UNIT 3 RATE ANALYSIS

8 HRS.

Analysis of rates for main items of work using current market rates for materials, labour, plants, tools and equipment, transportation, handling, storage and contractor's profit - Preparing rate analysis for P.C.C, R.C.C, brick work, stone work, plastering and finishes.

### UNIT 4 ECONOMICS AND ARCHITECTURE

6 HRS.

Economics as a determinant to Architectural land & Built form - Construction Technology - Materials, technology, innovations, Labour - Site selection factors - Demand survey - Cost & sale value (guided by market)-Feasibility study and Government Proposals - Methods of contracting and its link to specification drafting - Business Environment and structure in practice - Valuation, depreciation and its implications - case studies.

Max. 30 Hours

## COURSE OUTCOMES

On completion of the course the student will be able to

- CO1: Identify the importance of specification and estimation in construction
- CO2: Categorize detailed specification and estimation for all stages of construction
- CO3: Determine the rate analysis for various items of work involved
- CO4: Compare and contrast construction technology and innovation
- CO5: Integrate the knowledge learnt in preparing valuation reports
- CO6: Justify market value based on current scenario

## TEXT / REFERENCE BOOKS

1. Rangwala S., Estimating and Costing (Professional practice), Anand Charotar Publishing House, 1990
2. Estimating, Costing, Specification and Valuation in Civil Engineering, M. Chakraborti, 2006
3. Dutta B.W., Estimating & Costing, UBS Publishers Distribution Pvt. Ltd., India, 1991
4. Gurcharan Singh and Jagdish Singh, Estimating Costing and Valuation, Standard Publishers Distributors, 2012
5. Tamilnadu Building Practice, Volume I, Government Publication
6. P.W.D Standard Specifications and Schedule of rates, Government Publication

| SARA7402 | ENVIRONMENTAL COMPLIANCE AND MANAGEMENT | L | T | P | Credits | Total Marks |
|----------|-----------------------------------------|---|---|---|---------|-------------|
|          |                                         | 3 | 0 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- The course aims to develop competence to understand the environmental compliances and management systems for buildings and infrastructure projects
- To expose students to policies, standards and procedures, related to environmental compliance requirements.
- To develop the necessary skills and sensitivity towards sustainability of built-environment

|               |                                                         |              |
|---------------|---------------------------------------------------------|--------------|
| <b>UNIT 1</b> | <b>INTERNATIONAL AGENDA AND SUSTAINABLE DEVELOPMENT</b> | <b>9 Hrs</b> |
|---------------|---------------------------------------------------------|--------------|

International agreements agendas and protocols; Earth Summit at Rio, 1992 and subsequent developments, Agenda 21; UNFCCC; Copenhagen Accord; Montreal Protocol; Kyoto protocol- CDM, J.I.; Case studies in India under CDM; COPs / United Nations Climate Change Conferences.

Sustainable Development; Concept & elements of sustainable development; Carrying capacity concept and indicators of carrying capacity demonstrated examples; Ecological footprint concept, carbon footprint & sustainability, measures for footprint reduction, learning to use online calculators.

|               |                                                            |              |
|---------------|------------------------------------------------------------|--------------|
| <b>UNIT 2</b> | <b>POLLUTION MANAGEMENT &amp; RENEWABLE ENERGY SOURCES</b> | <b>9 Hrs</b> |
|---------------|------------------------------------------------------------|--------------|

Air & Noise Pollution Management; Air pollutants- indoor, outdoor ; sources; nature; National Ambient Air Quality Standards & for Noise; Air pollution prediction modelling- concept, basic equation, fugitive dust modelling, line modelling, plume modelling, samples-GLC contour maps; Mitigating air and noise pollution in construction projects; Construction and demolition pollution control practices;

Renewable Energy & Green belt designing; Alternate sources of power generation , renewable energy; Solar power- methods of generation, applicability, calculations; Green belt design concepts - choosing location, width and plants according to bio indication, pollution tolerance and agro climatic zones.

|               |                                                        |               |
|---------------|--------------------------------------------------------|---------------|
| <b>UNIT 3</b> | <b>WATER, WASTE WATER &amp; SOLID WASTE MANAGEMENT</b> | <b>12 Hrs</b> |
|---------------|--------------------------------------------------------|---------------|

Water and wastewater management; Assessment of water consumption and waste water generation for different types of buildings; Permissions for water withdrawal for infrastructure projects from Central Ground Water Authority/ Board; Waste water treatment systems (definitions, processes, advantages and disadvantages)- BOD, COD, water quality limits as per Schedule VI and classification of water as per CPCB; Water harvesting- Solid Waste Management; Solid waste generation assessment; - technologies & innovations; Conventional & modern solid waste treatment systems; Area required and methods of composting, vermi-composting; landfill location and features; Biogas plants.

|               |                                                   |              |
|---------------|---------------------------------------------------|--------------|
| <b>UNIT 4</b> | <b>STATUTORY ACTS &amp; REGULATIONS &amp; EIA</b> | <b>9 Hrs</b> |
|---------------|---------------------------------------------------|--------------|

Statutory Acts, regulations & Notifications; Environment (Protection) Act 1986; Environment (Protection) Rule, 1986, as Amended to date; other acts, NOC's and Authorities which grant NOCs;. Environmental Impact assessment- methods, procedures, legal framework of EIA; EIA Notification 2006, as amended to date; Steps of environmental clearance (EC); Authorities jurisdictions to grant EC and their scope; Applicability of forest clearance; Formats- Form 1, 1 A; Understanding TOR; Understanding EIA; Generic structure of EIA; Baseline data generation- parameters and methods/ sources for climate, micro meteorology, air, water, noise, soil, drainage, topography, flora, fauna, socio economics, demography, industries, natural phenomenon; EMS - ISO 14001; Scope and Implementation.

|               |                                 |              |
|---------------|---------------------------------|--------------|
| <b>UNIT 5</b> | <b>CONSTRUCTIVE ASSIGNMENTS</b> | <b>9 Hrs</b> |
|---------------|---------------------------------|--------------|

Case studies of EIA as relevant to construction projects; Case study and filling of Form 1 & 1A.

**Max. 45 Hours**

**COURSE OUTCOMES**

- CO1** Articulate the importance of International agreements, agendas and protocols with respect to sustainability.
- CO2** Understand pollution management and also identify the various renewable energy sources.
- CO3** Outline the quality, quantity and treatment process of potable water, waste water and solid waste management in large projects.
- CO4** Learn to make strategic decisions with respect to environmental compliance.
- CO5** Appreciate the different policies, standards, procedures involved in environmental clearance for projects.
- CO6** Develop the various formats relating to environmental compliance requirements practically applicable for projects, and develop competence in their application.

**TEXT / REFERENCE BOOKS**

1. Bert P. Krages II (2000) *Total Environmental Compliance: A Practical Guide for Environmental Professionals*, London: CRC Press Published.
2. Christopher Sheldon, Mark Yoxon (2001) *Installing Environmental Management Systems: A Step-by-Step Guide*- Oxfordshire: Routledge;
3. Stefan Schaltegger, Martin Bennett, Roger L. Burritt (2010). *Management accounting for Cleaner Production (Eco-Efficiency in Industry and Science*. Springer
4. Water Environment Federation(2012) *Sustainability Reporting Statements for Wastewater Systems*- Alexandria: Water Environment Federation
5. Water Environment Federation(2012) *Sustainability Reporting Statements for Wastewater Systems*- Alexandria: Water Environment Federation
6. Bernd Wagner, Stefan Enzler (2006) *Material Flow Management: Improving Cost Efficiency and Environmental Performance (Sustainability and Innovation)*-Physica-a Springer Company.

| SARA6131 | BUILDING PERFORMANCE ANALYSIS<br>STUDIO | L | T | P | Credits | Total Marks |
|----------|-----------------------------------------|---|---|---|---------|-------------|
|          |                                         | 0 | 1 | 2 | 3       | 100         |

**COURSE OBJECTIVE:**

- To introduce Simulation software like EQuest, Sefaira, Design Builder, IES VE and Envi Met and upcoming software to learn the techniques and substantiate the design.
- To understand the various simulation strategies and applications related to building sensitivity analysis, i.e. understanding the impact of equipment load in the building.
- To determine the building performance through parameters like thermal comfort of spaces, daylighting analysis, wind analysis, energy optimization and quantification.

**STUDIO BRIEF****PART 1**

To understand the basics of Software through Hands-on experience and introductory parameters and their studies like Climatic analysis, Shadow analysis, volumetric zoning, mutual shading, building sensitivity analysis and material selection.

- To comprehensively study the behavior of building components through simulation strategies for better performance.
- To understand the climate responsive design strategies through daylighting analysis, solar radiation analysis, wind analysis, volumetric zoning of spaces and through performing iterations for one particular design.
- To perform Calculations and derive inferences for day lighting, ventilation and solar heat gain and loss with its analysis.
- Understanding the impact of design through multiple strategies & their behaviour from multiple results to determine the optimum design solutions
- Understanding the Behaviour of Building Components-through simulation
- To determine the behaviour of building in the aspects of Energy, CO2 footprint, resources footprint, etc.

**PART 2**

- Understanding of Thermal Behaviour of Spaces, Calculations for thermal comfort of spaces, for various climate and conditions and its associated parameters like heat gains-losses, temperature profiles, fabric gains-losses, Ventilation etc
- Learning the Life Cycle of the Built environment through software like OpenLCA, Revit, etc.
- Add on software and Hands-on with allied and compatible software like Radiance, PMV, Solar Tool etc

**COMPREHENSIVE LEARNING**

Report with individual exercises for various parameters of the taught software as per break-up of module.

**COURSE OUTCOME:**

- CO1** Ability to investigate the performance of buildings through calculations
- CO2** Understand the basics of simulation software to analyse building performance
- CO3** Demonstrate skills and techniques for substantiating design through various analysis – daylighting, wind, solar radiation
- CO4** Critically analyse and perform calculations, prepare graphs and analyse the thermal performance
- CO5** Applying various software tools to analyse sustainability in the built environment.
- CO6** Acquired knowledge on calculations for thermal comfort, Ventilation, modelling for energy performance

**TEXT/ REFERENCES BOOKS**

1. Help Manuals
2. Video Tutorials
3. Trainers or Expert's Guest Lectures

| S89APT                | PROFESSIONAL TRAINING |                 | L | T | P              | Credits | Total Marks |
|-----------------------|-----------------------|-----------------|---|---|----------------|---------|-------------|
|                       |                       |                 | 0 | 0 | 0              | 3       | 300         |
| Continuous Assessment |                       | University Viva |   |   | Min Pass Marks |         |             |
| 50                    |                       | 50              |   |   | 50             |         |             |

**COURSE OBJECTIVES:**

- To undergo professional training in a firm to get experience of handling various environmental design practice, Sustainable developments and learn latest software trending in the market.
- To utilize the forum to discuss key issues in the projects, keep track of the different sustainable approaches, communicate with the stakeholders and get an overall view of the contract administration.
- The final project report will comprise of an in-depth research and analysis of activities in the form of drawings & relevant details, schematic charts & reports, photographs, documentation of the project, comments, suggestions, etc to appraise the efficiency in progress of work.

**PROCEDURE**

1. The candidate has to join an Architectural or Environmental design practice or organization and work on the design/ documentation of projects related to Sustainable Architecture and or Environmental site planning projects for a minimum of 30 working days during their summer vacation.
2. Weekly report has to be sent to the concerned Year Coordinator by the student duly signed by the head of the firm, which needs to be compiled in the comprehensive report later.
3. This comprehensive report shall be submitted at the end of the summer internship along with the Joining letter and experience letter.
4. The evaluation of report and viva voce examination shall be conducted as per norms for the Institution Semester examination.

**COURSE OUTCOME:**

- CO1** Accumulate concepts or skills with access to leading experts with specialized knowledge and experience.
- CO2** Obtain enhanced knowledge, develop communication skills and learn practical application aspects in the field.
- CO3** Manage projects using proven, effective performance measurement techniques.
- CO4** Analyze and recommend project decisions concerning scope, design, cost and other project parameters faster, effectively and confidently.
- CO5** Ability to prepare a portfolio of the academic and professional design work.
- CO6** Develop knowledge of the new software, materials, costing and documentation prevalent in Sustainable Architecture projects.

| SDE1601 | PROFESSIONAL PRACTICE | L | T | P | Credits | Total Marks |
|---------|-----------------------|---|---|---|---------|-------------|
|         |                       | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To have a detailed understanding of the business principles, practices & procedures for Interior Designers.
- To know of the various facets of design formation and management, professional ethics and organizations, certification and licensing issues, design liability, project management, and portfolio development.

**UNIT 1      ROLE OF INTERIOR DESIGNER IN SOCIETY****6 Hrs.**

Interior Design Profession as compared to other professions. Difference between profession and business. IIID and other organizations related to interior design profession. Interior Designers approach to works, ways of getting works: types of works, works partly executed by other Interior Designers.: various precautions to be taken before taking up the work, conditions of engagement between interior Designer and client: commencement of work.

**UNIT 2      PROFESSIONAL CONDUCT****6 Hrs.**

Code of professional conduct: scale of charges: units and mode of measurements, clerk of work and his duties, inspection of work, certificate of payment to contractor, bill of quantities, schedule of rates, tenders, public, limited and negotiated tender documents and allied formalities. Preliminary knowledge of Consumer protection Act and other related acts on Interior Designers.

**UNIT 3      ISSUES OF PROFESSIONAL PRACTICE****6 Hrs.**

Issues of professional practice: Professional behaviour, Ethics, Types of clients, Contracts, Tenders, Arbitration etc. as defined in terms of Interior Design field and current day context. Career opportunities, styles of interior design practice, relationship between client and professional, type of fees, process of fees negotiations, billing methods, tax liabilities, contracts – types of contracts – item rate, labour, lump sum, cost plus percentage etc.

**UNIT 4      CORRESPONDENCE IN DESIGN****8 Hrs.**

Types of offices for interior design practice: staff structure, filing of records, correspondence and drawings, maintenance of accounts, presentations in meetings, recording minutes of meeting. Knowledge of role of consultants and coordination between different consultants on a big project. Interior Designer's duties : drawings to be prepared : Interior Designer's relation with other parties connected with works such as client, contractor, sub-contractors, consultants and authorities.

**UNIT 5      CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Demonstrate comprehensive understanding through accompanying assignments, group discussions, and site visits.

**Max. 30 Hours****COURSE OUTCOME:**

- CO1** Understand of how modern businesses start and run
- CO2** Supervise and manage live design projects
- CO3** Understand the basic skillset and duties of a design business owner.
- CO4** Record the rules and regulations of professional practice in interior design
- CO5** Compare various types of interior design offices and the needs they cater to
- CO6** Evaluate the importance of correspondence in design with various stakeholders.

**TEXT / REFERENCE BOOKS**

1. Piotrowski, C. M. (2013). Professional Practice for Interior Designers. Germany: Wiley.
2. How to Run a Successful Design Business: The New Professional Practice. (2012). United Kingdom: Ashgate Publishing Limited.
3. Ravindra, S., Krishnamurthy, K. (2014). PROFESSIONAL PRACTICE. India: PHI Learning.
4. Coleman, C. (2001). Interior Design Handbook of Professional Practice. United States: McGraw-Hill Education.

| SDE1602 | INTERIOR DESIGN MANAGEMENT | L | T | P | Credits | Total Marks |
|---------|----------------------------|---|---|---|---------|-------------|
|         |                            | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To provide an insight into management of building involving finance and human resource
- To learn about concepts and application of management in interior design
- To gain knowledge about the methodology of executing a Project

**UNIT 1 INTRODUCTION****6 Hrs.**

Project planning and project scheduling and project controlling, Role of Decision in project management, Method of planning and programming, Human aspects of project management, work breakdown structure, Life cycle of a project, disadvantages of traditional management system, defining precedence relationships among activities, estimating activities duration, estimating resource requirement for work activities

**UNIT 2 ELEMENTS OF NETWORK****6 Hrs.**

Event, activity, dummy, network rules, graphical guidelines for network, numbering of events; Knowledge Management, Feedbacks, Information loops, Updates; Record Keeping Activity Documentation and Reporting Scope of Work Induction, Work distribution, Task Assignments Time management, Scheduling; Construction schedule (related to interior design field) labour schedule, material schedule, financial schedule, equipment schedule, organization schedule.

**UNIT 3 PROJECT TIME REDUCTION AND OPTIMIZATION****8 Hrs.**

Project cost, Indirect project cost, direct project cost, slope of the direct cost curve, total project cost and optimum duration, contracting the network for cost optimization, steps in cost-time optimization, Pre-tender planning, planning during tendering. Post tender advantage, bar chart - advantages and limitations, mile stone chart, CPM network analysis & PERT time estimates, time computation & network analysis

**UNIT 4 PROJECT UPDATING AND ALLOCATION****6 Hrs.**

When to update? Data required for updating, steps in the process of updating Resource usage profile: Histogram, Resource smoothing and Resource levelling, Computer applications in project management.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Demonstrate comprehensive understanding through accompanying assignments, group discussions, and site visits.

**Max. 30 Hours****COURSE OUTCOME:**

- CO1** Understand the currently prevalent techniques in the planning, programming and management of a project.
- CO2** Communicate novel Ideas Briefs, Detailed Briefs and Concept Notes to general stake holders
- CO3** Apply various documentation methods for the smooth organization of a project.
- CO4** Understand system changes to improve cost-effectiveness of a project
- CO5** Discuss and apply usage of various project management tools
- CO6** Ability to Approximate Scale of Work, Cost Estimation, and other skills required in establishing an independent design office

**TEXT / REFERENCE BOOKS**

1. Punmia et al., (2002). Project Planning and Control with PERT & CPM. India: Laxmi Publications Pvt Limited.,
2. Wiest J., Sevy F, (1982). A Management Guide to PERT, CPM, prentice Hall of India Pub, Ltd., New Delhi
3. Burgess R.A., G.White, (1975). Building production and project Management, The construction press, London.
4. Best K., (2010). The Fundamentals of Design Management, AVA Publishing.
5. Mozota B., (2004). Design Management: Using Design to Build Brand Value and Corporate Innovation, Allworth Press.

| SDE2601 | ADVANCED COMPUTERS AND FABRICATION DESIGN | L | T | P | Credits | Total Marks |
|---------|-------------------------------------------|---|---|---|---------|-------------|
|         |                                           | 2 | 0 | 4 | 4       | 100         |

**COURSE OBJECTIVES:**

- To reinforce the concepts of 3D modelling.
- To enable them to experiment with forms, mapping, rendering and presentation techniques.
- To prepare the student for mass production of furniture for various classes of people with the parameters of economy and culture

**UNIT 1 MATERIAL AND PROCESSES IN DESIGN 15 Hrs.**

Material Deposition Processes Laser Deposition, Micro-Plasma Powder Deposition, Chemical vapour Deposition, Micro Welding, Powder Casting Metal 3D Printing, Powder Deposition 3D printing;

**UNIT 2 SUBTRACTIVE MANUFACTURING 20 Hrs.**

Subtractive Processes Electrochemical machining, Electro-Discharge machining, Ultrasonic Machining, Laser Beam Machining, Water jet machining, Abrasive Jet Machining, Plasma Arc machining; Cutting and Removal Water Jet Cutting, Plasma Cutting, Laser Cutting, Electro-Discharge Wire Cutting; Abrasive Jet Cutting

**UNIT 3 ADDITIVE MANUFACTURING 20 Hrs.**

Additive Extrusion Processes Extruded Filament 3D printing, Clay 3D printing, Stereo lithography; Special Purpose Manufacturing processes- Rot molding, Layer Compression, Sheet contouring, Friction Welding

**UNIT 4 SURFACE TREATMENT PROCESSES 20 Hrs.**

Surface Treatment Processes Laser Etching, Acid/Base Etching, Electro Chemical Etching, Sand Blast Etching, Ultraviolet Etching, Photochemical Machining Electro Chemical Polishing

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS 15Hrs.**

Demonstrate comprehensive understanding through accompanying assignments, group discussions, and site visits.

**Max. 90 Hours**

**COURSE OUTCOME:**

- CO1** Understand the various subtractive manufacturing processes frequently used in Interior and furniture design.
- CO2** Compare the various new technologies being incorporated into manufacturing processes
- CO3** Comprehend the various subtractive manufacturing processes frequently used in Interior and furniture design.
- CO4** Discuss the various additive manufacturing processes frequently used in Interior and furniture design.
- CO5** Analyse the various surface treatment processes in the manufacturing of interior design elements.
- CO6** Develop systematic design approach and space planning through manufactured furniture as elements of design.

**TEXT / REFERENCE BOOKS**

1. Jain V., (2007). Advanced Machining Processes. Allied Publishers, New Delhi.
2. P. C. Pandey, H.S. Shan, (2007). Modern Machining Processes, Tata McGraw-Hill, New Delhi.
3. G.F. Benedict, (1987). Nontraditional Manufacturing Processes, Marcel Dekker Inc., New York.
4. McGeough, (1998). Advanced Methods of Machining, Chapman and Hall, London.
5. Garmo P., J.T. Black, Kohser R., (2001) Material and Processes in Manufacturing, Prentice Hall India.

| S102APT1 | PRACTICAL TRAINING | L | T | P | Credits | Total Marks |
|----------|--------------------|---|---|---|---------|-------------|
|          |                    | 0 | 0 | 0 | 12      | 600         |

**FOCUS**

To offer students an opportunity to work in an interior design office / firm and get acquainted with the demands of the profession.

**CONTENT**

The duration of the Practical Training shall be for a minimum period of sixteen weeks and shall cover various aspects of the interior design profession.

During this period, the candidate shall submit a report covering the following:

- (i) Report of project study that shall consist of various drawings, observations, field-notes, technical data pertaining to issues of design, material, construction and detailing of the project / building under study undertaken beyond office hours.
- (ii) Report of work done in office covering routine/ day to day work during the training period.

**NOTE**

The training should be undertaken with an Interior Design Firm/ Office having a minimum professional experience of 5 years. A Practical Training Examination will be conducted at the end of the training period, in which the work done by the trainee will be assessed through a viva voce.



Entrepreneurship

| SDE1801 | BUSINESS MANAGEMENT & ENTREPRENEURSHIP | L | T | P | Credits | Total Marks |
|---------|----------------------------------------|---|---|---|---------|-------------|
|         |                                        | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To enable the students to Develop entrepreneurial skills.
- To analyze the environment related to small scale industry and business.
- To understand the process and procedures of setting up small enterprises.
- To develop management skills for entrepreneurship development.

**UNIT 1 BUSINESS FOUNDATION****4 Hrs.**

Introduction to business and the forms of business enterprises; scope of management process; **Set up of an independent design business, Hiring processes, Project Scheduling and work delegation.**

**UNIT 2 RESPONSIBILITIES OF A BUSINESS****4 Hrs.**

**Ethical and social responsibilities of and within a business, with regards to the environment, consumers, workers, investors and business approaches; Contracts and Agreements, Conflict Resolution, Arbitration;**

**UNIT 3 RUNNING A DESIGN BUSINESS****8 Hrs.**

Business economics; project financing and banking system trends and guidelines within the emerging markets.

Intellectual Property- **Registration process of Intellectual property Rights, Design Registration, and Brand/Trademark Registration; Core marketing strategies: branding, positioning, and competitive analysis.** Product or service transformation to commodity quickly as competition & duplication of successful products, analysis of competition and advertising to position and brand products and services creation of successful brands

**UNIT 4 ENTREPRENEURSHIP****10 Hrs.**

Meaning, need, transition to self-employment and Entrepreneurship, qualities of a good entrepreneur, problems of entrepreneurs. Economic, Legal, Socioeconomic, Psychological and Environmental factors influencing entrepreneurial development. **Social Entrepreneurship, Business Entrepreneurship, Trading Entrepreneurship, Corporate Entrepreneurship, and Agricultural Entrepreneurship; Timmons Model of Entrepreneurship, Investment Models, Start-up Business Models, Business Plans, Pitch presentations, Small Business models; Agencies supporting entrepreneurial Development, Institutional Finance to Entrepreneurs.**

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Demonstrate comprehensive understanding through accompanying assignments, group discussions, and site visits. 1. Visit to SIDCO, DIC and TIIIC; 2. Case study of an enterprise and two entrepreneurs; 3. Preparation of a project proposal for funding.

**Max. 30 Hours****COURSE OUTCOME:**

- CO1** Understand the foundations of a successful business practice
- CO2** Correlate the theories and concepts of business management from a regional point-of-view
- CO3** Understand the responsibilities of a business contract
- CO4** Evaluate the potential variety of roles of a professional Interior Designer, and the range of projects they may undertake.
- CO5** Examine the various entrepreneurial qualities and factors influencing development
- CO6** Formulate a business plan and project proposal based on own interests and ideas

**TEXT / REFERENCE BOOKS**

1. Gupta C.B, Srinivasan N.P, (2004). Entrepreneurship development in India, Sultan Chand & Sons, New Delhi.
2. Chunawalla S.A, (1991) Sales Management, Himalayan Publishing House, New Delhi.
3. Desai V., (2000). Project Management and entrepreneurship, Himalaya Publishing House, New Delhi.
4. David H. Moll, (1999) Entrepreneurship, Prentice Hall of India, New Delhi.
5. Jerkins F., (2000) Advertising, Prentice Hall of India, New India.

| S84APT                | PROFESSIONAL TRAINING | L               | T | P | Credits        | Total Marks |
|-----------------------|-----------------------|-----------------|---|---|----------------|-------------|
|                       |                       | 0               | 0 | 0 | 3              | 100         |
| Continuous Assessment |                       | University Viva |   |   | Min Pass Marks |             |
| 50                    |                       | 50              |   |   | 50             |             |

#### COURSE OBJECTIVES:

- To undergo professional training in a project a management firm to get an on-site experience of handling services in under construction high rise projects.
- To utilize the forum to discuss key issues in the projects, keep track of the different scheduled activities and communicate with the stakeholders.
- To get an overall view of the contract administration.

#### COURSE CONTENT

A candidate has to undergo practical training for 30 working days in an approved Project management organization, reputed in property development or infrastructure and established not less than five years. Companies for practical training are carefully selected.

The organizations train the students in specialised core areas of Building Services / Management and assist the candidates in identifying the area of study for dissertation. During this period the student is advised to study the live projects of the concerned company / industry. The training internship is intended to provide students with practical insights into the world of real business of the construction industry. The Institute looks for meaningful and supervised work experience for the student. The final project report will comprise of an in-depth research and analysis of activities in the form of drawings & relevant details, schematic charts & reports, photographs, documentation of the project, comments, suggestions, etc to appraise the efficiency in progress of work.

#### COURSE OUTCOMES:

- CO1** Accumulate concepts or skills with access to leading experts with specialized knowledge and experience.
- CO2** Obtain basic knowledge using an effective performance management system in managing technical projects effectively.
- CO3** Manage projects using a proven, effective performance measurement technique.
- CO4** Analyze and recommend project decisions concerning scope, cost and schedule parameters faster, more effectively and more confidently.
- CO5** Stay on top of schedules, budgets, workloads and human resources issues and delegate practically and fairly.
- CO6** Learn to avoid the pitfalls of project management by quickly identifying potential project risks and mitigate them as early as possible.

| SARA5401 | COST BENEFIT ANALYSIS FOR BUILDING & INFRASTRUCTURE PROJECTS | L | T | P | Credits | Total Marks |
|----------|--------------------------------------------------------------|---|---|---|---------|-------------|
|          |                                                              | 3 | 0 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To understand the financial and economic analysis of projects and concept of individual versus social welfare in large infrastructure and construction projects.
- To understand the various parameters and process for Social Cost benefit Analysis
- To explore the different tools and techniques for financial and economic appraisal.

**UNIT 1 SCOPE OF CBA****9 Hrs**

Concept and rationale - social and economic perspective -welfare criterion. Scope of CBA, SCBA, objectives of CBA, steps/procedures of CBA;

**UNIT 2 PARAMETERS OF CBA****12 Hrs**

Issues involved in CBA, SCBA -shadow price and externalities, distribution of project net benefits (referent and non-referent groups); Consumer and producer surplus, valuation of rated goods and services, methods of non-market valuation;

**UNIT 3 PROCESS OF CBA****9 Hrs**

Process of CBA, SCBA- least cost analysis (Life Cycle Costing); With and without project analysis, Deriving social cost of project using conversion factor; Identifying and deriving benefits to society; Social discount rate.

**UNIT 4 FINANCIAL AND ECONOMIC APPRAISAL****9 Hrs**

Calculating ENPV or EIRR; Applying distribution analysis, risk analysis; Case studies -road, power, investment region.Financial and economic appraisal.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****6 Hrs**

Exercises will be in the form of group work/and or individual assignments. Each group shall have its own unique real life ongoing project for study. Groups are encouraged to have diverse projects so that peculiarities in specific projects are explored by entire class. All group members are encouraged to deliver presentations along with written assignments

**Max. 45 Hours****COURSE OUTCOMES**

- CO1** Outline the scope of SCBA.
- CO2** Get exposure to the issues in SCBA, its various components and valuation.
- CO3** Understanding the process of SCBA and its benefits to society.
- CO4** Apply quantitative techniques for financial appraisal.
- CO5** Formulate a real analysis model after analysis.
- CO6** Perform an economic appraisal.

**TEXT / REFERENCE BOOKS**

1. Anthony, E.(2001). *Cost benefit analysis- Concepts and practices*. New Delhi.: Boardman, Prentice-Hall of India,
2. Asian Development Bank (2013) *Cost-benefit analysis for development: A practical guide*. Mandaluyong City, Philippines: Asian Development Bank.
3. Campbell H., Brown, R. (2003). *Benefits-cost analysis- financial and Economic appraisal using spreadsheets*, Singapore: Cambridge,
4. Campbell, H., Brown R.(2016) *Cost- Benefit Analysis - Financial and economic appraisal using spread sheets*, Oxfordshire: Routledge.

| SARA5202 | RESOURCE MANAGEMENT | L | T | P | Credits | Total Marks |
|----------|---------------------|---|---|---|---------|-------------|
|          |                     | 3 | 0 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To understand the necessity of resource like men, materials and equipment management construction industry.
- To familiarize the students with varied equipment commissioned for various activities at site during different phases of a project.
- To impart and train rigorously the students for human resources management and to familiarize the knowledge of labour regulations and laws to manage the construction activities.

|               |                                         |              |
|---------------|-----------------------------------------|--------------|
| <b>UNIT 1</b> | <b>EQUIPMENT PLANNING AND ECONOMICS</b> | <b>9 Hrs</b> |
|---------------|-----------------------------------------|--------------|

Nature of work in construction projects, site constraints, rate of daily output, equipment suitability, equipment output capability, equipment productivity, future use of equipment; equipment owning costs, equipment operating costs, equipment engineering - standard equipment, minor equipment, operating reliability repair and maintenance considerations, safety features - safety management - equipment acquisition - purchasing plant / equipment, hiring equipment, leasing and hire-purchase equipment, replacing equipment, depreciation analysis.

|               |                                          |               |
|---------------|------------------------------------------|---------------|
| <b>UNIT 2</b> | <b>CONSTRUCTION EQUIPMENT MANAGEMENT</b> | <b>12 Hrs</b> |
|---------------|------------------------------------------|---------------|

Earth moving equipment - excavation and lifting equipment- earth cutting and moving equipment- transportation equipment - Compacting and finishing equipment. Production Equipment - concrete batching plants, concrete mixers, and transportation equipment – concrete placing equipment - Pre-casting special equipment - pre-stressing equipment, GRC equipment, steam curing equipment, shifting equipment, erection equipment - concrete vibrating, repairing and curing equipment, concrete laboratory testing equipment.

Material hoisting plant- cranes - support and utility services equipment's- pumping equipment's, sewage treatment, compressed air equipment, carpentry equipment - special purpose heavy construction plant- aggregate production plant & rock blasting equipment, piles and pile driving equipment.

|               |                                          |              |
|---------------|------------------------------------------|--------------|
| <b>UNIT 3</b> | <b>CONSTRUCTION MATERIALS MANAGEMENT</b> | <b>9 Hrs</b> |
|---------------|------------------------------------------|--------------|

Importance of material management - classification and codification of materials, Inventory control - managing the inventory and flow of raw materials, work-in-process, finished goods, and supplies for competitiveness and profitability, ABC analysis in inventory control, Inventory management safety stock, stock outs. stores management- quality control, use of materials management systems - purchase order - indents - marketing, registration of sellers - selection, placement of order - follow up - physical training - contract materials - physical inspection and verification - fixation of the re-order level.

|               |                                       |              |
|---------------|---------------------------------------|--------------|
| <b>UNIT 4</b> | <b>HUMAN RESOURCES AND MANAGEMENT</b> | <b>9 Hrs</b> |
|---------------|---------------------------------------|--------------|

Introduction – organization– management – employees – human resource management - personnel management – manpower planning, recruitment and selection, in-service training – training inputs, principles, types and assessments. Wages and salary administration – wage rate, wage payment methods, incentive plan, fringe benefits, productivity earnings, profit sharing, bonus payment, wage legislation and wage administration. Productivity in construction, measuring productivity, factors affecting productivity, responsibility for productivity. Employee's relation in an organization, motivating employees, hierarchy of motivation; Labour legislation, labour laws in construction, laws regulating wages, social security law, Industrial relations and trade unions.

|               |                                 |              |
|---------------|---------------------------------|--------------|
| <b>UNIT 5</b> | <b>CONSTRUCTIVE ASSESSMENTS</b> | <b>6 Hrs</b> |
|---------------|---------------------------------|--------------|

Prepare and present equipment and material planning schedule, checklist and productivity analysis for various earth moving equipment, production equipment, Material hoisting for a high rise building. Also prepare and justify the requirement of human resources with the help of histogram and organisation chart for the major construction site.

**Max. 45 Hours****COURSE OUTCOMES:**

- C01** Understanding the need and importance of equipment management under different task considerations in projects
- C02** Analysis of the options in selection of equipment and commissioning of the correct type of equipment at project site.
- C03** In-depth understanding on the different methods of production & material hoisting equipment, working under different site conditions.
- C04** Exposure towards material management techniques with the inventory control procedures at construction site
- C05** Surveying the factors influencing the labour productivity and applying the same in the construction site.
- C06** Comprehending the role of human resources including the various regulations to be followed in construction projects

#### TEXTS / REFERENCE BOOKS

1. Peurifoy, R.L., Ledbetter, Schexnayder, C.W.B., Construction Planning, Equipment and Methods, 5th Edition, McGraw Hill, Singapore, 1995
2. Sharma S.C. Construction Equipment and Management, Khanna Publishers New Delhi, 1988
3. Mahesh Varma, Construction Equipment and its Planning and Application, Metropolitan Book Company, New Delhi, 1983
4. Frank Harris and Ronald McCaffer, Management of Construction equipment, Macmillan Publication, 1991
5. Chitkara K.K. Construction Project Management: Planning, Scheduling and Controlling, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2014.
6. Mamoria C.B and S. V. Gankar, Personnel Management, Himalaya Publishing House. ,2003
7. Stephen E. Condrey, Handbook of Human Resources Administration, Jossey - Bass, 2010
8. Gopalakrishnan, Handbook of Materials management, PHI Learning Pvt. Ltd., 1993.
9. Carlton Coulter and Jill Justice Coulter, The complete standard handbook of construction personnel management, Prentice-Hall, Inc., New Jersey, 1989.
10. Mamoria C.B and S.V.Gankar, Personnel Management, Himalaya Publishing House. 2003.
11. Stephen E. Condrey, Handbook of Human Resources Administration, Jossey – Bass, 2010
12. Dwivedi R.S., Human Relations and Organisational Behaviour, Macmillan 2001.
13. Austen A.D., Managing Construction Projects: A guide to Processes and Procedures, International Labour Organisation, 1984.
14. Geoffrey D.Taylor, Materials in Construction, Longman, 2002.
15. Gopala Krishnan, Handbook of Materials management, PHI Learning Pvt. Ltd., 1993.

| SAR4063 | PROFESSIONAL TRAINING | L | T | P | Credits | Total Marks |
|---------|-----------------------|---|---|---|---------|-------------|
|         |                       | 0 | 0 | 0 | 12      | 600         |

### COURSE OBJECTIVES

- To give the student supervised opportunities to experience the essential practical aspects emphasized in an architect's office
- To provide opportunities to apply their acquired skills and knowledge in working life.

### FOCUS

As per the norms laid by the Council of Architecture, India, a candidate has to undergo Professional Training for one semester in an approved architectural firm established not less than five years with a registered architect. A student is to undergo this Professional Training during the seventh semester. The evaluation of the performance of the students in Professional Training shall be as per the assessment procedure laid out in clause 12c (vi) in the regulations.

### METHODOLOGY PROPOSED

- Procedure for practical training and evaluation mechanism has been evolved in consultation with practicing architects and the feed backs received.
- Monthly report & Final training report - 50% marks University Viva Voce - 50% marks

### COURSE OUTCOMES

**On completion of the course the student will be able to**

**CO1:** Analyzing the strength and the field of interest while choosing the office for doing internship

**CO2:** Understand the challenges to be faced in the professional life.

**CO3:** Comprehend the interaction between theory and practice

**CO4:** Enabling the students to deal with clients, contractors, masons, etc.

**CO5:** Developing Leadership skills, team work, co-ordination abilities

| SAR 1501 | PROFESSIONAL PRACTICE AND ETHICS I | L | T | P | Credits | Total Marks |
|----------|------------------------------------|---|---|---|---------|-------------|
|          |                                    | 2 | 0 | 0 | 2       | 100         |

## COURSE OBJECTIVES

- To expose of the important legal aspects and legislations practice and profession.
- To enable the students to understand the important laws and acts relevant to architecture.
- To construct knowledge on emerging trends in the practice of sustainable architecture, role of foreign architects.

## UNIT 1 INTRODUCTION

8 Hrs

Importance of Architectural Profession - Role of Architects in Society - Career options open for Architects-Prerequisites for Private Practice - Types of practices (Partnership/ Proprietary Concern /Associate - Architect's office and its management - Location, Infrastructure requirement - organizational structure, Basic accounts - Legal requirements, Registration of Firm, Tax Liabilities, Relationship with clients, contractors, Associate consultants and product Manufacturers.

## UNIT 2 CODE OF CONDUCT AND ETHICS

8 Hrs

Role of Professional Body (The Indian Institute of Architects) History, Objectives, its relevance - Architects Act 1972 (Background, intent, objectives)- Council of Architecture (role and function with regard to Architectural practice) - Registration of Architects - Importance of Ethics - guidelines prescribed for professional code of conduct -punitive action for professional misconduct.

## UNIT 3 STATUTORY PROVISIONS GOVERNING ARCHITECTURAL PROVISIONS

8 Hrs

Important Acts and Regulations governing the design of buildings- (Town & Country Planning Act, Consumer Protection Act, Copy Right Act, Persons with Disabilities Act, Coastal Regulation Zone Act, Heritage Act, Land Acquisition Act, Factories Act, Cinema Act)-Master Plan Provisions and Development regulations with reference to CMDA -Planning norms and Building Rules- Role of Planning Authority and local body - Building Approval process.

## UNIT 4 EMERGING TRENDS

6 Hrs

Meaning of GATS - Globalisation and its impact on architectural profession - Entry of Foreign Architects and their impact in Indian Architectural practice - Information Technology and its impact -specialisation in the field of architecture -Green Buildings and the governing laws.

Max. 30 Hours

## COURSE OUTCOMES

**On completion of the course the student will be able to**

**CO1:** Understand the role of architects in society.

**CO2:** Holistic understanding of legal requirements for managing an office and type of practices.

**CO3:** Acquire knowledge on various acts, development regulations, planning norms and building rules.

**CO4:** Comprehend the building approval process.

**CO5:** Figure out the role of foreign architects working in collaboration with local architects.

**CO6:** Enable the young minds to adopt green building strategies in design

## TEXT / REFERENCE BOOKS

1. Handbook of Professional Practice, IIA Publications, India
2. Roshan Namavati, Professional practice, Lakhani Book Depot, Mumbai 1984
3. Apte V.S., Architectural Practice and Procedure, Mrs. Padmaja Bhide, 2008
4. CMDA, Second Master Plan, 2026, CMDA Publications, 2008
5. Architects Act 1972, Council of Architecture, 2011
6. Krishnamurthy K.G. and Rvindra S.V., Professional Practice, PHI Learning Pvt Ltd, Delhi, 2014
7. Handbook of professional Documents, Council of Architecture, 2011

| SAR 1504 | PROFESSIONAL PRACTICE AND ETHICS II | L | T | P | Credits | Total Marks |
|----------|-------------------------------------|---|---|---|---------|-------------|
|          |                                     | 2 | 0 | 0 | 2       | 100         |

## COURSE OBJECTIVES

- To develop a comprehensive knowledge about architectural competitions.
- To construct knowledge on various practices related to easement and tender documents.
- To familiarize the students with an overview of new trends in project execution.

## UNIT I ARCHITECTURAL COMPETITIONS

6 Hrs

Importance of Architectural competitions - Types of competitions (open, limited, ideas competition) - Single and two stage competitions - Council of Architecture guidelines for conducting Architectural competitions - Code of Conduct for Assessors and Participants - Case studies.

## UNIT 2 EASEMENTS & TENDER

8Hrs

Easements - meaning, types of easements, bearing of easements in architectural design - acquisition, extinction and protection of easements. Tender - Definition - Types of Tenders - Open and closed tenders - Conditions of tender- Tender Notice - Tender documents - Concept of EMD - Submission of tender - Tender scrutiny - Tender analysis - Recommendations - Work order - E-tendering (Advantages, procedure, conditions).

## UNIT 3 CONTRACT & CERTIFICATES

8 Hrs

Definition - Necessity of contract - Contents of Contract Document (Articles of Agreement, Terms and Conditions, Bills of Quantities and specification, drawings, Appendix), types of contracts - Certification of Contractors' Bills - Various types of certificates and procedures to be adopted, importance of Final bill. Defects - Liability period - penalty Clauses.

## UNIT 4 LIABILITY, ARBITRATION AND NEW TRENDS IN PROJECT EXECUTION

8 Hrs

Types of Liability, Professional Duties and Conduct of architects as per Council of Architecture, Professional Negligence, Deficient service and Exceptions, Insurance, Examples of Cases, Arbitration (Definition, Advantages of arbitration, Sole and joint arbitrators, Role of umpires, Award, Conduct of arbitration proceedings) - Arbitration clause in contract agreement (role of architect, excepted matters). New trends in Project Execution - Understanding of BOT, BOLT, DBOT, BOOT - Role of project Managers - charging role of architect in large projects.

Max. 30 Hours

## COURSE OUTCOMES

**On completion of the course the student will be able to**

**CO1:** To understand the importance of architectural competitions in the field of architecture profession.

**CO2:** To comprehend and appreciate the rights of easement in architectural design.

**CO3:** To be familiar with the tender documents.

**CO4:** Synthesize the need and necessity of contract document and types of contract in architecture profession.

**CO5:** To interpret and analyze the professional duties and conduct as per guidelines of COA

**CO6:** Acquiring skill relating to new trends and role of architects in large projects.

## TEXT / REFERENCE BOOKS

1. Handbook of Professional Practice, IIA Publications, India
2. Roshan Namavati, Professional practice, Lakhani Book Depot, Mumbai 1984
3. Apte V.S., Architectural Practice and Procedure, Mrs. Padmaja Bhide, 2008
4. CMDA, Second Master Plan, 2026, CMDA Publications, 2008
5. Architects Act 1972, Council of Architecture, 2011
6. Krishnamurthy K.G. and Rvindra S.V., Professional Practice, PHI Learning Pvt Ltd, Delhi, 2014
7. Handbook of professional Documents, Council of Architecture, 2011

| SARA9131              | SUSTAINABLE DESIGN STUDIO I | L               | T | P  | Credits        | Total Marks |
|-----------------------|-----------------------------|-----------------|---|----|----------------|-------------|
|                       |                             | 0               | 0 | 12 | 6              | 300         |
| Continuous Assessment |                             | University Viva |   |    | Min Pass Marks |             |
| 200                   |                             | 100             |   |    | 150            |             |

**COURSE OBJECTIVE:**

- To identify contemporary relevance of sustainable principles in vernacular buildings and to compare/ contrast the same with recent buildings.
- To understand the difference in the sustainable principles adapted in vernacular buildings against contemporary buildings and the significance of passive techniques
- To understand and apply the climate responsive passive strategies on a small-scale building design

**STUDIO BRIEF 01****CASE STUDY 1**

To identify and document a building or a group of buildings from a pre-industrial, vernacular, traditional settlement in India and

- To comprehensively study the building in terms of its layout, use of materials, spatial and environmental concepts, user comfort, ambience, distinct features etc.,
- Understand its climate responsive design strategies, sustainable practices and their contemporary relevance.

**CASE STUDY 2**

To identify a modern building or a group of buildings built within the last decade and

- document and analyze their layouts, use of materials, spatial and environment concepts, ambience, user comfort etc.,

**COMPARISON OF CASE STUDIES 1 AND 2**

- To compare and contrast case studies 1 and 2 to understand the shift in societal values and their subsequent effect on sustainability

**PROPOSAL**

Propose changes or modifications (Façade modifications / passive strategy application) to the 'lesser performing case' and prove its enhanced climate responsiveness.

**DELIVERABLES**

Students shall submit case study documentation sheets with requisite sketches, photographs, models, cognitive analysis diagrams, empirical documentation, detailed narratives and proposal for modification and enhancement of one of the cases based on the analysis.

**STUDIO BRIEF 02**

1. The students shall design a residential building which shall function as per ECBC guidelines
2. Students shall select any one climatic zone from ECBC's climatic zone classification.
3. They shall select any city from a zone and research local bye laws and regulations.
4. They shall analyse site fit and program brief
5. They shall evaluate cultural, environmental factors and inspirations for environmental design from local vernacular architecture and nature.
6. The building should highlight at least one local material and one material which has low embodied energy as compared to conventional technology.

**DELIVERABLES**

1. Study report on climatic and microclimatic parameters that will guide environmental site development.
2. Study report and story board incorporating site fit, zoning and program brief, contextual adaptations from vernacular/ nature responses, conceptual design.
3. Residential typology precedent analysis and Preliminary energy analysis
4. Architectural documentation including 2D drawings and 3D models
5. Detailing and modelling of green building features emphasizing passive design features.
6. Detailed calculations as per ECBC standards.

**COURSE OUTCOME:**

- CO1** Understand and document the sustainable principles and practices, and passive design strategies in a built environment.
- CO2** Demonstrate a heightened awareness of sustainability as a multidimensional concept and awareness of the environmental factors influencing the built environment and vice versa.
- CO3** Critically analyze, evaluate and make informed judgment on the working of sustainable design strategies in vernacular and contemporary buildings
- CO4** Develop design strategies that optimize and conserve resources and provide comfortable environment for the occupants in a building in a particular climate
- CO5** Ability to use software tools to analyze sustainability in the built environment.
- CO6** Applying Passive strategies and finding solution for development of sustainable practices in a small-scale building.

**TEXT / REFERENCE BOOKS**

1. Deulgaonkar, A. (2015 ). *Laurie Baker, Truth in Architecture*. New Delhi: Jyotsna Prakashan.

2. Kainth, G. S. (2011). *Climate Change, Sustainable Development and India*. New Delhi: LAP Lambert.
3. Lengen, J. V. (2007). *The Barefoot Architect: A Handbook for Green Building*. California, USA: Shelter Publication.
4. Spiegel, R. (2010). *Green Building Materials: A Guide to Product Selection and Specification, 3rd Edition*. -: John Wiley & Sons.
5. TERI. (2004). *Sustainable Building - Design Manual Pt 1 & 2*. New Delhi: Teri Press, The Energy And Resources Institute.



| SARA5232 | TECHNOLOGY FOR ENERGY EFFICIENT BUILDINGS | L | T | P | Credits | Total Marks |
|----------|-------------------------------------------|---|---|---|---------|-------------|
|          |                                           | 3 | 0 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To understand the influence of HVAC technology on energy efficient buildings.
- To give a comprehensive introduction and the principles of natural and artificial lighting.
- To explore the fundamentals of integrating services in buildings.

**UNIT 1 HVAC TECHNOLOGIES****9 Hrs.**

**Factors affecting HVAC Design** - Types of Cooling systems air cooled, water cooled, chilled beams, chilled slabs, pre-cooling, free-cooling, VFD drives, etc.- ducting design, Individual controls and VAV boxes - Natural refrigerants,-types of air conditioning- combined heat power systems- Types of heating systems, radiant heating, solar heating -Conservatory design.

**UNIT 2 DAYLIGHTING & ARTIFICIAL LIGHTING****12 Hrs.**

**Principles of day lighting design** - Day lighting requirements, daylight protractor, day lighting sensors - Glare reduction systems and devices – Daylight harnessing systems -Daylight system with shading design - Artificial lighting - Principles of lighting systems, lighting design systems - Occupancy sensors - Glare reduction techniques.

**UNIT 3 VENTILATION TECHNIQUES****9 Hrs.**

**Requirements of ventilation as per ASHRAE/ECBC** - Natural ventilation: stack effect, courtyard effect, air changes, ventilation requirement calculations, cross ventilation - Artificial ventilation techniques: forced ventilation, fresh air systems, pre-cooling of fresh air - Heat recovery through economizers and desiccant wheels - Humidity control systems, demand controlled ventilation.

**UNIT 4 BUILDING SERVICES INTEGRATION****9 Hrs.**

**Integration of various building systems** - Building automation systems and intelligent building systems - Integration of HVAC systems with water supply and treatment systems - Occupant responsive buildings - Building information modelling- Case studies explaining various building systems.

**UNIT 5 COMPREHENSIVE LEARNING****6 Hrs.**

Exercise to work out cooling load, dehumidifying and heat load estimate. Comparative cost analysis (Capital investment vs maintenance/operating costs) against green buildings and ordinary buildings.

**Max.45 Hours****COURSE OUTCOME:**

- CO1** Comprehend the various types of air conditioning
- CO2** Understanding the principles of day lighting systems.
- CO3** Acquire knowledge on adopting the various daylight harnessing systems.
- CO4** Ability to categorize the ventilation requirements as per ASHRAE/ECBC.
- CO5** Evaluate the various methods to integrate automation of building systems in buildings.
- CO6** Develop the strategies to integrate services adopted in buildings through case studies.

**TEXT / REFERENCE BOOKS**

1. Allard, F. (1998). *Natural Ventilation in Buildings: A Design Handbook (BEST (Buildings Energy and Solar Technology))*. London: Routledge.
2. ASHRAE. (2007). *ASHRAE 90.1 user manual*. Atlanta: ASHRAE.
3. Brian Atkin. (1988). *Intelligent Buildings: Applications of IT and Building Automation to High Technology Construction Projects*. London: Kogan page limited.
4. David Egan, I. (1975). *Concepts in Thermal comfort*. Prentice: Prentice Hall.
5. Evans, M. (1980). *Housing, Climate and comfort*. London: Architectural Press.
6. Power, M. o. (2007). *Energy Conservation Building Code of India, User manual*. New Delhi: Ministry of Power.
7. standard, B. o. (1987). *Handbook of functional requirements of Buildings*. New Delhi: Bureau of Indian standard.
8. Wilson, P. T. (2011). *Daylighting: Architecture and Lighting Design*,. London: Routledge.

**WEBSITES**

1. <http://www.wbdg.org/resources/daylighting.php>
2. <http://www.wbdg.org/resources/efficientlighting.php>
3. [http://www.wbdg.org/resources/hvac\\_humidclimates.php](http://www.wbdg.org/resources/hvac_humidclimates.php)

| SARA5233 | PERFORMANCE ANALYSIS OF BUILDINGS | L | T | P | Credits | Total Marks |
|----------|-----------------------------------|---|---|---|---------|-------------|
|          |                                   | 2 | 0 | 1 | 3       | 100         |

**COURSE OBJECTIVES:**

- To introduce the need for performance analysis of buildings and the emergent outcomes.
- To comprehend the fundamentals of shading devices and the tools for shading analysis.
- To analyze energy use through open source software.

**UNIT 1 PERFORMANCE OF BUILDINGS****9 Hrs.**

Need for performance analysis of buildings - Soft Computation - Investigation and assessment, energy audit procedures - Design investigations- Energy conservation measure calculations - Modelling systems: cognitive, empirical and analytical assessment of buildings – Parametric and empirical building simulations.

**UNIT 2 WHOLE BUILDING ENERGY SIMULATION****12 Hrs.**

Modelling the Building form - Parametric and empirical building simulation - Factors affecting accuracy of energy model- Thermal performance criteria of buildings- Envelope considerations, climatic analysis, weather data- Heating and cooling systems modelling, ventilation systems modelling. Computing energy required for heating/ cooling needs through open source software's.

**UNIT 3 DAYLIGHTING AND SHADING SIMULATIONS****12 Hrs.**

Shading simulations- Principles of shading design- Tools for shading analysis- Tools for shading design - Shading design exercises using open source shading software - Day lighting simulation models- Day lighting simulation criteria- Factors affecting accuracy of day lighting model - Day lighting simulation exercises using daylight modelling tools - BIM Integration.

**UNIT 4 ANALYSIS OF BUILDING PERFORMANCE****6 Hrs.**

Metering systems - Analysis of collected data from existing buildings - Economic aspects of energy simulation results: LCA, payback analysis, break even analysis, benefit cost analysis, present worth analysis, etc. - Selection of appropriate ECM from modelling results-Recalibration of the model from actual performance data.

**UNIT 5 COMPREHENSIVE LEARNING****6 Hrs.**

Based on understanding of above Units the students are expected to perform Whole building computation of a small project emphasizing on the material selection.

**Max.45 Hours****COURSE OUTCOME:**

- CO1** Ability to investigate the performance of buildings through calculations
- CO2** Acquired knowledge on whole building energy simulation.
- CO3** Comprehensive understanding of the parametric and empirical building simulation.
- CO4** Skills to develop building models for shading analysis and understand thermal performance of built forms.
- CO5** Evaluate the various factors which influence energy modeling of buildings.
- CO6** Understanding the various parameters to assess the building performance.

**TEXT / REFERENCE BOOKS**

1. ASHRAE. (2006). *The ASHRAE Green Guide*. Butterworth- Heinemann: ASHRAE Press.
2. Clarke, J. (2007). *Energy Simulation in Building Design*. Routledge: Architectural Press.
3. GiulianoDall'O'. (2013). *Green Energy Audit of Buildings: A guide for a sustainable energy audit of buildings*. New York: Springer.
4. Power, M. o. (2007). *Energy Conservation Building Code of India, User manual*. New Delhi: Ministry of Power.
5. Waltz, J. P. (1997). *Computerized Building Energy Simulation Handbook*. Fairmont: Fairmont PR.
6. Wilson, P. T. (2011). *Daylighting: Architecture and Lighting Design*. London: Routledge.

**WEBSITES**

1. [http://doe2.com/download/equest/eQ-v3-63\\_Introductory-Tutorial.pdf](http://doe2.com/download/equest/eQ-v3-63_Introductory-Tutorial.pdf)
2. <http://ocw.mit.edu/courses/architecture/4-430-daylighting-spring-2012/>
3. [http://www.photosolar.dk/userfiles/file/Dokumenter/Guideline%20to%20daylight%20calculation\\_2013.pdf](http://www.photosolar.dk/userfiles/file/Dokumenter/Guideline%20to%20daylight%20calculation_2013.pdf)

| SARA9231              | SUSTAINABLE DESIGN STUDIO II | L               | T | P  | Credits        | Total Marks |
|-----------------------|------------------------------|-----------------|---|----|----------------|-------------|
|                       |                              | 0               | 0 | 14 | 8              | 300         |
| Continuous Assessment |                              | University Viva |   |    | Min Pass Marks |             |
| 200                   |                              | 100             |   |    | 150            |             |

**COURSE OBJECTIVES:**

- To incorporate the sustainable principles and approaches to the identified typology in the site, built form and the environment.
- To develop the design skills with respect to larger scale project
- To gain and apply knowledge for detailed calculations on energy and water saving.

**STUDIO BRIEF 01**

1. The student shall select a Campus type: Example  
Residential/ Commercial/ Institutional/ Industrial-manufacturing/Corporate/ Healthcare/ Hospitality
2. Students shall select any one climatic zone from ECBC's climatic zone classification.
3. They shall select any city from a zone and research local bye laws and regulations.
4. They shall analyse site fit and program brief
5. They shall evaluate cultural, environmental factors and inspirations for environmental design from local vernacular and nature.
5. They shall design buildings which shall function as per GRIHA and ECBC guidelines
6. The building should highlight material which has low embodied energy as compared to conventional technology and at least one sustainable building service technology in HVAC
7. The student shall design an energy model using an open source software such as eQUEST, IESVE, which gives comprehensive energy use analysis of the building.

**DELIVERABLES**

1. Detailed description of building typology selected and reasons for the same.
2. Climatic analysis and microclimatic analysis of the site.
3. A case study of a similar building in a similar climatic zone with respect to sustainability features, etc.
4. Study report on climatic and microclimatic parameters that will guide environmental site development.
5. Study report and story board incorporating site fit, zoning and program brief, contextual adaptations from vernacular/ nature responses, conceptual design.
6. Preliminary energy analysis and Architectural documentation including 2D drawings and 3D models
7. Detailing and modelling of green building features including passive design features, hybrid features, active features, etc.
8. Detailed calculations to show energy and water savings and daylight calculations
9. Detailed embodied energy calculation
10. Final energy analysis

**STUDIO BRIEF 02**

Retrofitting of building – Any Building type – Focus on building Envelope design

1. To understand Building and Climatic variables through field study analysis- measurements on-site, photos etc
2. The students will make a team and are to discover a single design strategy that will meet multiple design objectives.
3. Examine the elements in a building that mediate between the interior and exterior environment
4. To initiate energy conservation retrofits to reduce energy consumption and explore the building performance
5. To improve indoor environmental quality, decreasing moisture penetration, and reducing mold for occupant health and productivity.
6. The design major renovations and retrofits for existing buildings should include sustainability to reduce operation costs and environmental impacts, and can increase building adaptability, durability, and resiliency.
7. They shall follow the ECBC guidelines

**DELIVERABLES**

1. Detailed description of building typology selected and reasons for the same.
2. Climatic analysis and microclimatic analysis of the site.
3. Case studies to understand envelope design, various measures to retrofit with respect to sustainability features, etc
4. Alternative strategies for improving thermal comfort.
5. Base case and Design case analysis
6. Final Design with details and simulations
7. Summary of detailed energy, water savings, daylight and embodied energy calculations and conclusions.
8. Report of the entire exercise as group work to be submitted.

**COURSE OUTCOME:**

- CO1** Explore the sustainable principles relevant to the design typology and the context
- CO2** Ability to incorporate the sustainable principles and practices, and passive design strategies and analyze the same in the identified typology.
- CO3** Acquired knowledge on Energy models and calculations
- CO4** Develop design strategies that optimize and conserve resources and provide comfortable environment for the occupants in a building
- CO5** Simulating by use software tools to analyze the incorporated sustainable ideals in the emergent outcome.
- CO6** Critically analyse, evaluate and make informed judgment on the working of sustainable design strategies in design.

#### TEXT / REFERENCE BOOKS

1. ArvindKrishen, N. B. (1999). *Climate responsive architecture: A design handbook for energy efficient buildings*. New Delhi: McGraw Hill Education ( India) Pvt. Ltd.,
2. B.V Venkatarama Reddy and K.S Jagadish, s. ,. (2003). *Embodied energy of common and alternative building materials and technologie*. Vol. 35 (pp129-137): Energy and Buildings.
3. Egan, D. (1975). *Concepts in Thermal comfort*. Prentice: Prentice Hall.
4. Lengen, J. v. (2007). *The Barefoot Architect: A Handbook for Green Building* . UK: Shelter Publication.
5. Power, M. o. (2007). *Energy Conservation Building Code of India, User manual*. New Delhi: Ministry of Power.
6. Willie Weber, S. (. (2002). *Lessons from Vernacular Architecture*. -: Routledge.

| SARA7433 | ADAPTIVE REUSE AND RETROFIT | L | T | P | Credits | Total Marks |
|----------|-----------------------------|---|---|---|---------|-------------|
|          |                             | 3 | 0 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To give a comprehensive overview on how existing buildings can be adapted and retrofitted to function sustainably.
- To analyze the technologies which can be adopted for improving the energy efficiency of existing buildings
- To understand the various strategies adopted to conserve heritage buildings.

**UNIT 1 SUSTAINABLE RETROFIT FOR EXISTING BUILDING****9 Hrs.**

Retrofitting options for existing buildings: structural retrofit, facade, services, interior retrofit - Performance analysis of existing buildings - Physical audits - Building Simulation - Metering and tracking options - Analysis the building's current performance- Decision influencers for retrofit- economic, social and environmental issues.

**UNIT 2 ADAPTIVE REUSE OF OLD BUILDING****10 Hrs.**

Need for adaptive reuse - Issues to be explored in building adaption- Economic, social, environmental, and assessment models for adaptive reuse - Case studies of buildings with adaptive reuse.

**UNIT 3 TECHNOLOGIES FOR ENERGY EFFICIENCY IN EXISTING BUILDINGS****10 Hrs.**

Improving energy efficiency in existing buildings- Facade improvements, HVAC improvements, Indoor Environment Improvements - Monitoring the performance of retrofits - Case studies on energy efficiency improvements in existing buildings.

**UNIT 4 SUSTAINABLE CONSERVATION OF HERITAGE STRUCTURES****10 Hrs.**

Conservation of heritage structures - Sustainability in heritage structures - Adaptive reuse of heritage structures - Issues in adapting a heritage structure - Use of sustainable conservation techniques - Improving the energy performance of heritage structures - Case studies of sustainable conservation in heritage structures.

**UNIT 5 COMPREHENSIVE LEARNING****6 Hrs.**

Select a historic building (more than 100 years old) / abandoned modern building (less than 50 yearsold). Study the current state and performance of the building in terms of environment, social & economic aspects. Based on the results of the study, provide a suitable solution to improve the structure, façade, function of the building, which in turn will reflect on the three pillars of sustainability.

**Max.45 Hours****COURSE OUTCOME:**

- CO1** Understanding the various types and methods of validating existing building for retrofitting.
- CO2** Comprehending the ways to enhance the performance of existing building for retrofitting through audits, metering and simulation.
- CO3** Interpreting the strategies adopted from various 'adaptive reuse' case studies
- CO4** Critically analyzing the approaches adopted in improving the energy efficiency in different contexts.
- CO5** Ability to integrate energy efficient technologies to augment the performance of existing buildings.
- CO6** Exploring the issues involved in sustainable conservation of heritage structures.

**TEXT / REFERENCE BOOKS**

1. Sara J. Wilkinson, Hilde Remoy, Craig Langston, Sustainable Building Adaptation: Innovations in Decision-making, John Wiley and sons, 2014
2. John Krigger, Residential Energy: Cost Savings and Comfort for Existing Buildings, Prentice Hall, 2009
3. William H. Clark, Retrofitting for Energy Conservation, McGraw Hill Professional, 1997
4. Paul Apple, Sustainable Retrofit and Facilities Management, Routledge, 2013
5. ZeynepAygen, International Heritage and Historic Building Conservation: Saving the World's Past, Routledge, 2013

**WEBSITES**

1. [http://www.wbdg.org/resources/retro\\_sustperf.php](http://www.wbdg.org/resources/retro_sustperf.php)
2. <http://www.intach.org/about-charter-guidelines.php>
3. <http://cpwd.gov.in/Publication/ConservationHertBuildings.pdf>
4. <http://www.sciencedirect.com/science/article/pii/S0378778812004227>

| SDE4051 | INTERIOR DESIGN STUDIO I | L | T | P | Credits | Total Marks |
|---------|--------------------------|---|---|---|---------|-------------|
|         |                          | 0 | 0 | 8 | 6       | 300         |

**COURSE OBJECTIVES:**

- The studio aims at initiating the process of creativity and appreciation for design thinking. It promotes a workshop-based environment that will improve the thinking skills, investigative abilities, visualization, communication and graphical skills

**MODULE 1 VISUAL PRINCIPLES****50 Hrs.**

Exposure to various elements and principles of art and design in 2D. Expressions and explorations using Points, Lines, Planes and Volumes. Its relation in context to nature and environment. Principles of colour theory and explorations. Understanding of the visual relationships – balance, proportion, order, symmetry, rhythm, etc. Study of visual principles of composition: grids, layouts, asymmetry, balance and asymmetry. Fundamentals of Symmetry and Patterns in Nature. Evolution of Form in Nature. Triangles, Hexagons and rigid structures.

**MODULE 2 TWO DIMENSIONAL EXPRESSIONS****50 Hrs.**

Work by Buckminster Fuller and concept of sustainable structures. Understanding Fibonacci series and the Golden ratio. Geometry of shapes, Exploration in mixed media & collage to convey a specific theme and meaning.

**MODULE 3 THREE DIMENSIONAL EXPRESSIONS****50 Hrs.**

Exposure to various elements of 3D and principles of art and design in 3D. Expressions and explorations of spaces and Volumes. Experimentations with Form, Texture, Colour and space. Its relation in context to nature and environment, Radial Manipulation, Form Transition, Morphology. Exposure to form and movement, Form and metaphors - inspirations from nature, geometry, study of precedents, origami, puzzles etc.

**Max. 150 Hours****TEXT / REFERENCE BOOKS**

1. Farrelly, L. (2017). The Fundamentals of Architecture. United Kingdom: Bloomsbury Publishing.
2. Ching, F. D. K. (2014). Architecture: Form, Space, and Order. Germany: Wiley.
3. Jones, J. C. (1992). Design Methods. United Kingdom: Wiley.
4. Lawson, B. (2005). How Designers Think. (n.p.): Taylor & Francis.
5. Laseau, P. (2001). Graphic Thinking for Architects and Designers. United Kingdom: Wiley.
6. Ching, F. D. K., Juroszek, S. P. (2019). Design Drawing. United States: Wiley.
7. Weigand, J., Faimon, P. (2004). The Nature of Design. United States: F+W Media.
8. Pipes, A. (2003). Foundations of Art and Design. United Kingdom: Laurence King.
9. White, A. W. (2011). The Elements of Graphic Design. United Kingdom: Allworth.
10. Elam, K., Thompson, J. N. (2001). Geometry of Design: Studies in Proportion and Composition. New York: Princeton Architectural Press.

| SDE4051 | THEORY OF INTERIOR DESIGN | L | T | P | Credits | Total Marks |
|---------|---------------------------|---|---|---|---------|-------------|
|         |                           | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To introduce students to the basic elements of design, its principles, visual aspects, along with preparation, design vocabulary and thereby the application of these in design.
- To strengthen the students' understanding of human factors and dimensions while designing interior spaces and accessories.
- To enable students to explore the design process by identifying the design parameters and formulating concepts while emphasizing function and aesthetics.

**UNIT 1 INTERIOR SPACE****8 Hrs.**

Space–definition; elements of interior spaces, Interior space–spatial qualities: form, scale, outlook; structuring space with interior design elements; spatial form; **spatial dimension** – square, rectangle, curve linear spaces; height of space; spatial transitions – openings within wall planes, doorways, windows, stairways; horizontal and vertical circulation

**UNIT 2 DESIGN VOCABULARY & PRINCIPLES****9 Hrs.**

Principles of perception, Form – point, line, volume, shape, texture and color – in relation to light, pattern, Ratio; proportions – golden section; relationships; scale; Balance – symmetrical, radial, occult; harmony; unity; variety; rhythm; emphasis, Synthesis of these elements evolves understanding of interior space, static and dynamic aspects of spaces.

**UNIT 3 ANTHROPOMETRICS****6 Hrs.**

Definition, **body link system, static and dynamic anthropometry, theory of standard dimension based on human figures for activities, functions, circulation, furniture design, spatial requirements etc, relationship between human activities and anthropometrics, introduction to ergonomics, Design of Furniture for Living, Dining, Kitchen, Office etc.**

**UNIT 4 DESIGN PROCESS****7 Hrs.**

**Design process–Design criteria–function and purpose, utility and economy, form and style; human factors-human dimensions, distance zones, activity relationships, function, aesthetics values, ways to incorporate exuberance in interiors.**

**Max. 30 Hours****COURSE OUTCOME:**

- CO1** Recognize the two-dimensional aspects of spatial elements and their applications in interior spaces.
- CO2** Develop an understanding of design vocabulary and thereby perceive the visual environment.
- CO3** Interpret the principles of design using spatial elements and compositions in interior space
- CO4** Comprehend the relationship between form, dimensions of interior space and human dimensions and also between human factors and activity relationships
- CO5** Understand the need and relationships between anthropometric requirements and various functions of a space
- CO6** Develop the ability to analyse the design problem, synthesize the response and critically evaluate the design thereby define the cyclic design process

**TEXT / REFERENCE BOOKS**

1. Binggeli, C., Ching, F. D. K. (2012). Interior Design Illustrated. United Kingdom: Wiley.
2. The Handbook of Interior Design. (2015). United Kingdom: Wiley.
3. Linton, H. (2003). Color in Architecture: Design Methods for Buildings, Interiors, and Urban Spaces. United Kingdom: McGraw-Hill.
4. Poore, J., Ragan, S. L. (1994). Interior Color by Design: A Design Tool for Architects, Interior Designers, and Homeowners. Hong Kong: Rockport Publishers.
5. Whiton, S. (2013). Elements Of Interior Design And Decoration. United Kingdom: Read Books Limited.

| SDE4052 | ART& CRAFT STUDIO I | L | T | P | Credits | Total Marks |
|---------|---------------------|---|---|---|---------|-------------|
|         |                     | 0 | 0 | 8 | 4       | 200         |

**COURSE OBJECTIVES:**

- Develop sketching and visual representation in different media of different 2-dimensional art forms, painting and interior decoration of walls and floors.
- Understand the three-dimensional art and craft forms, natural forms, structure and learn to model the same in different media.
- Investigate the properties and appropriate use of materials in different craft forms.

**MODULE 1 TWO-DIMENSIONAL ART, CRAFT AND DESIGN****30 Hrs.**

Sketching and visual representations in various media -image-making, image manipulation and development - enlargement, cropping, reversing, abstraction, changes in colour and treatment - sequential imagery. Imagery from imagination, memory and direct observation. Knowledge of forms and their representation on 2d surface, light & shade, texture, colour variation, perspective etc.

**MODULE 2 THREE-DIMENSIONAL ART, CRAFT AND DESIGN****30 Hrs.**

Selection of two outdoor objects /systems and observation of their natural occurrence, relationships with context form, structure, colour textures and functions- 3-dimensional modelling in appropriate medium - Clay, Paper, wire, Plastic, wax etc. Ceramic work- Sculpting techniques on a plane surface; Soap and wax- The cutting of material such as soap or wax to form a figure or design; Clay modelling- Clay modelling will be able to sculpt or make any kind of a model. Making of creative shapes.

**MODULE 3 UNDERSTANDING MATERIALITY****30 Hrs.**

Selection of two materials used in everyday life – textiles, earthenware terracotta, metals, stone, plastic, paper, wax, glass, wood, wire, etc. and study its properties and materiality. Processes of additive, subtractive and constructional form-making in expressive and functional modes.

**MODULE 4 VISUALIZATION TECHNIQUES AND STORYBOARDING****30 Hrs.**

Concept- A theoretical and practical approach in understanding an abstract or generic idea from Particular instances. Storyboard/ Cartoon making Graphical representation in the form of illustrations or images displayed in sequence for the purpose of pre-visualizing the area of student's interest. A series of drawings that tells a story. Expressive and Communicative aspects. Implementing abstract or generic ideas into a Visual Identity.

**Max. 120 Hours****COURSE OUTCOME:**

- CO1** Understand and interpret different art forms in different media while appreciating artistic expressions
- CO2** Develop the ability to manipulate various types of images.
- CO3** Develop skills in image making, and development of sequential imagery
- CO4** Understand the various techniques of three-dimensional modelling using different mediums.
- CO5** Understand the properties and applications of any two materials in different craft forms like terracotta, metal craft
- CO6** Develop a narrative approach to their art work

**TEXT / REFERENCE BOOKS**

1. John W. Mills (1966). The Technique of Sculpture, B.T. Batsford Limited, New York - Reinhold Publishing Corporation, London.
2. C. Lawrence Bunchy. (1972). Acrylic for Sculpture and Design, New York
3. Ching, F. D. K. (2014). Architecture: Form, Space, and Order. Germany: Wiley.
4. Jones, J. C. (1992). Design Methods. United Kingdom: Wiley.
5. Lawson, B. (2005). How Designers Think. (n.p.): Taylor & Francis.
6. Ching, F. D. K., Juroszek, S. P. (2019). Design Drawing. United States: Wiley.
7. Pipes, A. (2003). Foundations of Art and Design. United Kingdom: Laurence King.
8. White, A. W. (2011). The Elements of Graphic Design. United Kingdom: Allworth.

| SDE4053 | INTERIOR GRAPHICS I | L | T | P | Credits | Total Marks |
|---------|---------------------|---|---|---|---------|-------------|
|         |                     | 1 | 0 | 3 | 3       | 200         |

**COURSE OBJECTIVES:**

- To outline the basic principles of drafting and rendering techniques
- To understand plane and solid geometry, isometric and axonometric view
- To familiarize with simple objects and building components through measured drawing.

**UNIT 1 INTRODUCTION****12 Hrs.**

Introduction to fundamentals of drawing/ drafting: Construction of lines, line value, line types, lettering, architectural notations & dimensioning. Basic rendering techniques, basics of sheet presentation drawing, drawing instruments, sheet layout. Use of scale, free hand and geometric construction of Lines

**UNIT 2 GEOMETRICAL DRAWING - PLANE GEOMETRY****12 Hrs.**

Construction of shapes - angles, circles, tangents. Construction of Plane Curves: Ellipse, Parabola and Hyperbola. Principles of orthographic projections, Construction and multiview projection of - Points, lines, square, rectangle, polygon, etc.

**UNIT 3 GEOMETRICAL DRAWING - SOLID GEOMETRY****16 Hrs.**

Multi-view projection of solids – cube, prism, pyramids, cones, cylinders etc.; Sections of solids, true shape of solids.

**UNIT 4 MEASURED DRAWING****8 Hrs.**

Study of plan, section and elevation of simple objects, simple building components and furnitures through documentation exercises.

**UNIT 5 ISOMETRIC AND AXONOMETRIC VIEW****12 Hrs.**

Isometric and Axonometric projection of planes, solids and combination of solid etc. Isometric and Axonometric projection of simple objects, building components etc.

**Max. 60 Hours****COURSE OUTCOME:**

- CO1** Understand the concepts and fundamentals of architectural drawing.
- CO2** Develop representation skills and to generate geometrical forms and its projections.
- CO3** Ability to represent various solids and its sectional projection.
- CO4** Measure real objects and represent them graphically.
- CO5** Create three-dimensional solids and combination of solids
- CO6** Develop graphical skill to represent real time objects.

**TEXT / REFERENCE BOOKS**

1. Ching, F. D. (2015). Architectural graphics. John Wiley & Sons.
2. Reekie, R. F., & McCarthy, T. (1995). Reekie's architectural drawing. Edward Arnold.
3. Morris, I. H. (1912). Geometrical drawing for art students. Longmans, Green.
4. Martin L.C. (1978). Architectural Graphics, The Macmillan Company, New York.
5. Dinsmore.G.A. (1968). Analytical Graphics, Van Nostrand, Company Inc., Canada.
6. Elam, K., Thompson, J. N. (2001). Geometry of Design: Studies in Proportion and Composition. New York: Princeton Architectural Press.
7. Laseau, P. (2001). Graphic Thinking for Architects and Designers. United Kingdom: Wiley.

| SDE4054 | INTERIOR DESIGN STUDIO II | L | T | P  | Credits | Total Marks |
|---------|---------------------------|---|---|----|---------|-------------|
|         |                           | 0 | 0 | 12 | 8       | 400         |

**COURSE OBJECTIVES:**

- To understand the process of evolution from program and conditions to concept, design and graphical representation of the process.
- To comprehend the fundamentals of small functional spaces understanding the anthropology as well as sensitivity to materials.

**MODULE 1****90 Hrs.**

Design of simple functional units with universal access compliance such as: Toilet for a physically handicapped person - hostel room, bed room, kitchen, Shop, Workshop, pavilions, snack bar.

**MODULE 2****90 Hrs.**

Design of multiple spaces and understanding their inter-relationships, such as: Residence, petrol bunk, fire station, police station, Cottage for an elderly couple

**Max. 180 Hours****TEXT / REFERENCE BOOKS**

1. Neufert E, Neufert P, (2012). "Neufert Architect's Data", Wiley Blackwell Publication, UK.
2. Dechiara J., Panero J., Zelnik M., (2011). "Time Saver Standards for Interior design and Space Planning", McGraw Hill, London.
3. Dechiara J., Panero J., (2011) "Standards for Interior Design and Space Planning", McGraw Hill Professional.
4. Jones, J. C. (1992). Design Methods. United Kingdom: Wiley.
5. Lawson, B. (2005). How Designers Think. (n.p.): Taylor & Francis.
6. Laseau, P. (2001). Graphic Thinking for Architects and Designers. United Kingdom: Wiley.
7. Weigand, J., Faimon, P. (2004). The Nature of Design. United States: F+W Media.
8. Pipes, A. (2003). Foundations of Art and Design. United Kingdom: Laurence King.

| SDE4055 | ART& CRAFT STUDIO II | L | T | P | Credits | Total Marks |
|---------|----------------------|---|---|---|---------|-------------|
|         |                      | 0 | 0 | 8 | 4       | 200         |

**COURSE OBJECTIVES:**

- To utilize models as technique for design presentations
- To construct models as a way of representation and experimentation
- To gain an ability to integrate all the technical aspects of sculpture, modelling, and storytelling as means to realize his creative ideas to shape in to concrete and significant art form.

**MODULE 1 CREATIVE REPRESENTATIONS OF SPACES****50 Hrs.**

To introduce the techniques used in modelmaking. Need for architectural models. Role of scale-models in design. Processes of additive, subtractive and constructional form-making in expressive and functional modes - Developing of surfaces and solids viz. Cubes, prisms, cylinders, pyramids, cones, spheres, etc. Development of transition pieces using appropriate materials. Various materials and tools to be used in model making.

**MODULE 2 MODELMAKING****40 Hrs.**

Representation of various building elements like Walls, Columns, Steps, Windows/glazing, Sunshades, Handrails, Furniture using materials viz. Paper/ Snow-white board / mount board / cardboard / Acrylic / Polystyrene (thermocole) / softwood / metals, etc. Various site elements – Contour representation, Roads/Pavements, Trees/Shrubs, Lawn, Water bodies, Street furniture, Fencing etc. Need for architectural models. Making models of the various interior spaces such as • Residences • Offices • Retail Spaces • Recreational Spaces. Scaled models of furniture.

**MODULE 3 FINISHES****30 Hrs.**

Painting model surfaces with various finishes, development of topography and landscape elements, use of materials like cork, polyurethane foam, use of laser, acid etching, stereolithography for development building model surfaces. Representing various surface finishes like brick/stone representation, stucco finish etc. Exercise involving the design of simple furniture and making a model of the same.

**Max. 120 Hours****COURSE OUTCOME:**

- CO1** Understand and interpret different art forms in different media while appreciating artistic expressions  
**CO2** Observe and interpret different forms and qualities in objects and environments  
**CO3** Communicate their personal thoughts and ideas through various mediums of art  
**CO4** Design and model craft forms using any medium  
**CO5** Develop a narrative approach to their art work  
**CO6** Interpret the different storied communicated through artwork of various types

**TEXT / REFERENCE BOOKS**

1. John W.Mills (1966). The Technique of Sculpture, B.T.Batsford Limited, New York - Reinhold Publishing Corporation, London.
2. Ching, F. D. K. (2014). Architecture: Form, Space, and Order. Germany: Wiley.
3. Jones, J. C. (1992). Design Methods. United Kingdom: Wiley.
4. Pipes, A. (2003). Foundations of Art and Design. United Kingdom: Laurence King.
5. White, A. W. (2011). The Elements of Graphic Design. United Kingdom: Allworth.
6. Smith H., (1982). The art of making furniture in miniature, E.P.Dutton Inc., New York.

| SDE4056 | INTERIOR GRAPHICS II | L | T | P | Credits | Total Marks |
|---------|----------------------|---|---|---|---------|-------------|
|         |                      | 1 | 0 | 3 | 3       | 200         |

**COURSE OBJECTIVES:**

- To outline the basic principles of perspective drawing and sociography.
- To measure and document the built form and represent it graphically.
- To develop the skill required for constructing a complete rendered three-dimensional simple built form.

**UNIT 1 INTRODUCTION OF PERSPECTIVE DRAWING 8 Hrs.**

Study of concepts, types and terminologies such as picture plane, station point, vanishing point, eye level, ground level, Horizon line etc. Technical construction of one point, two point and three-point perspective drawings through exercises on simple objects like cube, prism, combination of shapes and views at various eye levels.

**UNIT 2 PERSPECTIVE: SCIENTIFIC METHOD & OFFICE METHOD 16 Hrs.**

One point, two and three-point perspective of building interiors and exteriors. Adding figures, trees, furniture etc., shade and shadows. Introduction to office perspective method.

**UNIT 3 SCIOGRAPHY 16 Hrs.**

Principles of shade and shadow- construction of shadow of simple geometrical shapes - point, line and planes. Construction of sciography on, Interior elements.

**UNIT 4 MEASURED DRAWING: DOCUMENTATION 10 Hrs.**

Documentation of a complete building of a special interest in terms of history, building construction, architectural excellence or technology by using simple measuring tools like tapes, photographs etc.

**UNIT 5 INTERIOR RENDERING 10 Hrs.**

Techniques of rendering for various interior drawings - Colour Pencils Rendering, Watercolor Rendering, Pen & Ink Rendering, Marker Rendering Techniques, Using Mixed Media Rendering Techniques - Plans, site plan, elevations, views etc.

**Max. 60 Hours****COURSE OUTCOME:**

- CO1** Understand the concepts and fundamentals of perspective drawing.
- CO2** Construct the perspective drawings of the buildings and 3d views.
- CO3** Develop representation skills in three dimensional drawings and sciography.
- CO4** Develop the skill of architectural drawing through measured drawing of complex structures.
- CO5** Apply rendering techniques in architectural drawings.
- CO6** Construct a complete rendered three-dimensional drawing of a simple built form.

**TEXT / REFERENCE BOOKS**

1. Alkins B., (1986). Architectural Rendering, Walter Foster Art Books.
2. Batley C., (1954) Indian Architecture, D.B. Taraporevale Sons and Co. Ltd., Bombay
3. Norling E., (1986). Perspective drawing, Walter Foster Art Books, California.
4. Ching D.K., (2012) Architectural Graphics. United States: Wiley.
5. Dinsmore G., (1968). Analytical Graphics, Van Nostrand, Company Inc., Canada.
6. Holmes J., (1954). Applied Perspective, Sir Isaac Pitman and Sons Ltd., London.
7. Martin L., (1964). Architectural Graphics, The Macmillan Company, New York.
8. Gill R., (1974). Basic Perspective, Advanced Perspective, Thames and Hudson, London.

| SDE1301 | CREATIVE THINKING PROCESS AND METHODS | L | T | P | Credits | Total Marks |
|---------|---------------------------------------|---|---|---|---------|-------------|
|         |                                       | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To introduce 'design' as an integral feature and a product of larger socio-cultural issues and practices.
- To familiarize the young minds with the nature of design problems, methodology, creative techniques and the outcomes
- To explore the various channels to creativity and the directions through which they are expressed in the built form and the environment.

**UNIT 1 INTRODUCTION TO DESIGN****6 Hrs.**

Definition of Design, Understanding of Design, Purpose and nature of good design, evaluation of design, types of Design classifications, role of a designer, Scale, process and production; Context for design problems, design process, stages in the design processes, from different considerations - Broadbent, Christopher Alexander, Wade.

**UNIT 2 DESIGN PROBLEMS AND DIRECTIONS****4 Hrs.**

Context for the rise of the Design Methodology Movement, Different approaches in design- synchronous and asynchronous approaches, regression and escalation, participatory approach to design, design as process involving time and people, problem solving or intuitive, formulation of problems, nature of creative design problems, goals in design, different types of designs and the thrust given to the various solutions.

**UNIT 3 DESIGN THINKING****8 Hrs.**

Understanding the terms creativity, imagination etc. Theories on thinking, convergent & divergent thinking, lateral & vertical thinking, six hat thinking by Edward de Bono. Creative techniques like checklists, brainstorming, diagramming, mapping, parametric exploration, etc, design puzzles & traps, blocks in creative thinking. Introduction to various theories in Design such as aesthetic theory, proxemic theory. Theory related to human behaviour and environmental design.

**UNIT 4 CHANNELS TO CREATIVITY****8 Hrs.**

Types of concepts, process of creativity, tangible and intangible channels to creativity in Architecture and Design - the obscure, metaphors, transformation, paradox, precedents, nature, association with other arts, literal interpretation, materials, geometry, origami, literature and poetry etc. Philosophies of famous Architects and Designers.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Demonstrate comprehensive understanding through accompanying assignments, group discussions, and site visits.

**Max. 30 Hours****COURSE OUTCOME:**

- CO1** Understand the types of design problems, need to decode the brief to evolve 'problem driven outcomes.
- CO2** Understand, compare and synthesize mapped design methodologies in various contexts.
- CO3** Critically analyze the different types of thinking.
- CO4** Comprehend the various creative techniques in design related fields
- CO5** Investigate techniques to identify new directions in design thinking.
- CO6** Identify the various channels to creativity and critically analyze the direction through which the ideas are translated in architectural domain

**TEXT / REFERENCE BOOKS**

- Alexander C., (1977). Pattern Language, Oxford University Press.
- De Bono E., (1970) Lateral Thinking: Creativity step by step, Harper & Row.
- Broadbent G., (1973) Design in Architecture, Architecture & Human Sciences, John Wiley & sons, New York
- Thackara J., (2005). In the Bubble: Designing in a Complex World, The MIT Press.
- Hanington B., Martin B., (2012) Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions, Rockport Publishers.
- Whitten J., Bentley L., (2005). Systems Analysis and Design Methods, McGraw-Hill/Irwin.

| SDE1302 | COMMUNICATING DESIGN | L | T | P | Credits | Total Marks |
|---------|----------------------|---|---|---|---------|-------------|
|         |                      | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To develop methods for critical thinking and analysis.
- To help the students develop opinions on various design related topics.
- To develop new platforms and formats for their writing.
- To examine how space is conceived and conceptualised
- To evaluate texts
- To investigate “visual language”, symbolism, and some of the pictorial devices, materials, and techniques employed by designers to tell stories visually

**UNIT 1 COMMUNICATION PRINCIPLES****6 Hrs.**

Process of Communication. Transmission of ideas, facts & figures from one person to another. Kinds of Communication: Oral and Written, Verbal and Non-Verbal. Levels of Communication: Intrapersonal, Interpersonal, Group, Mass Communication.

**UNIT 2 READING DESIGN****4 Hrs.**

Reading skills: Model of reading to learning, reading tactics and strategies, reading purposes – associated apprehensions, reading for meaning, reading outcomes; Reading Space and its qualities; Presentations and writings of great design theorists

**UNIT 3 DESIGN STORYTELLING AND NARRATIVES****8 Hrs.**

Elements of a good story: facts, situation, characters, plot and resolution of a design project; Building context in the design process: Emotional, Environmental, Social context; Organising ideas- Personas, storyboards, and flowcharts; Documenting processes through writing

**UNIT 4 REPRESENTATION OF SPACE****8 Hrs.**

Innovation with orthographic drawings- beyond the plan, elevation, section; Perspectives and Montages; Maps and Models; Interior space and its occupation, experience and perception; Constructing and interpreting layers of meaning within interior spaces.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Demonstrate comprehensive understanding through accompanying assignments, group discussions, and site visits.

**Max. 30 Hours****COURSE OUTCOME:**

- CO1** Explore innovative ways of researching and writing about contemporary design and culture.
- CO2** Create valid arguments and to argue for and against ideas
- CO3** Analyse structure of oral and written arguments
- CO4** Critically evaluate design ideas.
- CO5** Understand and apply various spatial representations for their own designs.
- CO6** Produce a booklet of the ideas and themes discussed.

**TEXT / REFERENCE BOOKS**

1. Cottrell, S. (2005). Critical Thinking Skills: Developing effective analysis and argument. New York: Palgrave McMillan.

| SDE2301 | MATERIALS AND CONSTRUCTION - I | L | T | P | Credits | Total Marks |
|---------|--------------------------------|---|---|---|---------|-------------|
|         |                                | 2 | 0 | 2 | 3       | 200         |

**COURSE OBJECTIVES:**

- To identify the components of a building including the structural systems.
- To understand the properties and uses of varied natural, synthetic materials.

**UNIT 1 NATURAL MATERIALS****14 Hrs.**

Natural building materials – renewable and nonrenewable resources - Definitions, types and applications - soil, sand, aggregate, clay, gravel, timber, coconut leaf, reed, bamboo, Palmyra leaf, lime – Fencing and temporary shelters. Wood-Soft and hardwood. Fabrics – textile, Jute, leather etc. different types and their uses.

**UNIT 2 SYNTHETIC MATERIALS****16 Hrs.**

Synthetic Materials–Different types of Glass, their properties, manufacturing processes and uses. Plastics – injection moulding & other manufacturing methods, etc. Plywood, laminated wood and particleboards–properties, manufacture & uses.

**UNIT 3 BUILDING COMPONENTS****20 Hrs.**

Introduction to the fundamental components of a building (sub-structure & superstructure) indicating - Foundation –brick footing, stone footing & rcc column footing; concrete flooring, plinth beam & floor finish; superstructure- brickwork with sill, lintel, windows & sunshade, Flat rcc roof with weathering course, parapet & coping.

**UNIT 4 STRUCTURAL SYSTEMS****10 Hrs.**

Principles of load bearing Construction – Components of a load bearing wall & rcc slab roof system-rcc beams, columns and framed structure - simple brick footing - principles of bonding.

**Max. 60 Hours****COURSE OUTCOME:**

- CO1** Understand the properties and uses of natural materials like wood and fabrics, synthetic materials like glass and plastics and their appropriate application techniques.
- CO2** Select and specify materials based on the its properties and requirements
- CO3** Understand the components of a building and methods of construction including foundation, plinth, superstructure, floorings, openings, roofs and finishes.
- CO4** Get familiarized with the varied load bearing systems.
- CO5** Able to design interior elements that go with the existing architectural and structural components
- CO6** Have an overview of the various structural systems for architectural and interior spaces.

**TEXT / REFERENCE BOOKS**

1. Parker, Harry, (1957). Materials and Methods of Architectural Construction, John Wiley & Sons, London
2. Rangwala S.C., (1987). Engineering Materials, Charotar Publishing House, Anand.
3. Reid, E. (2013). Understanding Buildings, a Multidisciplinary Approach. United Kingdom: CRC Press.
4. Spence R.J., Cook D.J., (1983). Building Materials in Developing Countries, John Wiley and Sons.

| SDE2302 | INTERIOR SERVICES 1 | L | T | P | Credits | Total Marks |
|---------|---------------------|---|---|---|---------|-------------|
|         |                     | 2 | 0 | 2 | 3       | 200         |

**COURSE OBJECTIVES:**

- To develop an understanding of building services such as water supply, drainage and plumbing system.
- To familiarize them with the advanced service integration system and their applications in building.
- Evolving understanding in students to choose appropriate systems and integrate the same in their design projects.

**UNIT 1 WATER SUPPLY IN BUILDINGS****10 Hrs.**

Standard of portable water and methods of removal of impurities, Consumption order of water for domestic purposes, distribution system, service connection from mains, house-service design, tube well, pumping of water, types of pumps, cisterns for storage

**UNIT 2 BUILDING DRAINAGE****10 Hrs.**

Layout, Principles of drainage, Trap type, materials and functions, Inspection chambers, Design of Septic tanks and soak pits, Ventilation of house drains; Anti-siphonage or vent pipes, One and two pipe systems Sinks, bath tub, water closets, flushing cisterns, urinals, wash basins, bidet, shower panel etc.

**UNIT 3 PLUMBING****20 Hrs.**

Common hand tools used for plumbing and their description and uses, Joints for various types of pipes, Sanitary fitting standards for public conveniences; Different types of pipes and accessories for water supply, controlling fixtures like valves, taps, etc. Fittings and Choice of materials for piping: cast iron, steel, wrought iron, galvanized lead, copper, cement; concrete and asbestos pipes, PVC pipes; Sizes of pipes and taps for house drainage.

**UNIT 4 SERVICES STUDIO****20 Hrs.**

Preparation of plumbing layout of a single storey building & working drawing of various fittings and fixtures of water supply and sanitary installations. Components of Plumbing – sanitary ware -w.c, wash basin, bidet, bathtub, jacuzzi etc Sanitary fittings – taps, mixers, shower units, etc.

**Max. 60 Hours****COURSE OUTCOME:**

- CO1** Understand the basic principles of water supply and sanitation
- CO2** Describe the various components in a building drainage system.
- CO3** Attain knowledge about the drainage system for different types of buildings.
- CO4** Classify various sanitary fixtures and its applications.
- CO5** Possess skills and techniques necessary for the selection of various systems and their installation
- CO6** Prepare drainage and plumbing layout for a building.

**TEXT / REFERENCE BOOKS**

1. Water Supply and Sanitary Installations. (2005). India: New Age International (P) Limited.
2. Rangwala, S. C. (2005). Water Supply and Sanitary Engineering. India: Charotar Publishing House.
3. Basak, N. N. (2003). Environmental Engineering. India: Tata McGraw-Hill.

| SDE 9301 | INTERIOR DESIGN STUDIO III | L | T | P  | Credits | Total Marks |
|----------|----------------------------|---|---|----|---------|-------------|
|          |                            | 0 | 0 | 14 | 9       | 400         |

**COURSE OBJECTIVES:**

- To develop a sensitivity to design the interiors of public spaces incorporating services and the principles of place making.

The primary focus is on Anthropometry, Design methodology, Conceptual exploration and representation, Creativity, Scale/proportion, Documenting space, Graphic design, Concept evolution, Application of design principles and elements, design process, Portfolio development. There will be at least one major and one minor design exercise. The faculty can take up the exercises as per their order of preference. The order should be common across all sections. The faculty may achieve the stated minimum outcomes using appropriate strategies.

The list of suggested topics to be covered as design problems: Doctor's clinic, Kindergarten school, Architect's studio, Small cafeteria, Bank extension counter, Departmental store, local police station, local post office, products used by architects in the studio, products for children in kindergarten etc.

**Max. 210 Hours****TEXT / REFERENCE BOOKS**

1. Karlen, M. (2009). Space Planning Basics, 3rd ed. John Wiley & Sons
2. Dechiara J., Panero J., Zelnick M., (2011). "Time Saver Standards for Interior design and Space Planning", McGraw Hill, London
3. Binggeli, C., Ching, F. D. K. (2018). Interior Design Illustrated. United Kingdom: Wiley.
4. Panero J., Zelnick M., (1979). Human Dimension & Interior Space: A source book of Design Reference standards, Watson – Guptill.
5. Mitton M., (2003). Interior Design Visual Presentation: A Guide to Graphics, Models, and Presentation Techniques. John Wiley and Sons.
6. Rengel R, (2002). Shaping Interior Space, Fairchild Books & Visuals.

| SDE2401 | MATERIALS AND CONSTRUCTION II | L | T | P | Credits | Total Marks |
|---------|-------------------------------|---|---|---|---------|-------------|
|         |                               | 2 | 0 | 2 | 3       | 200         |

**COURSE OBJECTIVES:**

- To introduce the building materials and the construction techniques used for the walls, floors and ceilings.
- To expose the different types of wall panelling systems and false ceilings.
- To give an insight to the various finishes and the applications.

**UNIT 1 WALLS-TYPES OF MASONRY****14 Hrs.**

Different types-Stonewalls-random rubble, coursed rubble, square rubble, polygonal rubble & Ashlar etc , Brick masonry-Types of bonds-single & double Flemish bond, header bond, stretcher bond, rattrap bond, ornamental bonding

**UNIT 2 FLOORS****14 Hrs.**

Flooring: rammed earth, Natural stones like Shahabad, Tandur, Kota, Kadappa, Marble, Granite, etc., athangudi tiles, red oxide, terracotta tiles (Laying details), brick paving, glazed ceramic tiles, Vitrified tiles - Finishes: pointing, grouting, pavement, mud plastering, PCC.

Floor coverings - softwood, hardwood-resilient flooring-linoleum, asphalt tile, vinyl, rubber, cork tiles- terrazzo, marble & granite-properties, uses & laying. Floor tiles – ceramic glazed, mosaic and cement tiles - properties, specification for barrier free floors Drawings indicating various types.

**UNIT 3 FALSE CEILING & WALLPANELING****16 Hrs.**

Construction of various kinds of false ceiling such as thermocol, plaster of paris, gypboard, metal sheets, glass and wood. Construction of domes, vaults, & other special ceilings; Paneling Using wooden planks, laminated plywood, cork sheets, fibre glass wool & fabric for sound insulation and wall paneling for thermal insulation.

**UNIT 4 FINISHES****16 Hrs.**

Paints- enamels, distempers, plastic emulsions, cement based paints- properties, uses and applications- painting on different surfaces –defects in painting, clear coatings & strains-varnishes, lacquer, shellac, wax polish & strains-properties, uses and applications. Special purpose paints-bituminous, luminous, fire retardant and resisting paints- properties, uses and applications, low VOC paints

**Max. 60 Hours****COURSE OUTCOME:**

- CO1** Gain comprehensive knowledge on various types of masonry walls.
- CO2** Classify and understand the different materials for floor finishes in interior design.
- CO3** Select and specify flooring materials based on its properties and intended use.
- CO4** Understand the construction techniques of false ceiling in interior spaces planning.
- CO5** Design and specify appropriate false ceiling and wall panelling materials for the design context.
- CO6** Comprehend the various types of finishes and the respective maintenance.

**TEXT / REFERENCE BOOKS**

1. Punmia, B. C. (2008). Building Construction. India: Laxmi Publications Pvt Limited.
2. Jeffries, D. (2004). The Flooring Handbook: The Complete Guide to Choosing and Installing Floors. United States: Firefly Books.

| SDE2402 | INTERIOR SERVICES II | L | T | P | Credits | Total Marks |
|---------|----------------------|---|---|---|---------|-------------|
|         |                      | 2 | 0 | 2 | 3       | 200         |

**COURSE OBJECTIVES:**

- To give an insight to basic concepts and various components in air conditioning.
- To introduce the fundamentals of fire safety measure and design principles in the interiors.
- To understand the principles of acoustics and the associated materials.
- To give an overview of electrical wiring systems in interiors.

**UNIT 1 BASIC CONCEPTS AND SYSTEM COMPONENTS IN AIR CONDITIONING****16 Hrs.**

Vapour compression cycle – Compressors – Evaporators –Refrigerant control devices – Electric motors – Air handling units – Cooling towers. Window type and packaged air conditioners–Chilled water plants–Fan coiled systems–Water piping– Cooling load - Air-conditioning systems for different types of buildings – Duct layout etc.

**UNIT 2 FIRE SAFETY AND ELECTRICAL SYSTEMS****18 Hrs.**

Mechanism of fire spread in building and prevention – Fire safety standards – Concepts in fire protection – Firefighting installation and requirements - Heat sensitive detectors –Smoke detectors –Automatic water sprinkler system- Foam systems, Single/Three phase supply– Protective devices in electrical installation – ISI Specifications - Types of wires, Wiring systems and their choice –Planning electrical wiring for building interiors – Main and distribution boards- Typical Electrical layout for interiors.

**UNIT 3 ACOUSTICS AND SOUND INSULATION****16 Hrs.**

Room acoustics - resonance, reverberation, echo, reverberation time, simple exercise using Sabine's formula - Acoustical requirements of different types of building. – Sound absorption, absorption co-efficient and their measurements, Absorbing materials used and their choices, exercises involving reverberation time and absorption co-efficient. Sound insulation materials

**UNIT 4 SERVICES STUDIO****10 Hrs.**

Preparation of air conditioning layouts and electrical systems in a building.

**Max. 60 Hours****COURSE OUTCOME:**

- CO1** Classify the different types of air conditioning system and ability to apply the same.
- CO2** Understand the need and applications of various electrical systems
- CO3** Understand the mechanism of fire safety systems and the respective installation
- CO4** Understand the fundamental principles of acoustics and its importance in architectural design
- CO5** Solve the acoustical design problems in a space by acoustic treatments
- CO6** Exposure to various fixtures and fittings of HVAC, fire protection and acoustical systems

**TEXT / REFERENCE BOOKS**

1. Langley, B. C. (2000). Fundamentals of Air Conditioning Systems. United States: Fairmont Press.
2. Jain, V. K. (2007). Fire Safety in Buildings. India: New Age International (P) Limited.
3. Lord, P., Templeton, D. (2019). Detailing for Acoustics. United Kingdom: Taylor & Francis.

| SDE9401 | INTERIOR DESIGN STUDIO IV | L | T | P  | Credits | Total Marks |
|---------|---------------------------|---|---|----|---------|-------------|
|         |                           | 0 | 0 | 14 | 9       | 400         |

**COURSE OBJECTIVES:**

- To incorporate the various forms of thematic space making with traditional art and crafts from various parts of India.
- To create a thematic space making with Art and craft forms of our own culture in India – East, West, North, Central.

**MODULE 1**

Design of living units of various geographical locations and culture by involving historical periods, styles and use of craft in its inherent quality and form – craft and living environment. Response to today's situation of urban society – For a given building create contemporary homes of modern society – needs, realities, value system etc.

**MODULE 2**

Applications of art / craft at public level spaces- lounge (hotel), restaurant of specific ethnic characteristics. Spatial and service standards for star hotels – integration of interior design schemes for rooms, restaurants, bars, health clubs, shopping arcade and other guest areas with the general theme of the hotel. Special ideas for suites and banquet halls – contemporary interior schemes to integrate new concepts in lighting and materials.

**Max. 210 Hours****TEXT / REFERENCE BOOKS**

1. Karlen, M. (2009). Space Planning Basics, 3rd ed. John Wiley & Sons
2. Dechiara J., Panero J., Zelnik M., (2011). "Time Saver Standards for Interior design and Space Planning", McGraw Hill, London
3. Binggeli, C., Ching, F. D. K. (2018). Interior Design Illustrated. United Kingdom: Wiley.
4. Julius Panero & Martin Zelnick, Human Dimension & Interior Space : A source book of Design Reference standards, Watson – Guptill, 1979.
5. Mitton, M. (2003). Interior Design Visual Presentation: A Guide to Graphics, Models, and Presentation Techniques. Germany: Wiley.
6. Lin M., (1993). Drawing and Designing with Confidence: A step-by-step guide, Wiley and Sons.
7. Rengel R., (2002). Shaping Interior Space, Fairchild Books & Visuals.
8. Pile. J., (2005). A history of interior design, Laurence King Publishing.
9. Jones R., (2008). Interiors of Empire: Objects, Space and Identity within the Indian Subcontinent, Manchester University Press.

| SDE1503 | VISUAL IDENTITY & BRANDING | L | T | P | Credits | Total Marks |
|---------|----------------------------|---|---|---|---------|-------------|
|         |                            | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To have a detailed understanding of building successful brands.

**UNIT 1 BRANDING****6 Hrs.**

What is Branding? Overview of a Framework for Building Iconic Brands (Corporate Mission, Brand Vision, Brand Positioning, Brand Belief, Brand Personality, Brand Values, Brand Iconography, Brand Experience and Innovation Principles); Interior Design and its role in fostering a powerful brand; Challenges of creating global Brands; Brand Dynamics, Effective strategies for increasing brand value.

**UNIT 2 POSITIONING****6 Hrs.**

Brand Identity- Understanding the Competitive + Cultural Context in Which a Brand Operates (Situational Assessment), Defining + Exploring Consumer Needs, Aspirations + Perceptions, Behaviours (Consumer Discovery), Uncovering Enlightening Thoughts about the Category + the Consumer (Fresh Insights) and Brand Selling Ideas. Brand Ideals- Vision, Meaning, Authenticity, Coherence, Flexibility, Commitment, Value, Differentiation, Sustainability, Differentiating types of brand architecture, brand names, and taglines.

**UNIT 3 VISUAL IDENTITY****8 Hrs.**

Visual world of a Brand- Graphics, Typography, Colour Palette, Imagery. Sound, Animation, Presentation. Types of Images- Logo, Packaging, Retail Experience, Advertising (Print, Tv, Digital) and Website. Personality of a brand. Types of Brandmarks, Sequence of Cognition, Identity Design process & Branding tools and techniques; Common industry practices. Standards and guidelines, Design of Interiors to reflect Brand Image- Logo, Surfaces, Colour, Material, Furniture & Layout, Lighting, Case Studies

**UNIT 4 STRATEGIES****6 Hrs.**

Consumer Target + Mindset, Competitive Positionings, Primary Research, Positioning Territories, Insights + Perceptual Mapping, Segmentation & Iceberg Model, Brand Innovations, Role of Interior Design in Customer's Perception, Case Studies

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Demonstrate comprehensive understanding through accompanying assignments, group discussions, and site visits.

**Max. 30 Hours****COURSE OUTCOME:**

- CO1** Communicate the difference between a brand and an identity
- CO2** Assess the tools and techniques used in the brand identity process to develop brand positioning
- CO3** Demonstrate understanding of colour and typographic theory
- CO4** Create effective logos and corporate identities
- CO5** Showcase best practices in creation of an original visual brand identities
- CO6** Categorize the various elements of brand identity through interior space.

**TEXT / REFERENCE BOOKS**

- Airey, D. (2019). Identity Designed: The Definitive Guide to Visual Branding. United States: Rockport Publishers.
- Slade, C. (2016). Creating a Brand Identity: A Guide for Designers. United Kingdom: Laurence King Publishing. Brand Bible: The Complete Guide to Building, Designing and Sustaining Brands- DEBBIE MILLMAN
- Klanten, R. (2013). Brand Spaces: Branded Architecture and the Future of Retail Design. Germany: Prestel Pub.
- Internet Links-  
 Interbrand: [www.interbrand.com](http://www.interbrand.com)  
 Landor: [www.landor.com](http://www.landor.com)  
 Prophet: [www.prophet.com](http://www.prophet.com)  
 Pentagram: [www.pentagram.com](http://www.pentagram.com)  
 IDEO: [www.ideo.com](http://www.ideo.com)  
 Wolff Olins: [www.wolffolins.com](http://www.wolffolins.com)

| SDE9501 | INTERIOR DESIGN STUDIO V | L | T | P  | Credits | Total Marks |
|---------|--------------------------|---|---|----|---------|-------------|
|         |                          | 0 | 0 | 16 | 10      | 400         |

**COURSE OBJECTIVES:**

- To introduce the basics of designing for office interiors and to develop skills required for the same.

**MODULE 1****80**

Developing visually literate students who are proficient at analytical thinking, conceptualization and the problem-inquiry, solution cycle. Examining the connection between abstract design principles and the physical and visual environments. Consulting office for professional practitioner- Planning for small office – office of architects, interior designers, lawyer, and auditor – individual layouts, Modular units. play with levels. Lighting & colour scheme – natural & artificial light.

**MODULE 2****160**

Interior designing for multi-functional, multi-level planning, design and detailing of various work spaces, interactions zones. Design of corporate Environments such as BPO, corporate office.

**Max. 240 Hours****TEXT / REFERENCE BOOKS**

1. Meyer B., Klanten R., Lovell S., (2007). *Furnish: Furniture and Interior Design for the 21st Century*. Germany: Prestel Pub.
2. Bennett, W., Diamonstein, B., Diamonstein. (1982). *Interior Design, the New Freedom*. United States: Rizzoli.
3. Forino, I., Postiglione, G., Basso Peressut, L., Scullica, F. (2008). *Places & Themes of Interiors.: Contemporary Research Worldwide*. Italy: Franco Angeli Edizioni.
4. Grieco, L. (2018). *The Other Office 3: Creative Workspace Design*. Netherlands: Frame Publishers.
5. Zhang, C. (2018). *Rethinking Workspace Design: A Workplace Design for Employees to Feel Engaged and Happy*. United States: Boston Architectural College.

| SDE9601 | INTERIOR DESIGN STUDIO VI | L | T | P  | Credits | Total Marks |
|---------|---------------------------|---|---|----|---------|-------------|
|         |                           | 0 | 0 | 16 | 10      | 400         |

**COURSE OBJECTIVES:**

- To study and develop innovative schemes for complex interior spaces like hospitals and auditorium. Extensive knowledge of working drawings is also intended.

**MODULE 1****100 Hrs.**

Spatial and environmental standards for various types of auditorium spaces- performing arts, cinema, and convention centre. Detail schematics of wall panelling, false ceiling and carpeting to satisfy acoustic requirements. Lighting study to develop ideas for foyer, auditorium and stage requirements.

**MODULE 2****140 Hrs.**

Hospital Interior Design- Efficient utilization of space based on study ;Emergency, different wards, pathological rooms, radio logical rooms, operation theatres, etc. keeping in mind Technical requirements, Rigid functional relationships between different medical departments, aspects of psychology of both patients and staff. Managing service requirements- lighting, acoustics, plumbing and drainage, operational flow, etc.

**Max. 240 Hours****TEXT / REFERENCE BOOKS**

1. Leslie, F. (2000). Designs for 20th-century interiors. London: Harry N. Abrams.
2. Diamonstein., Bennett, W., Diamonstein, B. (1982). Interior Design, the New Freedom. United States: Rizzoli.

| SDE3502 | PRODUCT DESIGN | L | T | P | Credits | Total Marks |
|---------|----------------|---|---|---|---------|-------------|
|         |                | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To get an insight of various products and accessories used in Interior Spaces.
- To understand relevant products designed according to user's needs.
- To know about the role of accessories in interiors. Integration of accessories in interior design and stylistic development.
- To learn about the practical aspects of product design processes

**UNIT 1 INTRODUCTION****4 Hrs.**

An brief introduction to Product Designing – Various elements – History of Product Design – Definition of Product Design, understanding of Product Design - Purpose of Product Design – Role of Product Designers. Design approaches in product and lifestyle accessories design with a focus on functionality, ergonomics, aesthetics, multiple usages etc.

**UNIT 2 HUMAN FACTORS****8 Hrs.**

Application of human factors data. Human activities, their nature and effects. Human response to climate. Visual, Auditory, Tactual, Olfactory human mechanisms, Physical space and arrangement. Evolving the strategy of design with integration of technical complexities and lifestyle influences. Development of the design of products and accessories to specific interiors and prevailing trends.

**UNIT 3 DESIGN APPROACH****8 Hrs.**

Design approach with limited constraints inherent in accessory products. Broad based approach towards innovative design and application to multi products and multi materials in manufacturing interior products and lifestyle accessories. Study of materials and processes adopted in accessories design. Stylistic development of interior products from the past to present with insight into technological advances and the influences of social, economic and political factors on their design. Form, Colour, Texture, Symbols, User specific criteria, Material, Technology and recyclability, Packaging. Multiple Utility oriented approach to Product Design.

**UNIT 4 PRACTICAL ASPECTS****6 Hrs.**

Consumer Motivations Identification of user needs and Driving Factors; Emotional Design, Sensibility, Social Ethics and Concerns; Market Gaps, Market Oriented Innovation; Business Evolution Product Planning for the future, Disruptive Innovation; Basic understanding of construction principles, modelling, rapid prototyping, with broad orientation to socio-cultural and historical context of the sector. Orientation to Indian as well as global context of interiors, trends and market.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Demonstrate comprehensive understanding through accompanying assignments, group discussions, and site visits.

**Max. 30 Hours****COURSE OUTCOME:**

- CO1** Understand the role of product design and designers for our everyday environment.
- CO2** Analyse the various approaches to Product and accessories design for Interior Environments.
- CO3** Apply various human factors in design of products and accessories.
- CO4** Develop approaches to design keeping practical aspects in mind.
- CO5** Approach towards Product Design in relation with various spaces
- CO6** Distinguish various design trends in the Indian and Global market.

**TEXT / REFERENCE BOOKS**

1. Slack L., (2008) What is Product Design? Roto Vision publishers.
2. Crochet T., Vleck D., (2008) Designer's Guide to Decorative Accessories, Prentice Hall, 1st edition.
3. Ashby M., Johnson K., (2002). Materials and Design: The Art and Science of material selection in product design, Butter Worth Heinemann, 1st edition.
4. Product Design and Development. (2003). United States: McGraw-Hill Education (India) Pvt Limited.
5. Stark J., (2011) Product Lifecycle Management: 21st Century Paradigm for Product Realisation, Springer.

| SARA2501              | MATERIALS AND CONSTRUCTION<br>STUDIO IV |                       | L                        | T | P | Credits | Total Marks |
|-----------------------|-----------------------------------------|-----------------------|--------------------------|---|---|---------|-------------|
|                       |                                         |                       | 1                        | 1 | 3 | 3       | 200         |
| Continuous Assessment | End Semester Examination                | Min Pass Marks        |                          |   |   |         |             |
| 150                   | 50                                      | Continuous Assessment | End Semester Examination |   |   |         |             |
|                       |                                         | 75                    | 25                       |   |   |         |             |

**COURSE OBJECTIVES:**

- To comprehend the properties and the types of nonferrous materials.
- To synthesize the ways through which the nonferrous materials are used in fixed as well as movable barriers in the built form as well as the environment.
- To develop ways to adopt nonferrous materials in architectural design.

**MODULE I GLASS AND PLASTICS FOR ARCHITECTURAL APPLICATIONS****35 Hrs.**

Classification of glass - Composition of glass, its properties and uses - Various types of glass e.g., plate glass, figured glass, float glass (toughened glass, laminated glass), tinted glass, reflective glass, wired glass, foam glass, glass block, fiberglass, float glass, obscured glass etc. - Decorative glass, insulated glass (sound, heat) - properties and application in building industry, glazing and energy conservation measures.

Thermal Insulation- Heat transfer and heat gain by materials -vapor barriers and rigid insulation. Blanket, poured and reflective insulation - properties and uses of (spun glass, foamed glass, vegetable fibers, mineral fibers, foamed plastics, and vermiculite and glass fibers)

Plastic: Properties, types and uses as building material - Polymerization, thermoplastics, thermosetting plastics, elastomers-Plastics in construction (polythene, polypropylene, polyvinyl chloride, PVC poly-structure, Polyethylene (Low density and high density), polycarbonate, acrylic flooring, PVC tiles, roof lights, domes, and handrails, curtain wall, jali work, applications of uPVC

**MODULE II ALUMINIUM FOR ARCHITECTURAL APPLICATIONS****40 Hrs.**

Aluminium, windows and ventilators - Methods of construction - typical details showing fixing of framing members, glass panes, roller position (in case of sliding window), hinge arrangement (in casement window), locking arrangement and related hardware, thumb rules Cladding - Construction methods using Aluminum cladding (includes other ACP materials), shop front handrails - Structural Glazing, curtain walls.

**Max. 75 Hours**

| Modules | Assignments                                                                                                                    | Outdoor / hands on                                                                                                                                                       | Construction plates                                                      | No. | Remarks                             |
|---------|--------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----|-------------------------------------|
| I       | Collection of brochures for different types of glass                                                                           | Report – student have to visit and study the applications of glass and plastics for architectural applications                                                           | Thermal insulation and expansion joints                                  | 1   | Facilitates Architectural design VI |
| II      | Collection of brochures for various aluminium sections and applications, Case studies for application of aluminum in buildings | Report – students have to visit and study aluminum installations in the interiors with respect to the thrust area and give a brief report with sketches and photographs. | Aluminium joinery                                                        | 1   |                                     |
|         |                                                                                                                                |                                                                                                                                                                          | Aluminium door & windows                                                 | 3   |                                     |
|         |                                                                                                                                |                                                                                                                                                                          | Partitions and false ceilings                                            | 1   |                                     |
|         |                                                                                                                                |                                                                                                                                                                          | Curtain wall and ACP                                                     | 1   |                                     |
|         | Sketches – fixing details, wall systems, doors and windows for uPVC, glass and plastics wall systems                           |                                                                                                                                                                          | Application of concrete in the outcome of Architectural design III / IV. | 1   |                                     |

**COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Categorize the applications of nonferrous materials in buildings.
- CO2** Explain the various types of aluminium joinery in movable barriers in load bearing and non-load bearing
- CO3** Develop aluminium joinery for space dividers and false ceilings in the interiors.
- CO4** Explain the utilization of plastics and glass for appropriate applications in buildings.
- CO5** Devise ways to incorporate nonferrous materials in architectural design studios.

**TEXT / REFERENCE BOOKS**

Rangwala S.C. (1982). Engineering Materials, AnandCharotar Publishing House

Ahuja T. D and Birdie G.S., Fundamentals of Building Construction, Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 1999

Punmia B.C, A Text book of Building Construction, Laxmi Publications Pvt. Ltd., New Delhi, 2004.

Boyne, Architects working details, Volumes I, II, III, IV, & V, The Architectural Press, London, 1959

| SARA9501              | DESIGN STUDIO V          |                       | L                        | T | P     | Credits | Total Marks |
|-----------------------|--------------------------|-----------------------|--------------------------|---|-------|---------|-------------|
|                       |                          |                       | 0                        | 1 | 12    | 7       | 400         |
| Continuous Assessment | End Semester Examination | Min Pass Marks        |                          |   |       |         |             |
|                       |                          | Continuous Assessment | End Semester Examination |   | Total |         |             |
| 250                   | 150                      | 125                   | 75                       |   | 200   |         |             |

### COURSE OBJECTIVES

- To expose the students on facilities to be provided to urban communities and train them to deal with the challenges posed in the design of multi-functional public buildings in an urban setting.
- To build upon the foundational design skills with more complex constraints and context. It integrates aspects of Architectural theory, Modern building technology, and Computation into the design process
- To understand and resolve the structural design and use of appropriate materials

### METHODOLOGY PROPOSED

#### STAGE I

Studying the design aspects and parameters involved in medium rise buildings with focus on context, user analysis, bye laws and regulations. Analysis of various approaches and strategies to design problem solving using creative thinking techniques, theories related to human behavior and environmental design, climate responsive and barrier free environment principles.

#### STAGE II

##### Phase I

Conceptualize and develop novel solutions to built-environment by evolving innovative forms for the perceived Architectural program by using three-dimensional approach through study models, 3d sketches, digital models and exploration of computer aided drawings and presentation.

##### Phase II (Iteration and Ideation)

Resolving the given design program by experimentation and multiple iterations leading to three-dimensional composition by understanding the layers of space making.

##### Phase III

Communicate the final outcome through high standard graphical representations (legible Architectural drawings) along with integration of structures and materials

#### DESIGN INTEGRATION

Application of the knowledge gained from core courses like theories of thinking, climatic design in developing architectural solutions. Computational and presentation skills previously acquired may be incorporated.

|                 |                          |               |
|-----------------|--------------------------|---------------|
| <b>TUTORIAL</b> | <b>PERSONAL BRANDING</b> | <b>6 Hrs.</b> |
|-----------------|--------------------------|---------------|

Choosing factors to align based on Vision and mission- Social presence and development- Creativity, Critical thinking, Problem solving; Motivation, Persuasion, Negotiation.

**Max. 195 Hours**

### SUGGESTED TYPOLOGIES:

The focus is on creating complex-built form, connecting multiple spaces and users in a mid-rise built environment like Nursing Homes / Club house/ Museums/ Memorial Complex / Cultural Centre, etc.,

### COURSE OUTCOME

On completion of the course the student will be able to

- CO1** Examine and infer from suitable literature and live case studies appropriate to the design typology.
- CO2** Proposition of precise understanding of the important local bye laws and Standards applicable to the specific typology.
- CO3** Developing an appropriate design intent based on notions, ideas with the three-dimensional perception as part of the design process.
- CO4** Apply the different techniques of creative thinking in design problem solving.
- CO5** Curate a deeper understanding of the need for climate responsive design and universal design.
- CO6** Integrate structural grid, parking, services and landscape in architectural design.

### TEXT / REFERENCE BOOKS

De Chiara, J., & Crosbie, M. (2017). *Time-saver standards for building types* (4th ed.). McGraw-Hill Education.

- Neufert, E. (2019). *Architects' data* (5th ed.). Wiley Blackwell.
- Gauzin-Muller, D. (2002). *Sustainable architecture and urbanism*. BirkhauserVerlag AG.
- Krishnan, A., Baker, N., Yannas, S., & Szokolay, S. (2017). *Climate responsive architecture: A Design Handbook for Energy Efficient Buildings* (1st ed.). McGraw Hill Education.
- Degenhart, C., Heiss, O., Ebe, J., & Fran Ford. (2010). *Barrier-free Design: Principles, Planning, Examples*. Birkhauser.
- Bassler, B. (2008). *Architectural graphic standards*. Hoboken, N.J.: John Wiley & Sons.
- Ching, F. (2011). *Visual dictionary of architecture* (2nd ed.). John Wiley & Sons.

| SARA2601              | MATERIALS AND CONSTRUCTION<br>STUDIO V |                       | L                        | T | P | Credits | Total Marks |
|-----------------------|----------------------------------------|-----------------------|--------------------------|---|---|---------|-------------|
|                       |                                        |                       | 1                        | 1 | 3 | 3       | 200         |
| Continuous Assessment | End Semester Examination               | Min Pass Marks        |                          |   |   |         |             |
|                       |                                        | Continuous Assessment | End Semester Examination |   |   |         |             |
| 150                   | 50                                     | 75                    | 25                       |   |   |         |             |

**COURSE OBJECTIVES:**

- To identify the various directions through which steel is effectively used in the built forms and environment.
- To understand the basic components of steel movable barriers in the external walls.
  - To discuss the principles of utilizing steel in truss and space frames.

**MODULE I****STEEL IN CONSTRUCTION****40 Hrs.**

Iron: brief study on manufacture, composition, properties and uses of cast iron, wrought iron, pig iron - Steel: Composition, Properties, anticorrosive measures, mechanical and heat treatment of steel - Market forms of steel: Steel for Reinforcement - Hot rolled bars, CTD Bars, TMT bars, Welded wire fabrics; Steel for Pre stressed concrete; Structural steel; Stainless steel, steel alloys, current developments.

Different types of doors and windows (open able, sliding etc., methods of construction using steel)- Design and detailing of steel rolling shutter. Design and detailing of steel roof trusses (north-light, tubular, butterfly truss etc.) including construction methods for roof covering using steel, FRP, polycarbonate, cement fiber sheets etc.

**MODULE II****LONG SPAN STRUCTURES****35 Hrs.**

Long span roofs using different types and materials (stadium and auditoriums). Methods of construction using cable Structure-principle of cable stayed bridges -space frame structures. Methods of construction using Shell structures and folded plates - various forms and classification of shells and types of folded plates, thumb rules

**Max. 75 Hours**

| Modules | Assignments                                                                         | Outdoor / hands on                                                                                                                                     | Construction plates                                               | No | Remarks                              |
|---------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|----|--------------------------------------|
| I       | Container architecture                                                              | Report – students have to visit and study steel construction techniques give a brief report with sketches and photographs.<br><br>Wire Model<br>Fabric | Steel sections and foundation and column layout                   | 1  | Facilitates Architectural design VII |
|         |                                                                                     |                                                                                                                                                        | Steel windows                                                     | 1  |                                      |
|         |                                                                                     |                                                                                                                                                        | Steel doors and rolling shutters                                  | 1  |                                      |
|         |                                                                                     |                                                                                                                                                        | Steel truss and space frames                                      | 1  |                                      |
| II      | International case studies with different roof forms and detail the steel joineries |                                                                                                                                                        | Architectural detailing in public spaces                          | 1  |                                      |
|         |                                                                                     |                                                                                                                                                        | Application of concrete in the outcome of Architectural design V. | 1  |                                      |

**COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Categorize the ways through which steel is used in conventional as well as large span structures.
- CO2** Explain the various components of steel doors and rolling shutters and the thumb rules
- CO3** Integrate the steel members for structural and non-structural purposes in design.
- CO4** Devise and detail the applications of steel in public realms
- CO5** Combine steel with other materials for architectural applications

**TEXT / REFERENCE BOOKS**

1. Punmia B C, Jain.A.K. Jain,A.K. (1998). Comprehensive design of steel structures, Laxmi Publications Pvt. Ltd.
2. Boyne (1959). Architects working details, Vol. I, II, III, IV, & V, The Architectural Press, London

3. Ramaswamy G.S. (1984). Design and Construction of Concrete shell roofs, Krieger
4. Ahmad.M.H., Haji,M.T&Rasdi.M, (2000). Design Principles of Atrium Buildings for the Tropics, University Technology Malaysia.



| SARA9601              | DESIGN STUDIO VI         |                       | L                        | T | P  | Credits | Total Marks |
|-----------------------|--------------------------|-----------------------|--------------------------|---|----|---------|-------------|
|                       |                          |                       | 0                        | 0 | 13 | 7       | 400         |
| Continuous Assessment | End Semester Examination | Min Pass Marks        |                          |   |    |         |             |
|                       |                          | Continuous Assessment | End Semester Examination |   |    |         |             |
| 250                   | 150                      | 125                   | 75                       |   |    |         |             |

**COURSE OBJECTIVES:**

- To explore the challenges posed in designing group of buildings in large sites.
- To practice the knowledge on structural resolve and building service integration in Architectural creations.

**METHODOLOGY PROPOSED****STAGE I**

Study through Participatory workshops/seminars/Special lectures on the various energy efficient planning and infra-structure aspects of designing large sites. Research on the various aspects of multi-functional, multi storied, Service intensive complex-built environments with horizontal and vertical circulation and understanding the dynamics of large span structures and integrating appropriate structural systems. Explore latest trends in construction technology and materials.

**STAGE II****Phase I**

Conceptualize and integrate complex issues of the given program, the site, and the vertical and horizontal layering of functional requirements and services with a special focus on energy efficient solutions for both the building and the environment. The design solution should accomplish a strong resolve towards building structures and services systems.

**Iteration and Ideation (Phase II)**

Resolving the given design program by experimentation and multiple iterations to understand the interrelationship of spaces, the space in between buildings, the structural and services integration.

**Phase II**

Communicate the final outcome through high standard graphical representations (legible Architectural drawings) with details of structural systems, various services and energy efficient techniques incorporated in the design solution.

**DESIGN INTEGRATION**

Application of the knowledge gained by the students from core courses like energy efficient architecture, building structures and building services in developing the design.

**Max. 195 Hours****SUGGESTED TYPOLOGIES:**

Mixed use or single use high rise buildings in a typical urban context like Large commercial complexes /multiplex/ hospital/ hotels/ serviced apartments, etc.,

**COURSE OUTCOME**

**On completion of the course the student will be able to**

- CO1** Analyze a multi-functional, multi storied, multi-use-built environments and render the needed spatial qualities
- CO2** Develop a knowledge repository to understand the importance of spatial proximities and connections
- CO3** Solve complex building structural systems in an efficient way and explore various combinations in structural systems
- CO4** Analyze and apply integration of specialized building services in multilevel planning of buildings.
- CO5** Evolve design focusing on Integrating sustainable energy concepts and techniques.
- CO6** Create an innovative built environment using various new age materials and advanced construction technology.

**TEXT / REFERENCE BOOKS**

- De Chiara, J., & Crosbie, M. (2017). *Time-saver standards for building types* (4th ed.). McGraw-Hill Education.
- Neufert, E. (2019). *Architects' data* (5th ed.). Wiley Blackwell.
- Bureau of Indian Standards. (2016). *National building code of India 2016*.
- Gauzin-Muller, D. (2002). *Sustainable architecture and urbanism: Concepts, Technologies, Examples*. BirkhauserVerlag AG.
- Parker, D. And Wood, A. (2013). *The Tall Buildings Reference Book*. New York: Routledge.
- Kloft, E. and Johann, E. (2003). *High-rise Manual: Typology and Design, Construction and Technology*, 1st Ed. Basel: BirkhauserVerlag AG.
- Giedion, S. (2009). *Space, Time and Architecture*, rev. Ed. Cambridge: Harvard University Press.
- Lawson, F. (2007). *Congress, convention and exhibition facilities*. Oxford u.a.: Architectural Press.

Osamu, A. W., Linde, R. M. and Bakhoum, N. R. (2011). *The professional practice of architectural working drawings*. 4th Ed. Hoboken: John Wiley & Sons.



|          |                            |   |   |   |         |             |
|----------|----------------------------|---|---|---|---------|-------------|
| SARA3504 | ENVIRONMENT AND PSYCHOLOGY | L | T | P | Credits | Total Marks |
|          |                            | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To expose the relationship between man and his larger environment, with special emphasis on aspects that are likely to affect intervention in or creation of the built environment.
- To familiarize the students with basic concepts/ theories of psychology as relevant to architecture.
- To analyse the human dimension of environmental sustainability from psychological perspectives

**UNIT 1 INTRODUCTION****8 Hrs.**

Introduction to the discipline environmental psychology, its importance in the field of architecture, understanding the principles of psychology, the roots and Edges of environmental psychology- Theories and approaches in Environmental Psychology. Emotional Relationships to Place: Attachment & Identity

**UNIT 2 BASIC ATTENTION PROCESSES AND MEMORY****7 Hrs.**

Models of Attention - Automization and Attention. The Use of Knowledge - Memory and built environment- theories on different types of memories - Retrieval from Long-Term Memory - Models of Semantic Memory - Basics of Visual Memory - Object Transformation in Visual Memory

**UNIT 3 PERCEPTION****8 Hrs.**

Sensory Mechanisms and Concept of perception, Role of Culture in Perception - visual perception, theories on environmental perception- Gestalt Principles - environmental perception and design. Concepts of cognition. Environmental cognition and design. Environment and human response in relation to different environmental variables. Classical Theory of Decision Making and Prospect Theory of Decision Making

**UNIT 4 SPACE AND HUMAN BEHAVIOR****7 Hrs.**

The Density/Crowding Distinction - Crowding and Density Human Experimental Studies -Physiological reactions - Task performance, Social-affective responses - Crowding in everyday settings - The residence - Recreational areas - Hospitals - Prisons. Concept of personal spaces, personal space and human behavior. Personal space and environmental design. Concept of territoriality, territoriality and human behavior & territoriality and environmental design. Residential environment- Concept of Home. Neighborhood concept & Neighborhood satisfaction. Place attachment theory, Workplace environment and behavior. Application of the knowledge in design of a residence, community neighborhood and other built environments.

**UNIT 5 COMPREHENSIVE LEARNING**

Documentation of Human Preferences in public spaces through various survey techniques.

**Max. 30 Hours****COURSE OUTCOME:**

**On completion of the course the student will be able to**

- CO1 Explore and understand various perspectives on human-environment interrelationships
- CO2 Relate the impact of space on human behaviour
- CO3 Develop clear knowledge on memory and attention
- CO4 Evaluate the role of perception and cognition in shaping human responses
- CO5 Build a systematic evaluation of the built environment in relationship to the act of socialising
- CO6 Apply the acquired knowledge through case evaluations.

**TEXT / REFERENCE BOOKS**

1. Morgan, T., & Clifford, Introduction to Psychology, Tata McGraw-Hill Publications, New York, 2001
2. Robert, G. (2002). Environmental Psychology: Principles and Practice, Optimal books, 2002.
3. Devlin, A. S. (2018). Environmental Psychology and Human Well-being: Effects of Built and Natural Settings. Academic Press.
4. Bell, P. A., Greene, T. C., Fisher, J. D., & Baum, A. (1996). *Environmental psychology*. Harcourt.
5. Mehrabian, A., & Russell, J. A. (1974). An approach to environmental psychology. the MIT Press.

| SARA9121              | BUILDING MANAGEMENT STUDIO I | L               | T | P  | Credits        | Total Marks |
|-----------------------|------------------------------|-----------------|---|----|----------------|-------------|
|                       |                              | 0               | 0 | 12 | 6              | 300         |
| Continuous Assessment |                              | University Viva |   |    | Min Pass Marks |             |
| 200                   |                              | 100             |   |    | 150            |             |

### COURSE OBJECTIVES:

- To augment the knowledge imparted through lectures by discussion of practical cases to determine practice, critically analyze application of knowledge in the professional context, experience simulated application procedure in a limited context.
- Live case studies are to be undertaken and various aspects of the course to be taken up in the studios. Emphasis is given to interaction with project technical staff and other stakeholders. Application of software and other IT tools on actual real life cases are undertaken to enable hands on experience.

### STUDIO BRIEF

The Building Management studio I aims to provide an opportunity for students to get introduced to project management and familiarize with the building project services through studies of project drawings & documents and extracting the inferences for group projects on the various aspects like Project brief - Area Usage - FAR / Area statement - Bye laws - Soil Investigation - Architectural appraisal, Configuration of spaces, plans, sections, elevations, levels, landscaping etc., -Structural appraisal: Foundation system, Structural system, Details on structural members including sizes and material specifications - MEP appraisal: Conceptual drawings, SLDs, and actual drawings showing location of services. Interaction of MEP with other aspects of project in terms of sequencing, layout etc. The study of internal and external co-ordination aspects required in various areas of construction and services to be understood practically through site visits.

Students shall gather information through their investigation from the live case studies related to the building techniques, building services and analyze the details with respect to industry standards and owner requirements to have better understanding on the key factors determining the process of project management at various stages of the project life cycle. The inferences of the study also to be compared with the building codes and standards and recommend the suitability.

### DELIVERABLES

The students shall define and record the case study documentation in project management context with reference buildings and related services, infrastructure with the project phases, project stakeholders and project organization and their roles, responsibilities, scope and services of team. The final report to comprise in-depth analysis of existing building services in the form of drawings, sketches, photographs, relevant details, referral codes, schematic charts, reports, cognitive analysis diagram, empirical documentation, detailed narratives and appraise the suitability and efficiency of design and application. The proposal for modification and enhancement of system based on their case analysis.

### TEXT / REFERENCE BOOKS

1. National Building Code of India 2016 (NBC Volume 1 & 2 )
2. National Fire Prevention Association standards
3. Bureau of Indian Standards ( BIS )
4. British Standards ( BS )
5. Energy conservation building code (ECBC)
6. Bureau of Energy Efficiency ( BEE )
7. American Society of Heating, Refrigeration and Air conditioning Engineers ( ASHRAE )
8. SP 72: National Lighting Code 2010.

| SARA9221              | BUILDING MANAGEMENT STUDIO II | L               | T | P  | Credits        | Total Marks |
|-----------------------|-------------------------------|-----------------|---|----|----------------|-------------|
|                       |                               | 0               | 0 | 11 | 6              | 300         |
| Continuous Assessment |                               | University Viva |   |    | Min Pass Marks |             |
| 200                   |                               | 100             |   |    | 150            |             |

### COURSE OBJECTIVES:

- To augment the knowledge acquired through lectures and through live case studies, critically analyze the application of knowledge in the Project Management context with reference to building construction and related infrastructures with topics on project phases, characteristics of the project life cycle, project stakeholders and project organization their roles, responsibilities, scope and services of team members.
- To ensure the logical understanding of the project management procedures and the use of software to prepare, monitor and track the project activities with schedule.
- To understand and devise the quality parameters for the execution of construction activities, services, external infrastructure and co-ordination basis the live case studies and interaction with the construction professionals and consultants.

### STUDIO BRIEF

Time Management; Development of Construction Logic; Work out alternatives of construction sequence logic considering project and site constraints, design requirement, services interaction, resource requirement etc.; Study of existing approach to construction logic; Analyse strengths and weaknesses; Preparation of Work Breakdown Structure (WBS).

Visualizing strategic breakdown of project into work packages; Identify approach of work breakdown for the project considering ease of coordination, cost savings etc.; Developing and presenting WBS of respective projects as a hierarchy of deliverables that collectively constitute the project; Presenting WBS in MS-Project with appropriate linkages; Project Planning & Scheduling; Identification of Activities, Milestones and Construction Sequencing considering: Activities, Non work activities, Characteristics of repetitive activities and projects, Typical and non-typical activities, Repetitive and non-repetitive activities.

Development of hierarchy of networks showing detailed activities, milestones using MS project; Calculation of quantities, cost and productivity data; Determine activity durations based on productivity data; Determining activity durations through deterministic and probabilistic durations; Parametric Estimating; Analogous Estimating (Top Down Estimating); Expert Judgement; Three Point Estimates etc.; Determining time duration and labour/equipment resources of all activities in the project using MS project; Utilization of network techniques for project planning, scheduling and control like; Time calculation of AON Network, PERT, PNET, Line of Balance Method and Monte Carlo simulation; Developing Project Schedule on MS Project.

Time Cost Analysis; Calculation of costs related to activities for calculating the cost of crashing a project; Determining costs associated with activities over a time graph; Calculate the costs associated with crashing the activities; Develop project and activity costing schedule on MS Project; Earned Value Management; Developing Planned Value, Actual Cost, Earned Value and Variances; EVM application for project progress; Resource and Material Management; Resource Histograms and Resource levelling; Developing resource histograms for projects; Achieve uniform resource allocation; Application of Multiple Resource Allocation Procedure, PACK method, Branch and Bound Method; Developing a revised resource based schedule; Application of MS Project.

TQM approach for the projects using quality parameters for the project; develop / devise project specific specifications; role of BOQ / contract conditions / special conditions / make of materials; develop quality check parameter for activities / trade packages; activities to be followed for ensuring quality in project execution. Discussion on the current practices and proposal for new techniques to be employed / suggested for quality. Quality test procedures for various construction activities – Site test – Lab test – Interpretation of test results. Procedure for rejecting non-quality / Non-conforming works. NCN procedures etc.

### DELIVERABLES

The students shall define and record the case study documentation in project management context with reference to buildings and related services, infrastructure considering different project phases. The final report to comprise in-depth analysis of project management approach and preparation of schedule using MSP, Cost Analysis, EVM, Resource Analysis and balancing, schedule crashing with time cost tradeoff. Students should also analyze and prepare the quality control / quality assurance plan for the selected project & services studied to have better quality standards, compare and infer the quality management system adopted for the investigated project.

### TEXT / REFERENCE BOOKS

1. National Building Code of India 2016 (NBC Volume 1 & 2 )
2. National Fire Prevention Association standards
3. Bureau of Indian Standards ( BIS )
4. British Standards ( BS )
5. Energy conservation building code (ECBC)
6. Bureau of Energy Efficiency ( BEE )
7. American Society of Heating, Refrigeration and Air conditioning Engineers ( ASHRAE )
8. SP 72: National Lighting Code 2010.



| SBAA5341 | COST MANAGEMENT | L | T | P | Credits | Total Marks |
|----------|-----------------|---|---|---|---------|-------------|
|          |                 | 3 | 0 | 0 | 3       | 100         |

### COURSE OBJECTIVES:

- The objective of the course is to familiarize the fundamentals of cost concepts and their applications in the various phases of the project cycle of construction projects.
- To provide a basic knowledge to carry out the evaluation of projects, computation of Profit on projects, systems and equipment and evaluation of project investment decisions.

|               |                                |              |
|---------------|--------------------------------|--------------|
| <b>UNIT 1</b> | <b>FUNDAMENTALS OF COSTING</b> | <b>9 Hrs</b> |
|---------------|--------------------------------|--------------|

Cost concepts- cost, costing, cost accounting, cost unit, cost centre. Elements of cost, Classification of cost. Methods of costing. Techniques of costing . Cost Sheet.

|               |                       |              |
|---------------|-----------------------|--------------|
| <b>UNIT 2</b> | <b>COST ESTIMATES</b> | <b>9 Hrs</b> |
|---------------|-----------------------|--------------|

Methods of estimating cost of construction for various work, cost indices, rate of labour and material, analysis of rates , preparation of abstract of estimated cost, use of CPWD schedule of rates, Deriving construction cost as per Bill of quantities . Construction Economics-Elasticity of demand, theory of production, costs analysis, contractors costs, perfect competition, monopoly, monopolistic.

|               |                                          |               |
|---------------|------------------------------------------|---------------|
| <b>UNIT 3</b> | <b>PREREQUISITES OF CONTRACT COSTING</b> | <b>12 Hrs</b> |
|---------------|------------------------------------------|---------------|

Definition, Essential Requirements, Trade usages, Forms of contract, Termination of Contracts, Labour Contract Negotiated Contracts, Schedule of Prices Contracts, Package Deal Contracts, Demolition Contracts, Responsibilities of the Engineer, Contractor and Owner, Earnest Money and Security Deposits, Mobilization Fund, Tender, Opening of Tenders, Scrutiny of Tenders, Acceptance of Tender, Revocation of Tender, Tender form, Unbalance Tender, Liquidated Damages, Advertisement, contract Documents, Qualification of Contractors, Direct and Indirect Costs, Basic price Contracts. Conditions of Contract: Definition, Object, Importance, Peculiarities, General Provisions, Typical Clauses of the Conditions of Contract, Conditions of Contract in Outlines. Rate Analysis: Purposes of Rate Analysis, Factors affecting, importance, Schedule of Rates, Task works per Day, Rate analysis of typical Items.

|               |                         |              |
|---------------|-------------------------|--------------|
| <b>UNIT 4</b> | <b>CONTRACT COSTING</b> | <b>9 Hrs</b> |
|---------------|-------------------------|--------------|

Contract costing- procedure for recording costs, methods of calculating profit on an incomplete contract. Cost plus contract- escalation clause- retention money- -Percentage completion method – completed contract method.

|               |                              |              |
|---------------|------------------------------|--------------|
| <b>UNIT 5</b> | <b>CONSTRUCTIVE LEARNING</b> | <b>6 Hrs</b> |
|---------------|------------------------------|--------------|

Assignments on Risk Associated with national and international contracts.

**Max. 45 Hours**

### COURSE OUTCOMES

- CO1** Interpret cost component and computation of cost of a service or a project.
- CO2** Predict the cost of the component of a project after considering qualitative and quantitative factors.
- CO3** Skillfully able to compute the profitability of a project
- CO4** Demonstrate how to be a successful entrepreneur
- CO5** Assess best and successful project
- CO6** Analyse and evaluate domestic and global competition in building management.

### TEXT / REFERENCE BOOKS

1. Rangwala S.C. (2004) *Estimating , Costing and Contracts*. Charotar Publications.
2. Dutta B.N.(2006) *Estimating and Costing in Civil Engineering: Theory and Practice, including Specifications and Valuation*. UBS Publication.
3. M. Chakraborty. (2006) *Estimating and Costing*. Authors' Publication.
4. Namavati R.(2010) *Theory & Practice of Valuation*. Lakhani Book Depot.
5. Ramachandran. R. & Srinivasan R. (2004) *Cost Accounting*. Chennai: Sriram publication.
6. Ghosh T. Banerjee & Bansal K. (2001) *Principles and Practice of Accounting*. New Delhi: Galgotia Publishing Company.
7. Hansen, M..(2007). *Managerial accounting*. Haryana: Thomson Publishing House.
8. Mittal, D. and Luv M. (2001) *Cost accounting*. New Delhi : Galgotia Publishing Company.
9. Shankamarayana, H.&Ramanath, H. (2011) *Financial Accounting for management*. New Delhi : Cengage India.

10. Singh H. (1993). *Construction management and accounts*. New Delhi : Tata McGraw Hill.
11. Venkatasivakumar V. (2011) *Cost accounting management*. Chennai : Pearson.



| SARA7306 | FACILITIES PLANNING AND MANAGEMENT | L | T | P | Credits | Total Marks |
|----------|------------------------------------|---|---|---|---------|-------------|
|          |                                    | 3 | 0 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To introduce the fundamentals of facilities planning and an effective management.
- To develop students capability to manage various building services in the built facility to increase safe and healthy utilisation of building properties.

|               |                    |               |
|---------------|--------------------|---------------|
| <b>UNIT 1</b> | <b>INTROUCTION</b> | <b>9 Hrs.</b> |
|---------------|--------------------|---------------|

Principle duties of a facility manager - Business aspects of facilities management - Diverse responsibilities and decision-making processes from building infrastructure to fleet services – Architectural Programming.

|               |                                             |                |
|---------------|---------------------------------------------|----------------|
| <b>UNIT 2</b> | <b>FACILITIES DESIGN AND SPACE PLANNING</b> | <b>12 Hrs.</b> |
|---------------|---------------------------------------------|----------------|

Applications of facilities design in defining the requirements of a project- Developing design strategies, implementing corporate philosophies and methodologies, and understanding the Project Development Process - Flexibility and facilities planning - Optimal space planning and cost minimization through facility layout.

|               |                                                      |               |
|---------------|------------------------------------------------------|---------------|
| <b>UNIT 3</b> | <b>FACILITY PLANNING AND DECISION SUPPORT SYSTEM</b> | <b>9 Hrs.</b> |
|---------------|------------------------------------------------------|---------------|

Knowledge based facility planning and decision support system - Application of artificial intelligence – Graphical & theoretic approach to multi-floor building design - Facility layout algorithm using graphics - Simulation in facility planning and efficiency analysis.

|               |                                                                   |               |
|---------------|-------------------------------------------------------------------|---------------|
| <b>UNIT 4</b> | <b>FACILITY MANAGEMENT DURING CONSTRUCTION PHASE AND HANDOVER</b> | <b>9 Hrs.</b> |
|---------------|-------------------------------------------------------------------|---------------|

Types of facility management options - Functionality of Building Automation systems - Wear and Tear of technical installations, recording operating costs, safety concepts, energy supply and waste management - Service tenders and contracts.

|               |                                 |               |
|---------------|---------------------------------|---------------|
| <b>UNIT 5</b> | <b>CONSTRUCTIVE ASSIGNMENTS</b> | <b>6 Hrs.</b> |
|---------------|---------------------------------|---------------|

Understand and present the importance of design and space planning requirement in building facilities. To analyse and present the facility planning aspects to be considered in design and space planning of large building facility and discuss / debate on the various facility management aspects required during post occupancy of building facilities.

**Max.45 Hours****COURSE OUTCOME:**

- CO1** Understand the concept of facilities planning of large building facilities.
- CO2** Comprehensive understanding of building and other services for the better management of facilities.
- CO3** Explore the best space planning measures to be taken during design stage for the best built facilities
- CO4** Analyse the importance of facilities planning requirements during construction and handing over phase of buildings
- CO5** Critical analysis of facilities planning and its impact over the post occupancy of buildings.
- CO6** Comprehend the understanding with the recommendation of best practices for effective functioning of building facilities.

**TEXT / REFERENCE BOOKS**

1. David G. Cotts, Kathy O. Roper, *The Facility Management Handbook*, Amacom, 2009
2. Bernard Lewis and Richard Payant, *Facility Manager's Maintenance Handbook*, McGraw Hills, 2007
3. Keith Alexander, Brian Atkin, Jan Bröchner, and Tore Haugen, *Facilities Management: Innovation and Performance*, Routledge, 2004
4. Eric Teicholz, *Facility Design and Management Handbook*, McGraw Hill Professional, 2001
5. Frank Booty, *Facilities Management Handbook, Fourth Edition*, Butterworth- Heinemann, 2006

| SARA5103 | BUILDING SERVICES | L | T | P | Credits | Total Marks |
|----------|-------------------|---|---|---|---------|-------------|
|          |                   | 3 | 0 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To outline the basic concepts of planning, design, execution and maintainability of mechanical, electrical, plumbing and fire safety services so as to effectively co-ordinate preconstruction and construction phase of projects.
- To familiarize the students with integration and coordination of various internal building services and external infrastructure services such as electrical, storm water drainage, sewerage, communication system and other civil infrastructure facilities.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                       |               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|---------------|
| <b>UNIT 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>WATER SUPPLY AND SANITARY ENGINEERING</b>                          | <b>9 Hrs</b>  |
| <p>Water Quantity and Pressures - Water-Pipe Sizing Wastewater piping-Wastewater-System Elements - <b>Layout of Waste Piping</b> - Interceptors - Piping for Indirect Wastes - <b>Waste-Pipe Sizing</b> - Venting - Plumbing-System Inspection and Tests. Gas piping - Gas Supply – <b>Gas pipe Sizes</b> - <b>Estimating Gas Consumption</b> – Gas pipe Materials. building automation systems – components of BAS related to Water supply and sanitary system; water pump monitoring and control.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                       |               |
| <b>UNIT 2</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>HVAC SYSTEM</b>                                                    | <b>12 Hrs</b> |
| <p>Factors in HVAC Design – Ventilation - Duct Design - Heat Losses - Heat Gains - <b>methods of heating buildings – methods of cooling and air conditioning</b> - Air-Conditioning Plant – Refrigeration - Cycles - Air-Distribution Temperature for Cooling - Condensers – Compressor Units.</p> <p>Cooling Equipment – Central Plant - Zoning - Packaged Air-Conditioning Units –Ducts - Variable Air Volume (VAV) Systems – Variable Frequency Drive (VFD) – dampers - Air-Water Systems - Industrial -Air Conditioning - Chemical Cooling - Energy efficiency techniques- Air conditioning in office, hospitals, malls, and laboratory etc. - Air conditioning for green buildings. Building; automation systems – components of BAS related to HVAC, Control of HVAC systems-Direct Digital Control – chiller pumps, BTU monitoring &amp; control. Vibrations from A/C equipment- vibration isolation - all, floor &amp; ceiling, AC ducts - <b>noise sources in ducts &amp; preventive measures</b>, fan room treatment, hangers, noise control in water piping system.</p> |                                                                       |               |
| <b>UNIT 3</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>ELECTRICAL &amp; FIRE FIGHTING SERVICES</b>                        | <b>9 Hrs</b>  |
| <p>Electrical - DC / AC system, electrical load and emergency power – electrical conductors and raceways – Substations – power distribution system – standby and alternate power supply system. Light and sight – quality of light – lighting methods – daylight – system design of lighting. <b>Measuring Light and Illumination –selection of recommended Illuminance - Zonal Cavity Method of Calculating Illumination - Lamp characteristics and Selection Guide –Integration of services – Electrical power metering / monitoring</b></p> <p>Fire detection and Fire alarm system – fire protections and fire-fighting system and monitoring – sprinkler system - – Standpipes- Water Supplies – <b>pump room design and system arrangements - safety and security systems – FAS, PAS – access control system- fire fighter telephone system – CCTV surveillance system – IBMS system. Components of BAS related to Electrical system and fire safety, security – Communication and Automation system</b></p>                                                                 |                                                                       |               |
| <b>UNIT 4</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>VERTICAL TRANSPORTATION &amp; EXTERNAL INFRASTRUCTURE SERVICES</b> | <b>9 Hrs</b>  |
| <p>Escalators - Elevator Installations - Electric Elevators - Hydraulic Elevators –MRL type elevators - Planning for Passenger Elevators – Elevator systems in high-rise buildings - <b>Planning and design of elevator lobby areas- Dumbwaiters - Conveyers and Pneumatic Tubes - Mail Chutes, recent development in elevator technology.</b></p> <p>External infrastructure services for residential and institutional complexes –planning, design, construction aspects of water supply, sewerage, solid wastes, roads and storm water drainage and RW harvesting. Telecommunications, Structured Cabling Systems - Blown Optical Fibre Technology (BOFT) - <b>Central Station Supervisory Systems-Integration of services</b></p>                                                                                                                                                                                                                                                                                                                                              |                                                                       |               |
| <b>UNIT 5</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>CONSTRUCTIVE ASSIGNMENTS</b>                                       | <b>6 Hrs</b>  |
| <p>Case study and presentation of large construction projects. Understanding and presenting the schematic of services and their integration in the complex and large project environment. Study and Presentation of BAS integration of various internal and external services. Study and presentation of noise control measures taken for various services equipment used in construction projects. Exploring the building services provisions and operations during pandemic conditions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                       |               |

**Max. 45 Hours****COURSE OUTCOMES:**

- CO1** Understand various concepts of ventilation systems, which includes, design, planning, execution, installation of the same in various building typologies.
- CO2** Critically evaluate and study importance of lighting and appraisal of new technologies in design of lighting systems in complex buildings
- CO3** Analyze and interpret various national and international codes for services and understand the concept of application of the same.
- CO4** Integrate building services and demonstrate various energy saving practices.
- CO5** Examine the various techniques for noise control and related construction methods.
- CO6** Evaluate quantitative metrics for various building services.

#### **TEXTS / REFERENCE BOOKS**

1. Frederick S. Merritt, Jonathan T. Ricketts, Building design and construction Handbook, McGraw-Hill Inc., 5th edition, 1994
2. Fred hall and Roger Greeno, Building Services Handbook, Routledge, 7th edition, 2013
3. M.David Egan, Architectural Acoustics, J. Ross Pub., 2007
4. Gurcharan Singh, JagdishSingh, Water Supply & Sanitary Engineering, Standard Publishers Distributors, 2007
5. Shri V.K. Jain, Fire Safety in Buildings, New age publishers, 2010
6. Shan Wang, Handbook of Air Conditioning and Refrigeration, 2nd Edition, McGraw Hill, 2000
7. Krieder, J. F., Handbook of Heating Ventilation and Air Conditioning, Taylor & Francis, 2005
8. Barrie Rigby, Design of Electrical Services for Buildings, 4th Edition, Routledge, 2013
9. W. E. Steward, T. A. Stubbs, Modern Wiring Practice Design and Installation; 14 edition, Newnes, 2009
10. BIS, National Building Code 2005, New Delhi, 2005.

| SARA6101              | PROJECT MANAGEMENT<br>WORKSHOP I | L               | T | P | Credits        | Total Marks |
|-----------------------|----------------------------------|-----------------|---|---|----------------|-------------|
|                       |                                  | 0               | 1 | 2 | 3              | 100         |
| Continuous Assessment |                                  | University Viva |   |   | Min Pass Marks |             |
| 50                    |                                  | 50              |   |   | 50             |             |

### COURSE OBJECTIVES:

- To augment the knowledge of software technologies in the areas of project management and familiarize the students on the use of software in a given context.
- To apply the learnings of software technologies in the live case study projects in the applicable areas where possible and compare with the actual scenarios to enable me to get hands-on experience.

### WORKSHOP BRIEF

The project management workshop I aims to provide the students with the opportunity to learn the software pertaining to the project management applications like scheduling, tracking, resource optimizing & levelling, MIS management information system, RFI request for information and drawings / submittal approvals, quality checklist of construction, enterprise resource planning, BIM and BMS etc. The software technologies shall be used to create the detailed aspects of scheduling and controlling like creation of WBS and tasks, WBS schedule, milestone schedule, floats, planning resources rates with time, project cost, resource cost, work and material quantity, resource usage, resource graph, update of project progress, earned value analysis, work with multiple projects, critical path etc. And also to explore other areas where the aid of software is key in project management processes.

Students shall gather information from their live case studies related to buildings and use the software to do the project management related functions basis the data gathered. The information shall be discussed / presented among the group to see the relevance to the actual scenario and do the betterment in the process with the help of technologies available. Any open sources of software shall be explored by students to get hands on experience in the process.

### DELIVERABLES

The students shall do the learnings in the software and should be aware of using the software for developing the project management functions. A small portion of project management activities or function will be defined to the students to develop the activities with the help of software basis their case study project. The software outputs of students will be validated with respect to the actual case study scenarios. The report containing the above should be submitted at the end of the semester for the evaluation.

### TEXT / REFERENCE BOOKS

1. Dayal,S (2008), Earned value management using microsoft office project – A guide for managing any size project effectively, Cengage, New Delhi.
2. Harris,P.(2011), Planning and Scheduling using Microsoft project 2010. BPB Publications, New Delhi.
3. Stover, T (2004), Microsoft office project 2007, Inside out prentice Hall of India, New Delhi.
4. Harris, P. (2008) Project planning and control using Primavera P6.50 for all engineering and construction. BPB, New Delhi.
5. Harris, P (2012) Oracle Primavera P6 version 8.1 and 8.2 professional and optional client. BPB, New Delhi.
6. Software related books & journals
7. Internet resources

| SARA6201              | PROJECT MANAGEMENT<br>WORKSHOP II | L               | T | P | Credits        | Total Marks |
|-----------------------|-----------------------------------|-----------------|---|---|----------------|-------------|
|                       |                                   | 0               | 1 | 2 | 3              | 100         |
| Continuous Assessment |                                   | University Viva |   |   | Min Pass Marks |             |
| 50                    |                                   | 50              |   |   | 50             |             |

### COURSE OBJECTIVES:

- To apply the learning of software technologies in the live case study projects in the applicable areas where possible and compare with the actual scenarios to enable to get hands on experience.
- To do the coordination of services with help of software to understand the areas where the attention of project managers required to do the basic planning in a complex projects.
- To train students for the managerial soft skill developments required for managing project management functions.

### WORKSHOP BRIEF

The project management workshop II aims to provide the students with the opportunity to use the software applications for developing project management and services coordination activities. Students shall gather information from their live case studies and use the software to develop comprehensive project management information related to projects like detailed schedule, critical path, resource optimization procedure, cash flow details, and the services coordination activities etc. The outcome of the workshop shall be discussed / presented among the group to see the relevance to the actual scenario and debated to do the betterment in the process. Any open sources of software shall be explored by students to get hands on experience in the process.

Also seminars and workshops shall also be conducted to develop career management skills and students shall present their understanding in the group on interview skills, group discussion skills, carrier developments, overcoming adversity in career; personal effectiveness skills like time management, stress management, problem solving, positive attitude and confidence, learning and self-development, self-behavior; Team management skills like team building, leadership skills, motivation, conflict management skills, decision making, change management, art of delegation and feedback.

### DELIVERABLES

The students shall develop the required project management learnings in the software for the case study project and present the same in the workshop. Also they have to work on the co-ordination aspects of services with the help of suitable software and the level of co-ordination required at various stages of construction shall be discussed and debated in the workshop. Students should also present their understanding on the soft and managerial skills required for project management in the complex projects. The report containing the above should be submitted at the end of the semester for the evaluation.

### TEXT / REFERENCE BOOKS

1. Adair, J, (2013) creating success; Develop your leadership skills, 2<sup>nd</sup> Edition, Viva Books
2. Florence, S (2009), How to resolve conflicts at work, 1<sup>st</sup> Edition, PHI Learning
3. Mc.Grath, E.H. (2006), Basic managerial skills for all, Prentice Hall India. Delhi
4. Owen, J (2012), The leadership skills handbook, 2<sup>nd</sup> Edition, Kogan Page.
5. Wallace, Masters (2006), Personality development, Cengage Learning, New Delhi.
6. Whitear, Ribbens (2007), Handling difficult people and difficult situations, CIPD, London
7. Software related books & journals
8. Internet resources

| SARA2101              | ARCHITECTURAL GRAPHICS - I | L                     | T | P                        | Credits | Total Marks |
|-----------------------|----------------------------|-----------------------|---|--------------------------|---------|-------------|
|                       |                            | 1                     | 0 | 3                        | 2       | 100         |
| Continuous assessment | End Semester Examination   | Minimum pass marks    |   |                          |         |             |
|                       |                            | Continuous Assessment |   | End Semester Examination |         |             |
| 70                    | 30                         | 35                    |   | 15                       |         |             |

**COURSE OBJECTIVES:**

- To outline the basic principles of drafting and rendering techniques
- To understand plane and solid geometry, isometric and axonometric view
- To familiarize with simple objects and building components through measured drawing.

**UNIT 1 INTRODUCTION****12 Hrs.**

Introduction to fundamentals of drawing/ drafting: Construction of lines, line value, line types, lettering, architectural notations & dimensioning. Basic rendering techniques, basics of sheet presentation drawing, drawing instruments, sheet layout. Use of scale, free hand and geometric construction of Lines

**UNIT 2 GEOMETRICAL DRAWING - PLANE GEOMETRY****12 Hrs.**

Construction of shapes - angles, circles, tangents. Construction of Plane Curves: Ellipse, Parabola and Hyperbola. Principles of orthographic projections, Construction and Multiview projection of - Points, lines, square, rectangle, polygon, etc.

**UNIT 3 GEOMETRICAL DRAWING - SOLID GEOMETRY****16 Hrs.**

Multi- view projection of solids – cube, prism, pyramids, cones, cylinders etc.; Sections of solids, true shape of solids.

**UNIT 4 MEASURED DRAWING****8 Hrs.**

Study of plan, section and elevation of simple objects, simple building components and furniture through documentation exercises.

**UNIT 5 ISOMETRIC AND AXONOMETRIC VIEW****12 Hrs.**

Isometric and Axonometric projection of planes, solids and combination of solid etc. Isometric and Axonometric projection of simple objects, building components etc.

**Max. 60 Hours****COURSE OUTCOME:**

**On completion of the course the student will be able to**

- CO1** Understand the concepts and fundamentals of architectural drawing.
- CO2** Develop representation skills and to generate geometrical forms and its projections.
- CO3** Ability to represent various solids and its sectional projection.
- CO4** Measure real objects and represent them graphically.
- CO5** Create three-dimensional solids and combination of solids
- CO6** Develop graphical skill to represent real time objects.

**TEXT / REFERENCE BOOKS**

1. Ching, F. D. (2015). Architectural graphics. John Wiley & Sons.
2. Reekie, R. F., & McCarthy, T. (1995). Reekie's architectural drawing. Edward Arnold.
3. Morris, I. H. (1912). Geometrical drawing for art students. Longmans, Green.
4. Martin L.C.(1978). Architectural Graphics, The Macmillan Company, New York.
5. Dinsmore.G.A. (1968). Analytical Graphics, Van Nostrand, Company Inc., Canada.

| SARA9101              | ART STUDIO - I           |                       | L                        | T | P | Credits | Total Marks |
|-----------------------|--------------------------|-----------------------|--------------------------|---|---|---------|-------------|
|                       |                          |                       | 0                        | 0 | 4 | 2       | 100         |
| Continuous assessment | End Semester Examination | Minimum pass marks    |                          |   |   |         |             |
|                       |                          | Continuous Assessment | End Semester Examination |   |   |         |             |
| 70                    | 30                       | 35                    | 15                       |   |   |         |             |

**COURSE OBJECTIVES:**

- Develop sketching and visual representation in different media of different 2-dimensional art forms, painting and interior decoration of walls and floors.
- Correlate three-dimensional art and craft forms, natural forms, structure and learn to model the same in different media.
- Investigate the properties and appropriate use of materials in different craft forms.

**UNIT 1 INTRODUCTION****16 Hrs.**

Visual Art and Purpose - Expression of Imagination, Function, Ritualistic or Symbolic - Visual qualities and grammar of art; Imaginative thinking and creativity through hands on exercises – Visual effects, study of light and shadow, using lettering and combining lettering with image, in expressive and communicative modes.

**UNIT 2 DRAWING AND SKETCHING****20 Hrs.**

Sketching and visual representations using various media and tools – image-making, image manipulation and development, enlargement, cropping, reversing, abstraction, changes in colour and treatment, sequential imagery. Imagery from imagination, memory and direct observation

**UNIT 3 THREE-DIMENSIONAL VISUALISATION****12 Hrs.**

Study of outdoor objects /systems and observation of their scale and proportion, natural occurrence, relationships with context, form, structure, color and textures along with its functions

**UNIT 4 VISUALIZATION TECHNIQUES AND STORYBOARDING****12 Hrs.**

Storyboard/ Cartoon making Graphical representation in the form of illustrations or images displayed in sequence for the purpose of pre-visualizing the area of student's interest. A series of drawings that tells a story. Expressive and Communicative aspects. Implementing abstract or generic ideas.

**Max. 60 Hours****COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Interpret and combine different art forms in different media while appreciating artistic expressions.
- CO2** Develop the ability to manipulate various types of images.
- CO3** Develop skills in image making, and development of sequential imagery.
- CO4** Understand the various techniques of three-dimensional modeling.
- CO5** Design and model craft forms using any medium.
- CO6** Adapt the properties and applications of materials in different craft forms like terracotta, metal craft etc.

**TEXT / REFERENCE BOOKS**

1. Jones, J. C. (1992). Design methods, Wiley.
2. Bielefeld, B., & El Khoul, S. (2017). Basics Design Ideas. Birkhäuser.
3. Frank W. (1994). The Artist guide to Composition, David & Charles, UK.
4. Ching, F. D. (2008). Drawing a creative process. Wiley.
5. Pipes, A. (2003). Foundations of art and design. Laurence King Publishing.
6. John, W. (1966). Mills-The Technique of Sculpture, BT Batsford Limited.
7. Bunchy, C.L. (1972). Acrylic for Sculpture and Design, 450, West 33rd Street, New York.
8. White, A. W. (2011). The elements of graphic design: space, unity, page architecture, and type. Skyhorse Publishing, Inc..
9. Elam, K. (2001). Geometry of design: studies in proportion and composition. Princeton Architectural Press.

| SARA2202              | ARCHITECTURAL GRAPHICS - II | L                     | T | P                        | Credits | Total Marks |
|-----------------------|-----------------------------|-----------------------|---|--------------------------|---------|-------------|
|                       |                             | 1                     | 0 | 3                        | 2       | 100         |
| Continuous assessment | End Semester Examination    | Minimum pass marks    |   |                          |         |             |
|                       |                             | Continuous Assessment |   | End Semester Examination |         |             |
| 70                    | 30                          | 35                    |   | 15                       |         |             |

**COURSE OBJECTIVES:**

- To outline the basic principles of perspective drawing and sciography.
- To measure and document-built form and represent it graphically.
- To develop the skill required for constructing a complete rendered three-dimensional simple built form.

**UNIT 1 INTRODUCTION OF PERSPECTIVE DRAWING****8 Hrs.**

Study of concepts, types and terminologies such as picture plane, station point, vanishing point, eye level, ground level, Horizon line etc. Technical construction of one point, two point and three-point perspective drawings through exercises on simple objects like cube, prism, combination of shapes and views at various eye levels.

**UNIT 2 PERSPECTIVE: SCIENTIFIC METHOD & OFFICE METHOD****16 Hrs.**

One point, two and three-point perspective of building interiors and exteriors. Adding figures, trees, furniture etc., shade and shadows and applying rendering techniques. Introduction to office perspective method.

**UNIT 3 SCIOGRAPHY****16 Hrs.**

Principles of shade and shadow- construction of shadow of simple geometrical shapes - point, line and planes. Construction of sociography on Architectural elements.

**UNIT 4 MEASURED DRAWING: DOCUMENTATION****10 Hrs.**

Documentation of a complete building of a special interest in terms of history, building construction, architectural excellence or technology by using simple measuring tools like tapes, photographs etc.

**UNIT 5 ARCHITECTURAL RENDERING****10 Hrs.**

Techniques of rendering for various architectural drawings - plans, site plan, elevations, views etc, using mediums like pen and ink etc.,

**Max. 60 Hours****COURSE OUTCOME:**

**On completion of the course the student will be able to**

- CO1** Understand the concepts and fundamentals of perspective drawing.
- CO2** Construct the perspective drawings of the buildings and 3d views.
- CO3** Develop representation skills in three dimensional drawings and sociography.
- CO4** Develop the skill of architectural drawing through measured drawing of complex structures.
- CO5** Apply rendering techniques in architectural drawings.
- CO6** Construct a complete rendered three-dimensional drawing of a simple built form.

**TEXT / REFERENCE BOOKS**

1. Bernard Alkins, Architectural Rendering, Walter Foster Art Books, 1986
2. Claude Batley, Indian Architecture, D.B. Taraporevale Sons and Co. Ltd., Bombay
3. Ernest Norling, Perspective drawing, Walter Foster Art Books, California, 1986
4. Francis D.K. Ching, Architectural Graphics, Van Nostrand and Reinhold Company, NY 1975
5. George A. Dinsmore, Analytical Graphics, Van Nostrand, Company Inc., Canada, 1968
6. John M. Holmes, Applied Perspective, Sir Isaac Pitman and Sons Ltd., London, 1954
7. Leslie Martin C., Architectural Graphics, The Macmillan Company, New York, 1964
8. Robert W. Gill, Basic Perspective, Advanced Perspective, Thames and Hudson, London, 1974

| SARA 9201             | ART STUDIO - II          | L                     | T | P                        | Credits | Total Marks |
|-----------------------|--------------------------|-----------------------|---|--------------------------|---------|-------------|
|                       |                          | 0                     | 0 | 3                        | 2       | 100         |
| Continuous assessment | End Semester Examination | Minimum pass marks    |   |                          |         |             |
|                       |                          | Continuous Assessment |   | End Semester Examination |         |             |
| 70                    | 30                       | 35                    |   | 15                       |         |             |

**COURSE OBJECTIVES:**

- To utilize models as technique for design presentations
- To construct models as a way of representation and experimentation
- To gain an ability to integrate all the technical aspects of sculpture, modelling, and storytelling as means to realize creative ideas to shape into concrete and significant art forms.

**MODULE 1 EXPLORING MATERIALITY****10 Hrs.**

Selection of materials used in everyday life – textiles / earthenware terracotta / stone / paper / wax / glass / wood etc. and study their properties and characteristics, materiality and feeling. Processes of additive, subtractive and constructional form-making in expressive and functional modes.

**MODULE 2 CREATIVE REPRESENTATIONS OF SPACES****15 Hrs.**

Need for architectural models. Role of scale-models in design - Developing of surfaces and solids viz. Cubes, prisms, cylinders, pyramids, cones. Development of transition pieces, for spheres etc. using appropriate materials. Various materials and tools to be used in model making. Use of materials, viz. paper / mountboard / cardboard in architectural models.

**MODULE 3 CREATIVE REPRESENTATIONS OF SPACES****20 Hrs.**

Use of materials, viz. Snow-white board / mountboard / cardboard / Acrylic / Polystyrene (thermocol) / softwood / metals in architectural models. Painting model surfaces with various finishes, development of topography and landscape elements, use of materials like cork, polyurethane foam, use of laser, acid etching, stereolithography for development of building envelopes.

**Max. 45 Hours****COURSE OUTCOME:****On completion of the course the student will be able to:**

- CO1** Develop the processes of 3-dimensional form making from concept to finish.
- CO2** Interpret different art forms in different media while appreciating artistic expressions.
- CO3** Observe and interpret different forms and qualities in built and natural environments and objects.
- CO4** Design and model craft forms using any medium.
- CO5** Develop a narrative approach to art work.
- CO6** Interpret the different stories communicated through visualizations of various types.

**TEXT / REFERENCE BOOKS**

1. Jones, J. C. (1992). Design methods, John Wiley & Sons
2. Bielefeld, B., & El Khoul, S. (2017). Basics Design Ideas. Birkhäuser.
3. Ching, F. D., & Juroszek, S. P. (2010). Design drawing. John Wiley & Sons.
4. Faimon, P., & Weigand, J. (2004). The nature of design. HOW Books.
5. Pipes, A. (2003). Foundations of art and design. Laurence King Publishing.
6. John, W. (1966). Mills-The Technique of Sculpture, BT Batsford Limited.
7. White A.W. (2011). The Elements of Graphic Design: Space, Unity, Page Architecture, and Type, Skyhorse Publishing, Inc.,
8. Elam, K. (2001). Geometry of design: studies in proportion and composition, Princeton Architectural Press.
9. Yarnell, J. (2002). Painting Techniques, North Light Books.
10. Anderson Turner, Pottery Making techniques: a pottery making illustrated handbook, American ceramic Society, 2004
11. Chapman G. and Robson P., Art from Rocks and Shells, Thomson Learning, 1995
12. Barnbaum, B. (2010). The Art of Photography, Wiley

| SARA9102              | DESIGN STUDIO I          |                       | L                        | T | P | Credits | Total Marks |
|-----------------------|--------------------------|-----------------------|--------------------------|---|---|---------|-------------|
|                       |                          |                       | 1                        | 2 | 9 | 7       | 300         |
| Continuous Assessment | End Semester Examination | Min Pass Marks        |                          |   |   |         |             |
|                       |                          | Continuous Assessment | End Semester Examination |   |   |         |             |
| 200                   | 100                      | 100                   | 50                       |   |   |         |             |

**COURSE OBJECTIVES:**

- The studio aims at widening the avenues of creativity and allows inquiring more on lateral thinking.
- The emphasis is on understanding the process of design as a proactive and analytical tool towards generating alternatives which forms the foundation for future design
- To introduce students to various ideas and techniques of creative thinking and communication; To provide students with a foundation in design through the comprehension of elements and principles of composition;

**MODULE I ELEMENTS OF DESIGN, SHAPE AND ITS MANIPULATION 30 Hrs.**

Introduction to elements and principles of design – Exploring the interrelationship between part and the whole - Shapes - Developing geometric and organic shapes and compositions - Texture - study of textures – role of texture in stimulating human senses Exploring use of colour and its application in stimulating human senses - symbolism using colors

**MODULE II PRINCIPLES OF DESIGN - ORDERING PRINCIPLES AND SCALE/PROPORTION 36 Hrs.**

Exploring spatial relationships through ordering principles – spatial transformation using Balance, Contrast, and Pattern Gestalts theory of Composition - Continuity, Similarity, Proximity, Closure, Figure ground. Human & Dramatic Scale - Anthropometrics - Anthropological studies and important dimension of man at different activities and reach. Proportioning systems - Classical orders, Golden Section - Types of proportion.

**MODULE III FORM AND ITS COMPONENTS AND DERIVATION 48 Hrs.**

Evolution of forms from planes - Study of solids and voids and their interdependence - 3d abstraction -Articulation and its role as a form modifier - edges and corners, surfaces - Transformation of form- dimensional, subtractive and additive- centralized, linear, radial, clustered and grid forms for arriving at new shapes and compositions. Interlocking of forms- interlock of forms differing in geometry or orientation (rotated grid).

**MODULE IV CONCEPTS OF SPACE – SPATIAL RELATIONSHIPS & ORGANISATION 32 Hrs.**

Concepts of space- form- space relationships- Visual & Emotional effects of geometrical forms & their derivatives - Spatial relationships - Space within a space, interlocking spaces, adjacent spaces and spaces linked by a common space, Spatial organization - centralized, linear, radial, clustered, grid.

**TUTORIAL SESSION INTRODUCTION TO COMMUNICATION 14 Hrs.**

Basics & Principles– Objectives of Communication – Types - Verbal and non-verbal communication - Barriers to communication - Communication techniques - Listening & understanding - The four essential Communication skills - Levels of Communication: Intrapersonal, Interpersonal, Group, Mass Communication - computer enabled Presentations - Public Speaking Techniques

**Max. 165 Hours****COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Understand the basic characteristics of different techniques, mediums and its practical applications.
- CO2** Ability to comprehend the elements of space making through understanding the configuration of elements which can be unified as a whole in a composition.
- CO3** Apply the basic elements and principles of design and implement them in design compositions
- CO4** Analyze, visualize, communicate and represent design
- CO5** Create models /sculptures to understand the evolution of three-dimensional forms from two dimensional shapes
- CO6** Develop an insight towards sensibility and aesthetic appreciation.

**TEXT / REFERENCE BOOKS**

1. Pramur V.S., (1973). Design Fundamentals in Architecture, Somaiya Publication Pvt. Ltd.
2. Bloomer, C. M. (1990). Principles of visual perception. Herbert Press.
3. Ching, F. D. (2014). Architecture: Form, space, and order. John Wiley & Sons.
4. Gottfried,S.(1984). The four elements of Architecture, London. UK: Cambridge University press.
5. Catanese A.J. and. Snyder.J.C (1988) Introduction to Architecture, New York: McGraw Hill.
6. Dekay.M& Brown G.Z. (2014). Sun, wind and Light: Architectural design strategies, John Wiley and sons, 3rd edition

| SARA9202              | DESIGN STUDIO II         |                       | L                        | T | P | Credits | Total Marks |
|-----------------------|--------------------------|-----------------------|--------------------------|---|---|---------|-------------|
|                       |                          |                       | 0                        | 1 | 9 | 6       | 300         |
| Continuous Assessment | End Semester Examination | Min Pass Marks        |                          |   |   |         |             |
|                       |                          | Continuous Assessment | End Semester Examination |   |   | Total   |             |
| 200                   | 100                      | 100                   | 50                       |   |   | 150     |             |

**COURSE OBJECTIVES:**

- To enable the students, understand the principles of composition and its importance in Architecture and to understand role of transformation of form in Architecture
- To know the importance of spatial qualities and to experiment and understand the art of space arrangement
- To enable Conceptualization in architecture through creative thinking and to analyse the functional relationship between space, user and built environment

**MODULE I PRINCIPLES OF COMPOSITION****30 Hrs.**

Role of Principles of Design in a built form - Qualities of - Dominance, Unity, Harmony, Punctuating Effect, Dramatic Effect, Climax, Contrast, Accentuation, Fluidity. Analyzing compositions - balance, rhythm, movement etc. and its application.

**MODULE II ANALYZING ARCHITECTURE****45 Hrs.**

Concept /Content/Context -Understanding the response of a built form as a negotiation of its setting-climatic, social, economic, cultural and aesthetic. Study of built examples through documentation and analysis.

**MODULE III EXPLORING ARCHITECTURE****60 Hrs.**

The Art of Space Making - Analyzing spatial qualities - spatial in quest of a pavilion Design (e.g. Gazebo, Kiosk, Shop, Security Cabin, a Police Booth - developing the Tectonic Vocabulary).

|                         |                                           |                |
|-------------------------|-------------------------------------------|----------------|
| <b>TUTORIAL SESSION</b> | <b>DESIGN STORYTELLING AND NARRATIVES</b> | <b>15 Hrs.</b> |
|-------------------------|-------------------------------------------|----------------|

Elements of a good story: facts, situation, characters, plot and resolution of a design project; Building context in the design process: Emotional, Environmental, Social context; Organizing ideas- Personas, storyboards, and flowcharts; Documenting processes through writing.

**Max. 150 Hours****COURSE OUTCOME:**

**On completion of the course the student will be able to**

- CO1** Understand the principles of composition and its importance in architecture
- CO2** Document and analyze a modest design project that incorporates technical and environmental areas of study.
- CO3** Develop analytical and creative thinking.
- CO4** Ability to comprehend the transformation of forms through sketches and three-dimensional models
- CO5** Evolve from concept to pragmatic design within a specific timeline
- CO6** Present an architectural design project and justify the different approaches that rate their judgement for the final solution

**TEXT / REFERENCE BOOKS**

1. Brown, G. Z. (1985). Sun, wind, and light. Architectural design strategies, John Wiley and sons, 3rd edition.
2. Hamlin, T. (Ed.). (1952). Forms and Functions of Twentieth-century Architecture: Building types: buildings for commerce and industry, for public health, for transportation, for social welfare and recreation. The community as architecture (Vol. 4). Columbia University Press.
3. Prammar V.S., (1973). Design Fundamentals in Architecture, Somaiya Publication Pvt. Ltd.
4. Leland M. Roth, (2014) Understanding Architecture: Its Elements, History, and Meaning, Westview Press
5. Ching, F. D. (2014). Architecture: Form, space, and order. John Wiley & Sons.
6. Gottfried, S. (1984). The four elements of Architecture, London. UK : Cambridge University press.
7. Catanese A.J. and Snyder, J.C. (1988) Introduction to Architecture, New York: McGraw Hill.
8. Dekay, M. & Brown, G.Z. (2014). Sun, wind and Light: Architectural design strategies, John Wiley and sons, 3rd edition

| SARA2201                 | MATERIALS AND<br>CONSTRUCTION STUDIO - I |                       | L                        | T | P | Credits | Total Marks |
|--------------------------|------------------------------------------|-----------------------|--------------------------|---|---|---------|-------------|
|                          |                                          |                       | 1                        | 1 | 3 | 3       | 200         |
| Continuous<br>Assessment | End<br>Semester Examination              | Min Pass Marks        |                          |   |   |         |             |
|                          |                                          | Continuous Assessment | End Semester Examination |   |   |         |             |
| 150                      | 50                                       | 75                    | 25                       |   |   |         |             |

**COURSE OBJECTIVES**

- To comprehend the types of building materials and the appropriate applications in the built form and environment.
- To explore the fundamental components of the buildings, the role and purpose in the built forms including the necessary thumb rules for designing temporary shelters and single storied buildings.
- To incorporate appropriate materials while designing space enclosures.

**MODULE I INTRODUCTION TO BUILDING MATERIALS****30 Hrs.**

Introduction to building materials - Natural building materials – renewable and nonrenewable resources - Definitions, types and applications - soil, sand, aggregate, clay, gravel, timber, coconut leaf, reed, bamboo, Palmyra leaf, lime – Fencing and temporary shelters

Manufactured building materials - Definitions, types and applications - glass, paint/ polish, brick, terracotta products, stabilized mud blocks, polymer, steel, Basics of DPC.

**MODULE II INTRODUCTION TO FUNDAMENTALS OF COMPONENTS OF BUILDINGS****45 Hrs.**

Introduction to fundamental components of buildings (sub structure & super structure) – definitions and thumb rules based on soil types as well as the number of floors and height of the structure

Principles of load bearing Construction - simple brick footing - principles of bonding, English and Flemish bond, rat trap Brick bond, T-Junctions (1 and 1 1/2, 2 bricks), L - Junctions, Cross junction (2 bricks), Brick piers, Cavity walls, rat trap bond, plinth and Sill details, brick arches and lintels, compound walls.

Stone foundation - random rubble/ ashlar, copings, stone piers, plinth and sill details, stone arches and lintels, stone fencing, Dhajji wall construction

Flooring: rammed earth, Natural stones like Shahabad, Tandur, Kota, Kadappa, Marble, Granite, etc., athangudi tiles, red oxide, terracotta tiles (Laying details), brick paving, glazed ceramic tiles, Vitrified tiles - Finishes: pointing, grouting, pavement, mud plastering, PCC.

**Max. 75 Hours**

| Modules | Assignments                                                                                                                                                                                             | Suggestive<br>Outdoor / hands<br>on Workshop        | Construction plates                                                                                    | No. | Remarks                              |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----|--------------------------------------|
| I       | Collection of brochures, BM and applications in buildings, Case study presentation of temporary structures, specific to building materials and applications - Eraser models to explore types of Bonding | Handling Mud<br>Brick bonding<br>Bamboo<br>Workshop | Construction techniques for temporary structures                                                       | 1   | Facilitates Architectural design III |
|         |                                                                                                                                                                                                         |                                                     | Brick bonding                                                                                          | 2   |                                      |
|         |                                                                                                                                                                                                         |                                                     | Stone masonry                                                                                          | 1   |                                      |
|         |                                                                                                                                                                                                         |                                                     | Compound wall section                                                                                  | 1   |                                      |
| II      | Sketches and pictures – rammed mud wall, stabilized mud wall                                                                                                                                            |                                                     | Building components (Shallow foundations, flooring, wall, sill, openings, lintel, slab, roof, parapet) | 2   |                                      |

**COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Classify the building materials based on properties and applications in built forms and environment.
- CO2** Explain the applications of building materials in the sub and super structures.
- CO3** Design temporary as well as permanent elements for enclosing spaces both physically and visually.
- CO4** Devise ways to incorporate natural and manufactured materials in buildings.
- CO5** Generate ways to utilize diverse materials for temporary structures as well as single storied buildings.

**TEXT / REFERENCE BOOKS**

1. Arora S.P. and Bindra S.P., (2012). Text book of Building Construction, Dhanpat Rai & Sons, New Delhi.
2. Chudley R., (1999). Construction Technology (Volume 1), Longman publications 3rd Edition.
3. Ching, F.D.K. (2000). Building Construction Illustrated, John Wiley & Sons
4. McKay W.B. (1981). Building construction, Volume 1 and 2, Longman UK
5. Rangwala S.C. (2000). Building Construction, Anand Chartar Publishing House, India
6. Klans Dukeberg, Bambus - Bamboo, Karl Kramer Verlag Stuttgart Germany, 2000

| SARA2301                 | MATERIALS AND CONSTRUCTION<br>STUDIO - II |                       | L                        | T | P | Credits | Total Marks |
|--------------------------|-------------------------------------------|-----------------------|--------------------------|---|---|---------|-------------|
|                          |                                           |                       | 1                        | 1 | 3 | 3       | 200         |
| Continuous<br>Assessment | End Semester<br>Examination               | Min Pass Marks        |                          |   |   |         |             |
|                          |                                           | Continuous Assessment | End Semester Examination |   |   |         |             |
| 150                      | 50                                        | 75                    | 25                       |   |   |         |             |

**COURSE OBJECTIVES:**

- To trace the various stages involved in timber processing and the associated defects.
- To comprehend the various types of timber joinery adopted in the movable and fixed barriers in the external walls.
- To figure out the ways through which timber is utilized in the built environment.

**MODULE I TIMBER AS A BUILDING MATERIAL****30 Hrs.**

Introduction to timber, types of trees for timber production, processing of timber, defects of timber, conservation and preservation of timber, timber as a building material construction (types, seasoning, defects), manufactured timber - Mangalore tiles, madras terrace roofing, applications of timber in contemporary architecture

**MODULE II TIMBER JOINERY****45 Hrs.**

Timber joinery details – doors, Drawings on Methods of construction using natural timber in joinery works including methods of fixing and options for finishing, fixing details. - Different types and methods of fixing - Windows (paneled, louvered, glazed, pivoted and sliding windows) - Doors (paneled, glazed, sliding, folding, louvered and pivoted) - Ventilators (top hung, louvered, and glazed) - Hardware for doors, windows and ventilators and application for a simple structure with schedule of joinery windows, partitions, paneling, truss, simple staircase – thumb rules

**Max. 75 Hours**

| Modules | Assignments                                                                                          | Suggestive Outdoor/ hands on Workshop                                                                        | Construction plates                                                            | No. | Remarks                             |
|---------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----|-------------------------------------|
| I       | Applications of timber in building, Timber in vernacular and contemporary architecture -case studies | Carpentry Workshop<br>Understanding of joineries (doors, windows, chairs, tables)                            | Types of timber trusses and Madras terrace roofing                             | 1   | Facilitates Architectural design IV |
| II      | Sketching of various joineries in timber<br><br>Sketching –trusses, staircase in vernacular houses   | Report – Observe the activity of a carpenter who is in the process of making a joinery and document the same | Timber joinery details                                                         | 1   |                                     |
|         |                                                                                                      |                                                                                                              | Types of timber joinery in doors, windows and ventilators                      | 3   |                                     |
|         |                                                                                                      |                                                                                                              | Partitions and paneling                                                        | 1   |                                     |
|         |                                                                                                      |                                                                                                              | Design and develop joinery details for the outcome of Architectural design II. | 1   |                                     |

**COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Explain the treatment of timber the various applications in buildings.
- CO2** Demonstrate the types of joinery adopted in doors, windows and furniture
- CO3** Design timber partitions and paneling.
- CO4** Illustrate the utilization of timber in roofs and simple staircases.
- CO5** Design and develop timber joineries in architectural designs.

**TEXT / REFERENCE BOOKS**

- Arora, S. P., Arora, S. P., & Bindra, S. P. (1984). Text Book of Building Construction: Including Engineering Materials. Dhanpat Rai and Sons.
- Chudley R., (1999). Construction Technology (Volume 1), Longman publications 3rd Edition.
- Watson, D.A. (1972). Construction Materials and Processes, McGraw Hill.
- Ching, F.D.K. (2000). Building Construction Illustrated, John Wiley & Sons
- McKay W.B. (1981). Building construction, Volume 1 and 2, Longman UK
- Rangwala S.C. (2000). Building Construction, AnandCharotar Publishing House, India
- Sharma S.K. (1998). A Text book of Building Construction, S. Chand and company, New Delhi
- Bayliss R. (1969). Carpentry and Joinery (Volume 1), Hutchinson Technical Education Publishers

9. Kumar, S. (2010). Building Construction, Standard Publishers Distributors
10. Herzog, T., Natterer, J., Schweitzer, R., Volz, M., & Winter, W. (2012). Timber construction manual. Walter de Gruyter.



| SARA2401                 | MATERIALS AND<br>CONSTRUCTION STUDIO - III |                          | L                        | T | P | Credit<br>s | Total<br>Marks |
|--------------------------|--------------------------------------------|--------------------------|--------------------------|---|---|-------------|----------------|
|                          |                                            |                          | 1                        | 1 | 3 | 3           | 200            |
| Continuous<br>Assessment | End Semester<br>Examination                | Min Pass Marks           |                          |   |   |             |                |
|                          |                                            | Continuous<br>Assessment | End Semester Examination |   |   |             |                |
| 150                      | 50                                         | 75                       | 25                       |   |   |             |                |

**COURSE OBJECTIVES:**

- To explore the types of concrete and the applications in the built forms.
- To understand the various contexts in which concrete is used in constructing walls, roofs and foundations along thumb rules.
- To comprehend the ways to prevent the entry of water and dampness in buildings.

**MODULE I APPLICATIONS OF CONCRETE IN CONSTRUCTION****40 Hrs.**

Introduction to reinforced cement concrete, suitability requirements for aggregates, grading of aggregates, reinforcement, admixture - Mix proportioning, batching, mixing, transporting, placing, compaction, Ready Mix Concrete, curing formwork - Quality control, tests for concrete, joints in concrete including role of expansion joint, vacuum dewatering, concrete finishes. Centering, Scaffolding, formwork.

Introduction to concrete and its applications – deep foundations, framed structure, expansion joints, slab, WPC, DPC, staircase, cold storage, RCC Columns and Foundations - Different Types of foundations - Detailing of columns - Shallow (Mat and Raft foundation), spread (Square, rectangle, circle, combined, strip and ring foundation), deep (pile, piers, caissons) .Super Structure - Beams, sill level, detailing of apertures (lintels, sunshades, arches etc.) - Roofs (one way slabs, 2-wayslab, continuous, flat slab, coffer slab etc.) – Staircases – thumb rules

**MODULE II SPECIAL CONCRETE AND APPLICATIONS IN CONSTRUCTION****35 Hrs.**

Introduction to special concrete and its applications – light weight, foam, ferrocement, Construction methods for different types of Special Concrete like Pre and post tensioning and precast concrete - Ferro cement, Lightweight concrete, high density, fiber reinforced polymer concrete. Detailing of Ferro cement water tanks, toilet units, slabs, waffle slab, filler slab, funicular shell, and other precast systems. Design and detailing of building materials and components developed by research organizations like CBRI, SERC, NBO, and BMTPC.

**Max. 75 Hours**

| Modules | Assignments                                                                                                                  | Suggestive Outdoor/ hands on Workshop                                                                                                                                                                                                                       | Construction plates                                                | No. | Remarks                            |
|---------|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-----|------------------------------------|
| I       | Applications of concrete in buildings – foundation, flooring, shear walls, sill, lintels, slabs, planter box, retaining wall | Report – students have to visit and study the building in construction with respect to the thrust area and give a brief report with sketches and photographs.<br><br>Emphasis is on the details related to barrier free environment.<br>FerrocementWorkshop | Deep foundation – types, grouping                                  | 1   | Facilitates Architectural design V |
|         |                                                                                                                              |                                                                                                                                                                                                                                                             | Types of slabs – one way, two way, coffered, flat slab             | 2   |                                    |
|         |                                                                                                                              |                                                                                                                                                                                                                                                             | Staircase – dog legged staircase                                   | 1   |                                    |
|         |                                                                                                                              |                                                                                                                                                                                                                                                             | WPC, DPC, cold storage, expansion joint                            | 1   |                                    |
| II      | Sketching – types of staircases, domes and shells                                                                            |                                                                                                                                                                                                                                                             | Swimming pool and terrace gardening                                | 1   |                                    |
|         |                                                                                                                              |                                                                                                                                                                                                                                                             | Application of concrete in the outcome of Architectural design III | 1   |                                    |

**COURSE OUTCOME:**

On completion of the course the student will be able to

- C01** Explain the applications of concrete in the built forms along with the thumb rules.
- C02** Categorize the types of special concrete and the respective utilization in building construction.
- C03** Explain the components of the concrete staircase and the design thumb rules.
- C04** Develop the details for cold storage, swimming pool and terrace gardens.
- C05** Integrate the applications of concrete and special concrete in architectural design studios.

**TEXT / REFERENCE BOOKS**

1. Arora S.P. & Bindra S.P. (1990) A Text Book of Building Construction, Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 1990
2. Punmia B.C. (2005). A Text book of Building Construction, Laxmi Publications Pvt. Ltd., New Delhi
3. Chudley R. (1999). Construction Technology, Volume 1, Longman publications 3rd Edition.
4. McKay W.B (1981). Building Construction, Volumes 1,2 and 3, Orient Longman, UK, 1981
5. Rangwala S.C. (1982). Engineering Materials, Anand Charotar Publishing House
6. Kumar, S, (2010). Building Construction, Standard Publishers Distributors, 2010
7. Kind-Barkauskas, F., Kauhsen, B., Polónyi, S., & Brandt, J. (2013). Concrete construction manual. Walter de Gruyter.

| SARA1302 | BUILDING SERVICES-I | L | T | P | Credits | Total Marks |
|----------|---------------------|---|---|---|---------|-------------|
|          |                     | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To inculcate basic principles of plumbing and sanitation services
- To understand its necessity in architectural space planning parameters.
- To enable them to comprehend the subject thoroughly and integrate the learning in the architectural design.

**UNIT 1 WATER SUPPLY AND PLUMBING****8 Hrs.**

Introduction to Building Services - Water sources- Quantity and quality of water-demand projection, per capita consumption of water, Nature of impurities, water treatment process, tests, Methods of Distribution, Layout of Distribution Pipes, sump and other storage tanks -Internal water supply in Buildings, Types of Pipes, Laying of pipes, Prevention of Water Wastage, Fixtures and fittings of a contemporary bathroom and kitchen - Preparing Water Supply Schemes, standards for water supply- ECBC requirements

**UNIT 2 SANITATION AND DRAINAGE****6 Hrs.**

House Drainage, Layout of Drainage system, Methods of laying and construction of sewers, Traps - shapes, sizes, types, function, Ventilation of House drainage - Anti siphonage pipe, various system of plumbing, Chambers - fixtures and fittings of toilet, bathroom and kitchen - Rain water harvesting and systems.

**UNIT 3 SEWAGE TREATMENT****6 Hrs.**

Typical layout and components of sewage treatment plant - Primary and Secondary treatment - Activated Sludge Process, Disinfection, Disposal of Sewage-Disposal of sewage from isolated buildings - Septic Tanks, Disposal of sewage in Villages - Waste water recycling - ECBC requirements

**UNIT 4 ENVIRONMENTAL SANITATION****6 Hrs.**

Introduction to Environmental sanitation-the importance of sanitation classification of waste- disposal of refuse, Sewerage system - storm water and design of sewers-systems of sewerage-dry and water carriage systems, patterns of collection, sewers - materials used, shapes of sewers, construction & maintenance of sewers, sewer joints, sewer appurtenances, EIA requirements of water supply and drainage systems for large scale infrastructure development.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Spatial requirements for overhead water tank, sump, sewage treatment plant, water treatment plant, plumbing shaft types – ventilation shaft, shaft for different types of pipes, and their location, integration in different building typologies. Suggested Assignment: Plates, brochure collection – incorporation of studied concepts in the respective semester's Architecture Design studio - Suggested Assignment: Documentation of Environmental sanitation through Case study and field visits.

**Max. 30 Hours****COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Ability to understand the importance of water supply system and its operation in buildings.
- CO2** Identify various types of sanitary fittings, demand calculation and to prepare water supply scheme.
- CO3** Develop comprehensive knowledge of design and construction of drainage systems in buildings and built environment
- CO4** Ability to understand the process of solid waste management and hence develop strategies for effective waste management in buildings and built environment
- CO5** Understand and comprehend the Environmental Sanitation through classification of types of wastes.
- CO6** Analyse and develop comprehensive knowledge of architectural space planning for water supply & sanitation system and integration of systems in built forms

**TEXT / REFERENCE BOOKS**

1. Fair G.M., Geyer J.C. and Okun D.A., Water and Waste Water Engineering: water Supply and wastewater Removal, 3rd Edition, October 2010 John Wiley & Sons,
2. Manual on water supply and treatment, 1999, CPHEEO, Ministry of works and Housing, New Delhi
3. Manual on Sewerage and Sewage treatment Systems, 2013, CPHEEO, Ministry of works and Housing, New Delhi
4. Rangwala S.C., water supply and sanitary Engineering, Anand Charotar publishing house, 29th edition, 2019
5. Venugopala Rao P., Textbook of Environmental Engineering, Prentice Hall of India Pvt. Ltd., 2004
6. Husain S.K., Textbook of Water Supply and Sanitary Engineering, Oxford & IBH, 3rd edition, 2017
7. Dr. B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain., "Water Supply Engineering" Laxmi Publications, 1995,. Reprint 2016
8. Dr.B.C. Punmia, Arun Kumar Jain., "Wastewater Engineering", Laxmi Publications, 1998.

9. Rakesh Hooja Ramesh K. Arora, et al., “Water Management- Multiple dimensions”, Rawat Publications, 2007
10. Nobert, M.L, “Plumbing, Electricity, Acoustics- Sustainable design methods for Architecture”, John Wiley & Sons, Inc, 2012.



| SARA1303 | CLIMATOLOGY | L | T | P | Credits | Total Marks |
|----------|-------------|---|---|---|---------|-------------|
|          |             | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To realize the role of climate in shaping a climate responsive built form.
- To understand the need and importance of ventilation, day lighting, shading devices in building design towards the approach of climate responsive built environment.
- To familiarize on passive design strategies for architecture of different climatic zones.

**UNIT 1 CLIMATE: FACTORS AND CLASSIFICATION 6 Hrs.**

Global climatic factors, Components of climate - Koppen Climate Classification System - Atkinson climate classification - Impact of climate and building on Ecological balance- characteristics of tropical climates - climate graph.

**UNIT 2 VENTILATION AND DAYLIGHTING 6 Hrs.**

Functions of ventilation - stack effect due to the thermal forces, wind velocity - wind rose, wind pressure - Air movement through buildings - Air movement around buildings - factors affecting air flow and wind shadows. Importance of day lighting – designing principles with day lighting in buildings – Characteristics of natural light: transmission, reflection, diffusion, glare – light shelves and light pipes.

**UNIT 3 SOLAR CHARTS AND SHADING DEVICES 8 Hrs.**

Introduction to Sun path diagrams - Angles of Incidence – Shadow angle protractor - Horizontal and Vertical Shadow angles - Shadow Mask - Exercises on plotting shadow angles on sun-path diagrams, Design of shading devices for walls with different orientations.

**UNIT 4 DESIGN WITH CLIMATE 6 Hrs.**

Climate data analysis for various zones - Design considerations and strategies through case studies - hot and dry; hot and humid; warm and humid; cold and cloudy; cold and dry; moderate/composite. Passive design strategies with respect to different climatic zones in India. Selection of building components based on climate classification – Design strategies and construction parameters for Walls, Roofs & floors surfaces (surface color and texture, U value, exterior absorption / insulation) - material properties, thickness and layers / composite walls.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS 4 Hrs.**

Shading design calculations for wall in four different orientations. Comparative analysis of design strategies in traditional and contemporary buildings for a particular climatic region. Introduction to climatic analysis software for energy calculation of designed building envelope for their studio project with climate consultant,

**Max. 30 Hours****COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Comprehend the role of climate in architecture and the factors affecting the climate.
- CO2** Acquire knowledge on the climate classification based on the influencing factors.
- CO3** Understand the importance of natural ventilation and day lighting in building design and analyzing their designing strategies.
- CO4** Familiarize the sun as a main design element and understanding the sun path diagram in detail for calculating the heating and cooling hours of a region.
- CO5** Marking the angle of incidence for equinox, summer and winter solstices for arriving the shadow mask and overshadowing in sun path diagram for the design of shading devices.
- CO6** Creating a data base of passive design strategies adapted for different climate zones through a comparative analysis of traditional and contemporary buildings.

**TEXT / REFERENCE BOOKS**

1. Arvind Krishan, N. B. (2001). *CLIMATE RESPONSIVE ARCHITECTURE: A Design Handbook for Energy Efficient Buildings*. New Delhi: Tata McGraw-Hill Education India.
2. Evans, M. (1980). *Housing, Climate and Comfort*. London: Architectural Press.
3. Givoni, B. (1976). *Man, climate and architecture* (Architectural science series). Applied Science Publishers.
4. Mareike Krautheim, R. P. (2014). *City and Wind: Climate as an Architectural Instrument*. DOM Publishers.
5. Mark DeKay, G. Z. (2014). *Sun, Wind, and Light: Architectural Design Strategies*. John Wiley & Sons.
6. Majumdar, M. (2001). *Energy-efficient buildings in India*. TERI Press.

7. O H Koenigsberger, T. G. (2013). Manual of Tropical Housing and Building: Climate Design. Hyderabad: Universities Press India Pvt. Ltd.

**WEBSITES**

1. <https://law.resource.org/pub/in/bis/S03/is.sp.41.1987.pdf> - SP 41 (1987): Handbook on Functional Requirements of Buildings (Other than Industrial Buildings)
2. <http://koeppen-geiger.vu-wien.ac.at/>
3. <http://plea-arch.org/wp-content/uploads/PLEA-NOTE-1-SOLAR-GEOMETRY.pdf>
4. <https://nptel.ac.in/courses/105107156/>

| SARA1304 | PRINCIPLES OF SITE PLANNING | L | T | P | Credits | Total Marks |
|----------|-----------------------------|---|---|---|---------|-------------|
|          |                             | 2 | 1 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To impart knowledge on the site planning principles including the features and parameters that govern the proposed development.
- To educate the students in site selection for different building typologies including the techniques of surveying and site analysis.
- To evolve a methodology for site responsive design strategy through the relation between built environment and their immediate surroundings.

**UNIT 1 SITE LAYOUT AND PLANNING PRINCIPLES****8 Hrs.**

Definition of plot, site, region, site planning, units of measurements-Factors influencing a site-Onsite and offsite factors- Topography, hydrology, soils, vegetation, climate, surface drainage, accessibility, size and shape, infrastructures available- sources of water supply and means of disposal system-Architectural design consideration and visual aspects. Organization of vehicular and pedestrian circulation, Networks -types of roads, hierarchy of roads, networks, patterns, road widths, turning radii, street intersections.

**UNIT 2 SURVEYING AND SITE ANALYSIS****10 Hrs.**

Reconnaissance and need for surveying – chain survey, compass survey, plane table & theodolite surveys. Contouring: contour interval, characteristics, uses of contours. Study of site climate – elements of climate. Importance of site analysis- systemic process of site analysis- site suitability analysis- locality plans - Analysis of natural, cultural, aesthetic factors and visual characteristics- Site analysis diagram - Preparation of maps - matrix analysis, composite analysis

**UNIT 3 SITE SELECTION AND REGULATIONS****6 Hrs.**

Study of microclimate: Influence of vegetation, wind, landforms and water as modifier of microclimate-Site selection process- Site selection criteria for housing development, commercial and institutional projects. Site zoning regulations- Land use regulations-Development control rules of local bodies- building setbacks- FSI- FAR-plot coverage- OSR- parking regulations and standards.

**UNIT 4 SITE DESIGN AND DEVELOPMENT TECHNIQUES****12 Hrs.**

Site context- contextual analysis responding to programmatic, functional, environmental, aesthetic factors. Integrated approach to design of building and open spaces-relationship of space and mass, enclosure and spatial perception, spatial enclosure- Sense of space- Introduction to land use mapping, existing master plans- types of plans-site layout- Development of Master plan- Site plan. Case study of the projects in hilly areas, Housing development, Commercial, institutional spaces and factory buildings.

**UNIT 5 COMPREHENSIVE LEARNING****9 Hrs.**

Understanding the site features by visiting a nearby construction site and manual documentation with photos. Reviewing the given site plan and listing the opportunities on site design and development techniques. Detailed study of their specified site for semester design project on the Data Collection- Analysis of various factors influencing the site- Preparation of Site Analysis diagram -Analysis of built and open space relationship- concept development- circulation network analysis- Site development.

**Max. 30 Hours****COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Familiarize knowledge on the site layout and planning principles that govern the proposed development
- CO2** Students able to understand the importance of surveying and the different methods of surveying with hands on exercise.
- CO3** Preparation of site drawings and analysis of the site for preparing the feasibility of the proposed project
- CO4** Skill development on the site selection criteria with the context and typology specific
- CO5** Preparation of the matrix diagram with the available factors of site context and design development techniques.
- CO6** Exercise on site analysis, site design and development for the given land parcel.

**TEXT / REFERENCE BOOKS**

1. Dr.B.C.Punmia, A. K. (1983). Surveying Volume 1. New Delhi: Standard book house.
2. Joseph De Chiara, L. E. (1984). Time-Saver Standards for Site Planning. McGraw-Hill .
3. Joseph De Chiara, L. K. (1975). Urban planning and design criteria. Van Nostrand Reinhold .
4. Kevin Lynch, G. H. (1984). Site Planning. Cambridge: MIT Press.
5. Nicholas T. Dines, K. D. (1998). Time-saver standards for landscape architecture: design and construction data. McGraw-Hill.
6. Shahani, P. B. (1979). Text Book of Surveying: V. II. Oxford & I B H Publication.
7. White, E. T. (1983). Site Analysis: Diagramming Information for Architectural Design. Architectural Media.

| SARA9301              | DESIGN STUDIO III        |                       | L                        | T | P | Credits | Total Marks |
|-----------------------|--------------------------|-----------------------|--------------------------|---|---|---------|-------------|
|                       |                          |                       | 0                        | 1 | 9 | 6       | 300         |
| Continuous Assessment | End Semester Examination | Min Pass Marks        |                          |   |   |         |             |
|                       |                          | Continuous Assessment | End Semester Examination |   |   |         |             |
| 200                   | 100                      | 100                   | 50                       |   |   |         |             |

**COURSE OBJECTIVES:**

- To understand the relationship between the site and its setting with the built environment
- To generate solutions for a given low rise, multi room space program that are semantic with socio cultural and site-specific context, choice of material and the psychological requirements of the end user.
- To develop an architectural expression which is responsive to the people and environment

**STAGE I**

The art of decoding and creating spatial configuration of a single use space by understanding human physical, psychological and socio-cultural needs.

**STAGE II****Knowledge acclimatization (Phase I) :**

Critical analysis as a tool to enable the mind by critiquing selected works of architects for the core values and principle Design and decoding it from a user perspective. Review of literature to give the students the buoyancy to solve the given program.

**Iteration and Ideation (Phase II)**

Resolving the given Design Program by experimentation and multiple iterations leading to three-dimensional composition by understanding the layers of space making.

**Realization (Phase III)**

The creation of workable plans and the art of realizing through legible drawings as a medium to communicate the vision, reflecting creative approach drawn from data analysis and climatic consideration to the specific context. Use of a variety of materials and techniques to represent the design.

**DESIGN INTEGRATION**

Application of the knowledge gained by the students from core courses like Principles of Site Planning and Climatology in developing spatial configurations and its physical relationships.

**SUGGESTED TYPOLOGIES (One major & one minor design program.)**

Low rise environment like residence / primary health center / school / library / banks / community halls / showroom etc.,

|                 |                    |               |
|-----------------|--------------------|---------------|
| <b>TUTORIAL</b> | <b>SOFT SKILLS</b> | <b>8 Hrs.</b> |
|-----------------|--------------------|---------------|

Personal Skills-Integrity, adaptability - People's skills- teamwork, communication, respect - Workplace skills- Interpersonal skills- Initiative and enterprise- Professional Skills - Learning Technology - Listening Skills - Motivation skills - Leadership skills- Interpersonal and Team Skills Emotional Intelligence Skills - Expressing ideas -Training and Feedback.

**Max. 150 Hours****COURSE OUTCOMES:****On completion of the course the student will be able to**

- CO1** Assess the site and surroundings and its relationship with the activity, space for the given architectural program.
- CO2** Analyze and evaluate a design of given space by dissecting the case studies and evolve inferences.
- CO3** Application of anthropology and spatial data for arriving at requirements of the given space.
- CO4** Apply the knowledge on climate responsive building design and implement appropriate design strategies.
- CO5** Build a Process for Design evolution and communicate through drawings – plan, elevation and sections and final presentation with renderings.
- CO6** Evaluation of the design through creation of miniature models and experimentation of space design and 3D through the explored models.

**TEXT / REFERENCE BOOKS**

- Alexander, C. (1977). A pattern language: towns, buildings, construction. Oxford university press..
- De Chiara, J. (2001). Time-saver standards for building types. McGraw-Hill Professional Publishing.
- Alpern A. (1982), Handbook of specialty Elements in Architecture, Mc Graw Hill Book.
- Mills.E.D. (1985), Planning - The Architects Handbook, 10th Edition, British Library Cataloguing.  
Rafael.M. (2005), Theoretical Anxiety and Design Strategies in the Work of Eight Contemporary Architects, MIT Press

| SARA 1402 | BUILDING SERVICES - II | L | T | P | Credits | Total Marks |
|-----------|------------------------|---|---|---|---------|-------------|
|           |                        | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To outline the basic principles of Electricity and its application in simple buildings.
- To understand planning and design aspects of electrical services for building typologies.
- To familiarize electrical layout with appropriate fixtures and luminance.
- To integrate the learning in the architectural design.

**UNIT 1 INTRODUCTION TO ELECTRICITY****4 Hrs.**

Introduction to Relationship between phase & line, voltage and currents (with calculation units), Electrical supply system – Power Plant, HT Distribution, Sub-station-transformer-street pillar box, Sources of power supply - Power supply network diagram, Source to demand -Types of power supply based on consumer demand - Basic terminologies and units, Electrical system components - Estimation of power demand for different building typologies - Architectural spaces for electrical systems like Sub stations, electrical rooms, Transformer yard etc., - Single/Three phase supply - Earthing for safety, types of earthing – ISI specifications

**UNIT 2 ELECTRICITY IN BUILDINGS****10 Hrs.**

Supply load, Demand load, HT/LT service connections, Ring Mains gear (RMG), Transformer, Power Factor, MV panel room, Switch gear, Main Boards & sub distribution boards, Energy meters, System of connection for appliances, fittings & accessories, Conduits and pipes, safety methods, planning electrical layout and wiring for buildings. Designing the electrical layout for residential building, Needs and types of power backup systems: Diesel gensets, Uninterruptible power supply systems, Photovoltaic cells, Architectural spaces for DG's and UPS - Integration of photovoltaic cells in buildings

**UNIT 3 INTRODUCTION TO LIGHTING****6 Hrs.**

Basic terminologies and units –Luminous flux, candela , solid angle illumination – visual tasks and factors affecting visual tasks, MSCP, MHCP, colour temperature, colour rendering, space height ratio – modern theory of light – special features and minimum level of illumination for various tasks, Lighting principles, classification of lighting based on activity, source and fixture - Design requirements for different building typologies such as residential, commercial institutional spaces etc - Recommendation from NBC - Case studies.

**UNIT 4 LIGHTING****6 Hrs.**

Artificial Lighting: Requirements & design, type of lamps, fixtures, types of bulbs, energy efficient lighting options, preparing a lighting scheme with legend, glare, lighting schemes, types of lighting arrangements, Lumen's method of lighting, luminaire arrangement- various types of Lighting, Lighting for stores, offices, residences, minimum level of illumination required for physically challenged and visually challenged-ECBC requirements.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Suggested Assignment: Brochure collection of electrical systems and fittings and presentation - Incorporation of studied concepts in the respective semester's Architecture Design studio - Students are expected to have additional sheets on electrical wiring, fittings and lighting drawings

**Max. 30 Hours****COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Summarize the relationship between phase and line, voltage & currents and understand the basics about electrical supply system, principles & practices.
- CO2** Understand distribution, supply and connection of various accessories and appliances and prepare an electrical layout for special buildings.
- CO3** Clarify and discuss basic principles, characteristics of light.
- CO4** Analyze and understand natural lighting in space planning and various measurements of light.
- CO5** Identify and appraise various types of lighting for different interior spaces of varied building typologies.
- CO6** Ability to acquire skill required for the students to apply Electrical and Lighting aspects in his/her designs.

**TEXT / REFERENCE BOOKS**

1. Benjamin Evans, Daylight in Architecture, McGraw-Hill Book Company, New York, 1981
2. Hopkinson R.G., Architectural Physics-Lighting, H.M. Stationery Office, London, 1963
3. R.G.Hopkinson&J.D.Kay, The lighting of Buildings, Faber & Faber, London, 1969
4. Derek Philips, Lighting in Architectural Design, McGraw Hill. New York, 1964
5. Millet Marietta, Light Revealing Architecture, Van Nostrand Reinhold, London,1996
6. Pritchard D.C., Lighting, Longman scientific &Technical, Harlow, 1995

7. Peter Trequenza, and David Loe, The Design of Lighting, E & FN Spon, London, 2nd edition, 2004,
8. B.Rajaroo, Electricity for architects.
9. Energy Conservation Building Code user guide – ECBC, Bureau of Energy Efficiency, New Delhi, India



| SARA1403 | VERNACULAR ARCHITECTURE | L | T | P | Credits | Total Marks |
|----------|-------------------------|---|---|---|---------|-------------|
|          |                         | 2 | 1 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To understand the relationship between regional culture and built environment.
- To assimilate the association between environment, culture, geographical settings and their transformation in building typologies.
- To explore the various provocative facts about buildings and its relevance to built form, function and aesthetics.

**UNIT 1 UNDERSTANDING VERNACULAR ARCHITECTURE****10 Hrs.**

Definition of Vernacular architecture – classification of vernacular Architecture - Determinants of Vernacular Architecture - elements of Vernacular Architecture – approaches to the study of Vernacular architecture - an overview, Aesthetic, Architectural and Anthropological studies - Vernacular principles in contemporary design.

**UNIT 2 APPROACHES AND CONCEPTS IN DIFFERENT REGIONS****10 Hrs.**

Methodology to survey and study of Vernacular architecture - review of land, geography, topography, cultural and contextual responsiveness in detail - understanding the elements of vernacular architecture and its unique attributes in the tropics, deserts and hilly region - An overview of vernacular architecture in the tropics, deserts and hilly region - settlement pattern and spatial planning, built form and orientation, cultural aspects, symbolism, colour, art, construction materials techniques of the tropics, deserts and hilly region.

**UNIT 3 VERNACULAR ARCHITECTURE IN THE TROPICS****10 Hrs.**

Analyzing architecture in Tropics - The Traditional Malay House, Houses in Thailand, and Traditional Architecture in Indonesia - Architecture in Kerala (Houses & Palaces), Tamilnadu (Houses / palaces in Chettinad region) Evolution of the Bungalow from the traditional hut in Bangla.

**UNIT 4 VERNACULAR ARCHITECTURE IN DESERTS AND HILLS****10 Hrs.**

Architecture in North Africa, Arabia and Middle East Europe - Deserts of Kutch and Rajasthan; Havelis of Rajasthan and Gujarat, Bohra Houses, Subterranean Architecture of Gujarat. Major hill settlements in various regions of the world - Architecture of Houses in North East India - Hill Architecture in Kashmir, house boats - Vernacular architecture in Nepal.

**UNIT 5 EXPLORE VERNACULAR ARCHITECTURE****5 Hrs.**

Visual observation and brief documentation of small areas/streets, photo documentation of parts of small settlements with rich cultural and architectural characteristics - case studies of leading architects work (vernacular practices)

**Max. 45 Hours****COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Memorize and recreate the fundamentals of Vernacular Architecture and its process.
- CO2** Understand and describe the environmental, social, cultural and economic aspects influencing regional architecture.
- CO3** Understand and discuss various theoretical aspects of vernacular Architecture, relate their interconnections and influence in different settlement patterns and spatial planning across the country.
- CO4** Explore the various approaches of regional Architecture, compare and contrast different construction materials and techniques employed in regional Architecture.
- CO5** Assess various concepts of vernacular Architecture with assorted examples from different regions.
- CO6** Construct and demonstrate diverse regional design concepts and to recommend for application.

**TEXT / REFERENCE BOOKS**

1. Oliver, P. (Ed.). (1997). Encyclopaedia of vernacular architecture of the world (Vol. 3). Cambridge: Cambridge University Press. Amos Rapport, House Form and Culture, Englewood Cliffs, N.J., Prentice Hall, 1969
2. Fathy, H. (1986). Natural energy and vernacular architecture, University of Chicago Press, Chicago and London, 1986
3. Fry M. & Drew J., (1964) Tropical Architecture in the Dry and Humid Zones. Londres: Bestford
4. Jain. K & Jain. M. (1992), Mud Architecture of the Indian Desert, Aadi Centre, Ahmedabad
5. Auroville Charter, Auroville Architecture: Towards New forms, Second Edition, Prisma Publications, 2003
6. Pramari V. S. (1989) Haveli - Wooden Houses and Mansions of Gujarat, Mapin Publishing Pvt. Ltd., Ahmedabad,
7. Kennedy, J. F., Smith, M. G., & Wanek, C. (Eds.). (2014). The Art of Natural Building--Completely Revised, Expanded and Updated: Design, Construction, Resources. New Society Publishers.

| SARA9401              | DESIGN STUDIO IV         | L                     | T | P                        | Credits | Total Marks |
|-----------------------|--------------------------|-----------------------|---|--------------------------|---------|-------------|
|                       |                          | 0                     | 1 | 11                       | 7       | 300         |
| Continuous Assessment | End Semester Examination | Min Pass Marks        |   |                          |         |             |
|                       |                          | Continuous Assessment |   | End Semester Examination |         |             |
| 200                   | 100                      | 100                   |   | 50                       |         |             |

### COURSE OBJECTIVES

- To determine the role of anthropological issues that manifest itself in the creation of a community through a detailed investigation of a generic settlement at micro, Meso and Macro level. It sensitizes the mind about the symbiotic relationship between human need and built environment.
- To understand the physical space as a manifestation of socio-cultural elements
- Documenting a settlement with strong cohesive character and mapping various parameters through illustrative diagrams followed by a detailed analysis to generate logical conclusions.

### METHODOLOGY PROPOSED

#### STAGE I

##### Perustration and Social Audit (Phase I)

The exploration of the character of an identified settlement through observation, documentation of the physical, social, visual and Architectonic pattern and to transfer the recorded Field data into graphical representation for a holistic understanding.

##### Inquisition and Mapping (Phase II)

The mapping of the onsite work in the studio and discreetly analyze the available data to decode relationship between human needs and the physical, social, visual and architectonic pattern of the settlement.

#### STAGE II

To propose logical solutions for the perceived problems the settlement faces with high degree of sensitivity to the documented information.

#### DESIGN INTEGRATION

Application of the knowledge gained by the students from core courses like Vernacular Architecture, History Culture and Built Environment and Building Materials in developing spatial configurations.

|                 |                                     |               |
|-----------------|-------------------------------------|---------------|
| <b>TUTORIAL</b> | <b>READING &amp; WRITING SKILLS</b> | <b>8 Hrs.</b> |
|-----------------|-------------------------------------|---------------|

Reading skills: Model of reading to learning, reading tactics and strategies, reading purposes – associated apprehensions, reading for meaning (critical reading), reading outcomes, Reading Space and its qualities - writings on architectural design. Precise Writing - Building a Resume - Presenting Data in Verbal and Nonverbal modes

**Max. 150 Hours**

### SUGGESTED TYPOLOGIES

The study could be carried out in a rural or a semi urban settlement which has strong character and lifestyle, influencing the built form.

### COURSE OUTCOMES

**On completion of the course the student will be able to**

- CO1** Comprehend the morphology of a rural settlement over a period of time by understanding elements influencing it.
- CO2** Illustrate the nature and values of generic design as well as the interrelationship between human, society and environmental factors.
- CO3** Apply various methods of conducting surveys and document the physical, visual characteristics and demographic aspects in a holistic manner.
- CO4** Construct a body of knowledge in the vernacular / traditional architecture by decoding local materials and construction techniques.
- CO5** Prescribe interventions for the transformation and give appropriate strategies to address aspirations of the community.
- CO6** Integrate sensitivity in design approach in community-oriented projects with respect to context, collective values and needs.

### TEXT / REFERENCES BOOKS

1. Rapoport, A. (1969), House Form and Culture, Foundations of Cultural Geography, Prentice Hall, Newyork.
2. Fathy, H. (1986), Natural Energy and Vernacular Architecture: Principles and Examples with reference to Hot Arid Climates, University of Chicago Press, Chicago and London.
3. Rapoport, A. (2005), Culture, Architecture, and Design, Locke Science Publishing.

4. Taj M.H.&Gandhi.N (2009), Foundation for Architecture, Art & Design Book press
5. Madhavan,C. (2005), History and Culture of Tamil Nadu: Up to c. AD 1310, D. K. Printworld.



| SAR4065 | DESIGN STUDIO VII | L                     | T | P         | Credits | Total Marks    |
|---------|-------------------|-----------------------|---|-----------|---------|----------------|
|         |                   | 0                     | 0 | 18        | 12      | 600            |
|         |                   | Continuous assessment |   | Univ viva |         | Min pass marks |
|         |                   | 450                   |   | 150       |         | 300            |

### COURSE OBJECTIVES

- To expose the students to issues, challenges in the design of Industrial buildings and large built forms involving alternative construction materials and technology.
- To orient the students on the need for creating sustainable urban environment through sound Green building Principles.
- To understand the various green rating systems and procedures involved in it

### FOCUS

Exploration of architectural design and form using alternative materials / technologies and Green Building Techniques.

### METHODOLOGY PROPOSED

- To conduct workshop on sustainable architecture.
- To organize site visits where Green Building Principles are consciously adopted.
- Visit to Industrial complexes.

### DESIGN INTEGRATION

Experience gained through Practical Training

### SUGGESTED TYPOLOGIES

- Industrial Complexes
- Sports Complex involving Stadium Buildings
- Cost effective Housing

Max. 270 Hours

### COURSE OUTCOMES

On completion of the course the student will be able to

- CO1:**Acquiring knowledge in designing of industrial buildings  
**CO2:**Understanding alternative construction materials and technology  
**CO3:**Identifying the various technology for long span structures  
**CO4:**Insight of various green rating systems in today's context with respect to context and typology  
**CO5:**Integrating sustainable urban environment with green principles

### TEXT / REFERENCE BOOKS

1. Joseph DeChiara, Time Saver Standard for building types, McGraw Hill, 2nd Edition, 1980
2. Donald Watson and Crosbie, Time Saver Standards for Architectural Design, MGH, 2005
3. Joseph DeChiara; Julius, Time-Saver Standards for Housing And Residential Development, MGH, 2005
4. National Building Code of India, Bureau of Indian Standards, 2005
5. Ernst and Peter, Neufert's Architect's Data, Blackwell publishing professional, 2005
6. Peter Sturzebecher and Ulrich, Architecture for Sport, Wiley - Academy, 2002
7. Franziska Nauck, edited by Van Uffelen, Chris, Stadiums, Page One, 2006
8. James B., Fundamentals of Landscaping and Site Planning, the Avi Publications, 2005
9. Joseph N. Sabatini, Building & Safety Codes for Industrial Facilities, Brikhauser, 2004
10. Booqs, Green Living: Sustainable Houses, Booqs, 2009

| SAR 1502 | ARCHITECTURAL CONSERVATION | L | T | P | Credits | Total Marks |
|----------|----------------------------|---|---|---|---------|-------------|
|          |                            | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To develop a comprehensive knowledge about Conservation and its importance in today's context.
- To enhance the skills of the graduate to understand various principles and practices in the field of architectural conservation.
- To familiarize the students with an overview of best practices in conservation charters, various conservation processes, techniques and skills through case studies.

**UNIT I INTRODUCTION TO CONSERVATION****6 Hrs.**

Definitions of conservation, Need for Conservation, Approaches, Indian context - history and principles of conservation - Role of Conservation architect, ethics and values of Conservation.

**UNIT 2 CONSERVATION LEGISLATION****8 Hrs.**

Charters and Principles: Preserving Cities and Towns - International Charters, Venice to Mexico - Central and State Government Policies and legislations - Various Agencies and their role in conservation - Role of ASI, INTACH & IHCN - Problems of living cities in conservation practices.

**UNIT 3 CONSERVATION OF HISTORIC BUILDINGS****8 Hrs.**

Criteria for identifying historic buildings - guidelines for conservation - Documentation, analysis and investigation of existing condition [surveys, inventory and analysis] in terms of historical and architectural conservation - Concepts and techniques for building conservation - Structural survey reports analysis and synthesis for historical and architectural intervention in the structure listing of faults, repair and alterations - Material conservation

**UNIT 4 CASE STUDIES****8 Hrs.**

Indian Case studies - analysis, methodology and proposals, Tajmahal- Agra, Senate House, Chennai, Ruins of Hampi, Conservation methods adopted in Mamallapuram, Kanchipuram, Case studies in urban settings-Ahmedabad, Hyderabad, Champaner, Madurai, Puducherry. International Case studies - Conservation methods adopted for leaning tower of Pisa, World Heritage sites, UNESCO etc.

**COURSE OUTCOMES:**

**On completion of the course the student will be able to**

**CO1:** Classify and understand various processes involved in conservation practices and understand the cultural and technical background behind the same.

**CO2:** Understand and appreciate various documentation techniques and its importance in conservation process.

**CO3:** Compare and determine the limitation in preserving a building, settlement, part of a building with reference to its historical background and authenticity.

**CO4:** Demonstrate about different concepts and techniques adopted in different regions, with reference to identified case studies.

**CO5:** Examine architectural and historical intervention in conservation process.

**CO6:** Interrelate and communicate the analysis, methodology and proposal adopted in various buildings.

**Max. 30 Hours****TEXT / REFERENCE BOOKS**

1. Bernard Feilden, Guidelines for Conservation, a Technical Manual, INTACH, New Delhi, 1989
2. Bath, A Study in Conservation, HMSO Publication, London, 1977
3. Benny Kuriakose, Nupur Prothi Khanna and Malvika Baja Saini, Guidelines for Preparation of Heritage Management Plan INTACH, 2012
4. Pamela Ward, Conservation and Development in Historic Towns and Cities, Ohrid Press Ltd., 1968
5. Shyam Chainani, Heritage Conservation: Legislative & Organizational Policies for India, INTACH, 2012
6. Worskett Roy, Character of towns an Approach to conservation, Architectural Press, London, 1979

| SAR1601 | ARCHITECTURAL JOURNALISM | L | T | P | Credits | Total Marks |
|---------|--------------------------|---|---|---|---------|-------------|
|         |                          | 2 | 0 | 0 | 2       | 100         |

**Course objectives:**

- To introduce the fundamentals of journalism.
- To understand the role of technologies and presentation techniques in architectural journalism.
- To outline various works of architectural journalists, interpret the strategies adopted and develop new directions.

**UNIT 1 INTRODUCTION****6 Hrs**

Introduction to journalism, Subfields within Journalism, Key concepts and objectives of Journalism - Introduction to architectural journalism, skills needed, reporting, writing, editing, photography, columnists, public relationships, criticism.

**UNIT 2 TECHNOLOGIES IN JOURNALISM****8 Hrs.**

Environment, Social Change, Persuasion Interviewing techniques, Argument and debate as a technique in the investigation of social problems; evidence, proof, refutation, persuasion; training in argumentative speaking, theories of journalism, Introduction to architectural software needed in journalism and photography, Video coverage, walk through of buildings, production of contemporary architectural journalism. Understanding the individual demands in the context of newspapers, radio, film, and television.

**UNIT 3 PRESENTATION TECHNIQUES****8 Hrs.**

Text preparations, Mode of presentation, Standards and Guidelines for documentation, Code of ethics, Basic knowledge on Press laws, Press Council of India, Public Debate, Navigating Information Networks for Mass Media with relevance to searches on Architectural topics, User generated contents for analysis of various issues on Architecture, creating an online forum and platform for exchange of ideas and information, to critically contrast outputs of selected individual pieces of journalism.

**UNIT 4 IMPLICATIONS FOR ARCHITECTURAL DESIGN****8 Hrs.**

Regional, National and International discussion forums, Changes in contemporary and historical design practices, Discussions on topics needed in an architectural journal and current issues- types of journals, works of key architectural journalists, Public Discourse on the Internet, Mass Media and Public Opinion critically appraise selected individual pieces of journalism.

**Max. 30 Hours****Course Outcomes:**

**On completion of the course the student will be able to**

**CO1:** Understanding the objectives of journalism and skills required for the same.

**CO2:** Analysing and critically thinking about the effects of architecture on society as well as the tools to enable recording of the same.

**CO3:** Illustrating the fundamentals of writing and presentation, explain different strategies and their criticism

**CO4:** Interpret the ideologies of the architects, interior designers and comprehend the various schools of thought.

**CO5:** Analysing recent historical and contemporary examples of written and journalistic criticism of architecture.

**CO4:** Analysing major critical themes, thematic categories in architectural writing over the past three centuries.

**TEXT / REFERENCE BOOKS**

1. Somerset Maugham, Summing up, Penguin Books, 1992
2. Stephen Leacock, How to write, Dodd Newyork, 1943
3. Tony Horcup, Journalism: principles and practice, Sage Publications, 2004
4. Mohammad al-Asad w/ Majd Musa, Architectural Criticism and Journalism, Umberto Allemandi, 2007

| SAR 1611 | PROJECT MANAGEMENT | L | T | P | Credits | Total Marks |
|----------|--------------------|---|---|---|---------|-------------|
|          |                    | 2 | 0 | 0 | 2       | 100         |

**Course objectives:**

- To understand the basic requisites of traditional management systems, management skills and project planning.
- To compare and analyze the traditional and modern network techniques and their relationship in project planning.
- To connect and evaluate the project planning with project costing and knowledge on software application in planning of simple projects.

**UNIT 1 TRADITIONAL APPROACH AND NETWORK ANALYSIS****8 Hrs.**

Traditional Management System - Gantt's approach - load, progress and bar charts - limitations & overcoming - Project programming - work breakdown structure. Introduction to PERT & CPM -Introduction to network concepts, network elements and inter-relationships-Network techniques -Network logic - activity interrelationships - development of CPM network - Identification of critical path - Different float computations - Early start, early finish, late start, and late finish- worked out examples-Network control (updating): Introduction, process of updating, data required for updating, when to update, method of updating, examples.

**UNIT 2 PROBABILITY ANALYSIS 6 HRS**

PERT Network - Introduction to theory of probability and statistics - Probabilistic time estimates of activities - Analysis of PERT network.

**UNIT 3 PROJECT COST & RESOURCE ALLOCATION****8 Hrs.**

Introduction to two-dimensional network analysis - activity cost information - cost time relationship - crashed estimates for activities - compression potential-cost slope - Project direct cost and indirect cost- crashed program, Network compression - least cost, least time, optimum solutions. Resource allocation - Resource levelling and smoothing - Simple examples.

**UNIT 4 SOFTWARE APPLICATIONS****8 Hrs.**

Introduction to Project Management software's - Applications - Detailed planning of a simple project - Scheduling using M.S. project and Primavera.

**Max. 30 Hours****COURSE OUTCOMES**

**On completion of the course the student will be able to**

**CO1:** Understand the various management skills and techniques.

**CO2:** Estimate the duration for a construction project.

**CO3:** Experiment the calculation of project duration with CPM and PERT analysis and techniques.

**CO4:** Prioritize work activity in the project with the comparison of project scope and time with project costing.

**CO5:** Consider the allocation of required human resources for the project according to the project time and cost.

**CO6:** Create a project plan and schedule for a simple residential project with MS Project software.

**TEXT / REFERENCE BOOKS**

1. Jerome D. Wiest and Forinord K. Levy, A Management Guide to PERT/CPM, Prentice Hall of India Pub. Ltd., 2012
2. Mukhopadhyay, Project Management for Architects and Civil Engineers, IIT, Kharagpur, 1974
3. Chitkara K.K., Construction Project Management, Tata Mc Graw Hill Publishing Company, 2014
4. Burgess R.A. and White G., Building Production and Project Management, The Construction Press, London, 1979
5. Punmiya B.C. and Khandelwal K.K., Project Planning and Control with PERT/CPM, Laxmi Publications, New Delhi, 1989
6. Harris F.C. and McCaffer R., Modern Construction Management, Croshy Lockwood Staples, 2013.

 Skill Development

| SAR 1613 | STEEL IN ARCHITECTURAL DESIGN | L | T | P | Credits | Total Marks |
|----------|-------------------------------|---|---|---|---------|-------------|
|          |                               | 3 | 0 | 0 | 3       | 100         |

**Course objectives:**

- Ability to perform analysis and design of steel members
- Ability to design steel structural systems
- Familiarity with professional and contemporary issues

**UNIT 1 STEEL STRUCTURE****13 Hrs.**

Standard structural steel - thermal properties - Fireproofing Methods - Steel Sheeting - Types of Sheeting Light roofing materials (Recent trends in roofing materials like Corrugated GI Sheets, Pre-coated metal sheets, Polycarbonate sheeting, Teflon coated sheets, PTFE Steel alloys properties and uses) - Long span structures using steel - Steel Roofing namely cable structures - Cable suspended roof, Hyperbolic paraboloid roof, Catenary, Pneumatic & Membrane roof -mention their Concept, Development, Laws of formation, Merits and Demerits- Vertical, Horizontal & Hexagonal joints.

**UNIT 2 COMPOSITE CONSTRUCTION USING STRUCTURAL STEEL****8 HRS**

Concept of Composite materials - structural engineering & Material properties - Flitch Beam - Lightweight construction Foam Concrete - Ferro Cement - Fibre Reinforced Concrete Other composite construction materials.

**UNIT 3 DESIGN, APPLICATIONS AND CONSTRUCTION OF STEEL BUILDINGS****12 Hrs.**

Steel buildings design -Study of innovations in steel industry - Design and construction parameters developed by INSDAG. Concept of Recycled Steel - manufacture and assemble steel framed buildings - factories - multi-storey buildings and car parks - commercial buildings - Industrial and agricultural buildings - Bridges and multi-storey steel framed structures - The Case Studies include KCR Terminal at Hung Hom, Hong Kong, B3 Offices in Stockley Park, Renault Centre and Swindon By Normal Foster, Inmos Microchip Factory, Bridges and Public Bus Stop in St. Gallen, IBM Traveling Exhibition Pavilion

**UNIT 4 DOCUMENTATIONS, SEMINARS, WORKSHOP ON INNOVATIVE TECHNOLOGIES****12 Hrs.**

Documentation - Innovative Steel Buildings - International & Indian Context - Construction Methods & Techniques - Seminar to present a study of architectural form and structural expression through selected - case studies which will aid understanding of structural philosophy and analysis, building envelope and services and construction sequence - work shop on steel to be organized to give students hands on experience.

**Max. 45 Hours****COURSE OUTCOMES**

**On completion of the course the student will be able to**

**CO1:** Identify and compute the design loads on a typical steel building.

**CO2:** Identify the different failure modes of steel tension and compression members.

**CO3:** Select the most suitable section shape and size for tension and compression members and beams according to specific design criteria.

**CO4:** Identify the different failure modes of bolted and welded connections, and determine their design strengths.

**CO5:** Design bolted and welded connections for tension and comp. members and beams

**TEXT / REFERENCE BOOKS**

1. Stanley W. Crawley, Robert M. Dillon, Steel Buildings: Analysis and Design, John Wiley & Sons, Inc., 1993
2. Roger Brockenbrough, Frederick Merritt, Merritt Frederick, Structural Steel Designer's Handbook, McGraw Hill Companies, Inc. 1999
3. Michael Barnes, Michael Dickson, Widespan roof structures, Thomas Telford, 2000
4. Martorell, Bohigas & Mackay, Pavilion of the Future, Expo 92, Seville (MBM), 1992.
5. Prada Aoyama Tokyo Herzog and De Meuron. Milan, IT: Progetto Prada Arte Srl, 2003
6. Christopher Beorkrem, Material Strategies in Digital Fabrication, Routledge, Taylor & Francis Group, 2012.

| SARA1502 | BUILDING SERVICES-III | L | T | P | Credits | Total Marks |
|----------|-----------------------|---|---|---|---------|-------------|
|          |                       | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To develop the understanding of the advanced building services such as Air conditioning, Electromechanical conveyance system, fire and safety.
- To comprehend the services through service core in the design of multi-storey buildings.
- To integrate the learning in the architectural design

**UNIT 1 PRINCIPLES OF AIR CONDITIONING SYSTEMS****6 Hrs.**

Basic principles, laws and terminologies related to AC - refrigeration systems, components of refrigeration system: compressor, condenser, control devices, evaporator, filters, and cooling tower. Vapor compression cycle, Concepts of cooling load, calculation of cooling load-conductivity, transmission heat load, internal heat gain, concepts of zoning, room air distribution-types of outlets.

**UNIT 2 AIR CONDITIONING SYSTEMS****8 Hrs.**

Window air conditioners, Package units, direct expansion air conditioning systems - Split units, centralized plants and chilled water plants, Comparison of various systems - Space requirements for A/c units, AHU's & a/c plant, ducting, testing and maintenance on ducts and pipes- Energy saving through design, operation and maintenance - Emerging technologies - VAV, VRV/VRF, Heat Recovery systems, etc., Protection of Ozone Layer-ecofriendly refrigerants. Selection criteria, design / structural considerations and energy requirements for above-mentioned air-conditioning systems – ECBC requirements.

**UNIT 3 ELECTROMECHANICAL CONVEYANCE SYSTEMS****4 Hrs.**

Types of conveying systems: Elevators, Escalators, Travelators – Elevators: Types, Components, Design criteria, Traffic analysis, roundtrip time, Estimation of no. of lifts required for different building, typologies as prescribed by NBC – Escalators: Types, components, Design standards and specification from NBC – Travelators: Types, components, Range – Minimum and maximum distance to be covered, Design standards and specification as per NBC.

**UNIT 4 FIRE SAFETY AND SERVICE CORE****8 Hrs.**

Introduction, fire triangle, Fire Hazards, Classification of fire, methods of firefighting, fire load, Fire resistance grading, Grading for buildings, fire safety decision tree, Protection for structural components-Firefighting equipment - alarms, detectors, suppression systems, fire point, hydrant & hoses –Firefighting services-Site planning, Fire protection concepts in buildings, design of fire escape routes, design of egress, Requirements for fighting fire in high rise buildings, NBC planning consideration, staircase enclosure, lifts & lifts enclosures, fire lift, basements, air conditioning. Service cores - Definition, design approach, functions of service core, service core types and placements-Service cores-toilets, elevator, electrical, air conditioning, staircases, exits & life safety considerations.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Case studies/ Field visits and their critical appraisal through plates Discussion on various manufactures of Elevators & Escalators on their product categories and specification - Determining air conditioning load, identifying appropriate system developing layout, for their current design exercise - Coordination with other services, architectural and structural designs. Case studies and their critical appraisal - Application of fire and safety norms and regulations in their current design exercise. Space planning for air conditioning systems, conveyance systems, firefighting and service core.

**Max. 30 Hours****COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Understand the fundamental principles of air conditioning systems and its operation in buildings.
- CO2** Develop comprehensive knowledge on various types of Air conditioning systems and expertise on selection of appropriate system for a specific building typology
- CO3** Develop comprehensive knowledge of architectural space planning for air conditioning systems.
- CO4** Understand design strategies involved in planning and sizing of electromechanical conveyance systems.
- CO5** Develop comprehensive knowledge on fire behavior, principles of firefighting, fire detection system, its integration with building and its importance in space planning.
- CO6** Develop comprehensive knowledge on service core design in multistoried buildings.

**TEXT / REFERENCE BOOKS**

1. Thomas D. Eastop and William Edward Watson, Mechanical services for buildings, Longman scientific and technical publisher, 1992
2. Paul Lang, Principles of Air Conditioning, Delmar publisher, 1995
3. Arora C.P, Refrigeration and Air Conditioning, Tata McGraw Hill, 2000

4. M.H.Lulla, Airconditioning for Architects, Chennai
5. Jain V.K., Fire safety in buildings, New Age International Pvt. Ltd. Publishers, 2010
6. Subramaniam K., Lift Technology- An Insight on Design Basics and its Evolution, EVB, 2010
7. William H. Severns and Julian R. Fellows - Air conditioning and Refrigeration - John Wiley and Sons, London - 1988  
Andrew H. Buchanan - Design for fire safety - John Wiley and Sons Ltd., New York.
8. Bureau of Indian standards - National building Code of India.
9. Energy Conservation Building Code user guide – ECBC, Bureau of Energy Efficiency, New Delhi, India.

| SARA1602 | BUILDING SERVICES-IV | L | T | P | Credits | Total Marks |
|----------|----------------------|---|---|---|---------|-------------|
|          |                      | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To understand the basic principles of physics of sound and enable them to apply the knowledge in various buildings.
- To make students realize the importance of acoustics and equip them with the knowledge for designing acoustically sound performing spaces.
- To make the students understand the design strategies and process in selecting the appropriate vertical transportation devices
- To explore the necessity of integrating the services and centralised control management

**UNIT 1 INTRODUCTION TO SOUND****4 Hrs.**

Characteristics of sound – reflection, diffusion, transmission, diffraction, absorption - Human ear and hearing – Basic terminology: frequency, pitch, tone, timbre, sound pressure, sound intensity, decibel scale, loudness, threshold of audibility and pain, sound masking, inverse square law – frequency range of audible sounds Types of noises, transmission of noises, acoustical comfort, Concept of Geometric acoustics

**UNIT 2 ACOUSTICS****8 Hrs.**

Planning & Design against outdoor noise – for air traffic, road traffic and rail traffic – air borne noise & structure borne noise / impact noise – sound isolation – sound transmission class - Acoustic defects – reverberation time - Absorption coefficients of materials. Sound absorbing materials: porous materials, panels, membrane absorbers, space/functional absorbers & cavity / Helmholtz resonators- **ECBC requirements**

**UNIT 3 DESIGN OF PERFORMING SPACES****8 Hrs.**

Basic principles in design of auditorium, concert halls, open air theatre, Recording and Broadcasting studio. Sound systems – introduction – types – equipment's such as mics, speaker's etc. – standards – basic principles of sound system design. Exposure to acoustic design and simulation software.

**UNIT 4 SECURITY SYSTEMS AND SERVICES INTEGRATION****6 Hrs.**

Safety and security systems, PAS - access control system - firefighter telephone system - CCTV surveillance system - Control of Computerized HVAC Systems -Integration of services - Water pump monitoring & control, Electrical - power monitoring - fire alarm system, firefighting system and monitoring - IBMS system and its components –ECBC requirements.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Assignments on solving acoustic problems – Sabine's formula. Case study and observation / analysis of Acoustical Spaces – Concert halls, recording studio, etc. - Discussion on acoustic materials available in market with catalogue and samples. Assignment-Working out individual service layout and arriving coordinated layout for IBMS - **Case study on IBMS and critical analysis of the service integration - Applying the knowledge in their current design exercise.**

**Max. 30 Hours****COURSE OUTCOME:****On completion of the course the student will be able to**

- CO1** Understand the fundamental principles of acoustics and its importance in architectural design.
- CO2** Describe the different types of noise, their transmission and the measures to isolate / control them
- CO3** Analyze the various behavior of sound in indoor and outdoor space.
- CO4** Solve the acoustical design problems in a space by acoustic treatments.
- CO5** Design architectural spaces with respect to acoustic principles
- CO6** Understand the need of service integration and automated control

**TEXT / REFERENCE BOOKS:**

1. Siraskar K.A. (1972). Acoustics in Building Design, Orient Longman Ltd., 1972
2. Kandaswamy S., (2005), Architectural Acoustics and Noise Control, Allied publishers Pvt. Ltd., 2005
3. Egan, D. (2007). Architectural Acoustics, Rose publishing classics,
4. Marshall long, Architectural Acoustics, Elsevier academic press New York, 2006
5. Cavanaugh, W.J., Tocci, G.C., Wilkes, (2009). J.A Architectural Acoustics: Principles and practice, 2nd edition, John Wiley & sons,
6. Sinopoli, J. (2010), Smart Buildings for Architects, Owners and Builders, Elsevier Inc.
7. Energy Conservation Building Code user guide – ECBC, Bureau of Energy Efficiency, New Delhi, India

| SARA8204 | LIFE CYCLE ASSESSMENT OF BUILDINGS | L | T | P | Credits | Total Marks |
|----------|------------------------------------|---|---|---|---------|-------------|
|          |                                    | 3 | 1 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To understand the importance Life Cycle Assessment
- To devise the applicability of LCA process and impact categories
- To comprehend the tools for LCA

**UNIT 1 INTRODUCTION AND TERMINOLOGY****7 Hrs.**

History of LCA, Aspects of LCA, variants of LCA, Life cycle stages, end of life, Functional unit, System boundary, Life Cycle Inventory (LCI) data base, Life Cycle Management (LCM), Life Cycle Energy Analysis (LCEA), Carbon Accounting.

**UNIT 2 LIFE CYCLE ASSESSMENT IN BUILDING INDUSTRY****12 Hrs.**

Material level, Product Level, Building level, Industry level, LCA and Design process, Pre-design, Schematic Design and Design Development Stage. CA process and impact categories: Inventory Analysis, Impact assessment, interpretation, Different impact categories like Global Warming Potential (GWP), Acidification Potential (AP), Eutrophication Potential (EP), Smog Formation Potential, Fossil fuel and Ozone Depletion Potential.

**UNIT 3 DIFFERENT TOOLS FOR LCA****10 Hrs.**

Configuration of a tool, Classification of tools, Impact estimator and eco-calculator, Building for Economic and Environmental Sustainability (BEES), International LCA Tools, Related tools, Green footsteps & eco-friendly applications. **Guidelines to integrate: LCA with design and evaluation**, Different Scenarios of use of LCA, Sustainability targets, Selection of a LCA tools, LCIA.

**UNIT 4 LIFE CYCLE COSTING (LCC) TOOL****10 Hrs.**

Component characteristics of an element group, input for energy Calculation, **LCC calculations conduct of LCI and LCC calculations, Selective Assessment, Normalization and Weighing Factors LCA and LCC for different materials**. Case studies- Two and Three variants of a house, office building, retrofitting buildings.

**UNIT 5 COMPREHENSIVE LEARNING****6 Hrs.**

**Calculating LCA for a particular building using One Click, calculating the LCI and LCC calculations for any identified building.**

**Max. 45 Hours****COURSE OUTCOME:**

- CO1** Understand the aspects of Life Cycle Analysis
- CO2** Understand the life cycle assessment in building industry
- CO3** Analyse the available use of LCA
- CO4** Categorise the various parameters in Life Cycle Assessment
- CO5** Acquire knowledge about tools for LCA tools
- CO6** Integrate the aspects learnt in the tools for LCA calculations

**TEXT / REFERENCE BOOKS**

1. A. Kanpur and T.E. Graedel: Industrial Ecology. Encyclopaedia of Energy, Volume 3, 2004
2. Environmental life cycle analysis by David Camborne, CRC-Press 1997
3. Life-cycle analysis of energy systems from methodology to applications, by Bent Sorensen, Published by Royal Society of Chemistry, June 2011
4. Lifecycle Assessment: Principles and Practice Chapter 1
5. R. A. Frisch and N. E. Gallipolis: Strategies for Manufacturing, Scientific American 261 (3), 144-152 1989

| SARA8206 | DYNAMICS OF ORGANISATIONAL BEHAVIOUR | L | T | P | Credits | Total Marks |
|----------|--------------------------------------|---|---|---|---------|-------------|
|          |                                      | 4 | 0 | 0 | 4       | 100         |

**COURSE OBJECTIVES**

- To understand the behaviour of human beings as individuals and groups
- To interpret individual and group dimensions in organizational behaviour
- To comprehend the dynamics of complex work situations.

**UNIT 1 CONCEPT OF ORGANIZATIONAL BEHAVIOUR**

9 Hrs.

Definition-Nature-Characteristics-importance of organizational behaviour- models, -Cognitive Framework-Behaviouristic Framework and Social Cognitive Framework of organizational behavior.

**UNIT 2 INDIVIDUAL BEHAVIOUR**

7 Hrs.

Perception- Concept- Nature- Process- Importance-Management and Behavioural Applications of Perception- Attitude-Concept- Process and Importance- Attitude Measurement - Attitudes and Workforce Diversity- Personality- Concept, Nature, Types and Theories of Personality Shaping-Personality Attitude and Job Satisfaction-Learning- Concept and Theories of Learning.

**UNIT 3 GROUP BEHAVIOUR**

8 Hrs.

Motivation - Theories of Motivation- Early and Contemporary views- Motivating a Diverse Workforce- Leadership- Styles - Traits -Theories of Leadership -Interpersonal Relationship- Group Dynamics - Stages of Group Development-Group Cohesiveness-Formal and Informal Groups- Group Processes and Decision Making-Dysfunctional Groups.

**UNIT 4 ORGANISATIONAL DYNAMICS**

12 Hrs.

Organisational Power and Politics -Concept - Sources of Power- Distinction between Power-Authority and Influence- Approaches to Power, Political Implications of Power-Dysfunctional Uses of Power - Knowledge Management - Emotional Intelligence in Contemporary Business Organisation-Conflict-Sources-Types-Functionality and Dysfunctionality of Conflict- Resolution of Conflict. Change-Concept-Nature- Resistance to change- Managing resistance to change- Implementing Change- Kurt Lewin Theory of Change-Grievance -Types -Process of Grievance Handling-Stress-Consequences-Causes of Stress- Managing Stress- Organisational Culture-Characteristics-Elements-Implications of Organisation culture, Process - Job Satisfaction- Components - Significance - Influencing Factors.

**UNIT 5 CONSTRUCTIVE ASSIGNMENTS**

9 Hrs.

Case study presentation on topics revolving around organization behavior, dynamics need to be worked out..

Max. 45 Hrs.

**COURSE OUTCOMES**

On completion of the course, student will be able to

- CO1 Understand the basic elements of human behaviour.
- CO2 Discuss individual and group behaviour
- CO3 Examine important aspects of group/team processes.
- CO4 Demonstrate ability to manage, lead and work with other people in the organization.
- CO5 Analyze the significance of conflict, politics and change in organizations
- CO6 Design effective organizational dynamics.

**TEXT / REFERENCE BOOKS**

1. Newstrom John W. Organizational Behaviour: Human Behaviour at Work, Tata McGraw Hill, 12th Edition, 2017.
2. Luthans Fred, Organizational Behaviour, Tata McGraw Hill, 12th Edition, 2017.
3. Sundar & Srinivasan, Elements of Organisational Behaviour, Vijay Nicole Imprints Pvt. Ltd., 2009.
4. Luthans Fred, Organizational Behavior, McGraw Hill Publishers Co. Ltd., New Delhi, 2006.
5. Aswathappa K., Organizational behavior, HPH, Bombay, 2006.
6. S.S. Khanka, Organizational Behavior, S. Chand & Co.,

| SARA8205 | THERMAL COMFORT AND PASSIVE DESIGN | L | T | P | Credits | Total Marks |
|----------|------------------------------------|---|---|---|---------|-------------|
|          |                                    | 3 | 1 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To understand the importance Thermal comfort
- To devise the applicability of passive design in built environment
- To comprehend the parameters for Thermal comfort.

**UNIT I HUMAN BEHAVIOUR**

9 Hrs

Atmospheric and thermal comfort, building performance, and occupant health, safety, and productivity. Factors responsible, energy systems for human comfort, PPD & PMV analysis

**UNIT II NATURAL INFLUENCES**

9 Hrs

Micro and Macro thermal comfort scales — Interpreting Material data through Bio climatic charts Sun path, Passive strategies, Solar heat gain, Solar radiation, Stack effect, etc.

**UNIT III DESIGN ELEMENTS**

9 Hrs

Modifications of Architectural & Landscape Elements — Fenestration, roof, walls, flooring, trees and landscape. Climatic zones and architectural features -Courtyard, Cross ventilation Daylight factor, Walls, Trombe wall, Buried pipe system, Wind, Velocity, Wind tower etc.

**UNIT IV BUILDING MATERIALS**

9 Hrs

Properties of building materials related to Climatic zones -Properties of Heat transfer and energy flow, U-value, Appropriate materials. Mass materials/components selection strategy - Photovoltaic-Recycled Materials-Utilization of building water conserving installation- Evaporative coolers.

**UNIT V COMPREHENSIVE LEARNING**

9 Hrs

Designing for optimum Day Lighting-Ventilation and Thermal Comfort Standards for the identified built environment

Max. 45 Hours

**COURSE OUTCOME:**

- CO1 Understand the parameters for thermal comfort
- CO2 Understand the passive design strategies in built environment
- CO3 Acquire knowledge about building materials to specific Climatic zones
- CO4 Understand human thermal comfort and the means to achieving the same
- CO5 Acquire knowledge about Renewable energy
- CO6 Integrate the parameters learnt in thermal comfort

**TEXT / REFERENCE BOOKS**

1. Arvind Krishna, Simos Yanas, Nick Baker, S.V. Szokolay, Climate Responsive Architecture, Tata McGraw Hill Pub. Co, 2001
2. Daniel D. Chiras, The Solar House: Passive Heating and Cooling, Chelsea Green Publishing, 2002
3. David Lloyd Jones, Architecture and the Environment: Contemporary Green Buildings, Overlook Hardcover, 1998.
4. Givoni, Climate Considerations in Building and Urban Design, Wiley; 1st edition, 1998.
5. Hawkes Dean and Foster Wayne, Energy Efficient Buildings: Architecture, Engineering, and Environment. W. W. Norton & Company; First American Edition, 2002.
6. O.H Koenisberger, Manual of Tropical housing and climate, Longman Group United Kingdom, 2012.

| SARA3501 | BIOMIMICRY | L | T | P | Credits | Total Marks |
|----------|------------|---|---|---|---------|-------------|
|          |            | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To explore, understand and recognize the relation between nature and human.
- To comprehend and appreciate the natural construction by the organisms in nature.
- To generate similar approaches from nature in the built forms.

**UNIT1 INTRODUCTION****6 Hrs.**

Introduction- what is biomimicry - bionics - biomimetics - origins of biomimicry - Biomimicry vs biophilic -nature's laws, strategies, and principles - Nature as a model, measure and mentor, changing metaphor and approach organic architecture - animal architecture - complexity of natural organisms and systems - Relationship between nature and architecture.

**UNIT2 BIOMIMICRY CONCEPTS****8 Hrs.**

Nostos Erda: Returning Home to Earth - Natural materials manufacture principles - Inorganic materials - crystallized version of Earth derived materials - Natural construction - adaptation for human use (mud-dauber wasp compass termites, Eastern tent caterpillars, female bauble spiders and the extraordinary Namibian fog-basking beetle, beaver dam construction).

**UNIT3 BIOMIMICRY IN ARCHITECTURE****6Hrs.**

Biomimicry in architecture - overlap between biology and architecture - living building - biomimetics concepts - emerging biomimetics- technologies - nanotechnology in architecture - biomimetics products.

**UNIT4 BIOMIMICRY AND SUSTAINABILITY****6Hrs.**

Examples of Buildings - works of Douglas Cardinal, Imre Makovecz, Daniel Liebermann, Eugene Tsui, Jacques Gillet, Petra Gruber - Biomimetic Cities-Biomimetic future Approach- Levels of Biomimicry (organisms level, behaviour level, ecosystem level) - Nature model - New applications of biological life into Architecture.

**UNIT5 CONSTRUCTIVE ASSIGNMENTS****4 Hrs.**

Assignment on the concepts of biomimicry by reviewing journal papers. Documenting the influence of Biomimicry in Architecture. Analysis of case studies of various architects- Ar. Michael Pawlyn, Ar. Mick Pearce, Ar. Santiago Calatrava.

**Max. 30 Hours****COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Understanding the origin and principles of biomimicry and able to distinguish its application in architecture
- CO2** Understanding the origin and principles of biomimicry and able to distinguish its application in architecture.
- CO3** Exploration and critical analysis of the principles, design approaches of biomimicry adopted in architecture.
- CO4** Ability to outline the technologies and design strategies by adopted by pioneers in the built form.
- CO5** Skill to interpret philosophies in a sustainable approach adopted by architects in different contexts.
- CO6** Constructing knowledge on the role of nature as a model, measure and mentor in architecture.

**TEXT / REFERENCE BOOKS**

1. Benyus, J. M. (2002). Biomimicry: Innovation Inspired by Nature. William Morrow.
2. Gruber, P. (2011). Biomimetics in Architecture: Architecture of Life and Buildings. Springer.
3. Hansell, M. (2005). Animal Architecture (Oxford Animal Biology Series). OUP Oxford.
4. Mazzoleni, I. (2013). Architecture Follows Nature-Biomimetic Principles for Innovative Design (Biomimetics). CRC Press.
5. Pawlyn, M. (2011). Biomimicry in Architecture. RIBA Publishing.

| SARA3702 | ARCHITECTURAL PHOTOGRAPHY AND JOURNALISM | L | T | P | Credits | Total Marks |
|----------|------------------------------------------|---|---|---|---------|-------------|
|          |                                          | 2 | 0 | 0 | 2       | 100         |

**COURSE OBJECTIVES:**

- To make students aware about Architectural Journalism
- To encourage them to pursue Architectural Critiquing, Writing, Documentation and Research.
- To familiarize students in preparation of Book Reviews and Articles, with Photographs to support their work.

**UNIT 1 INTRODUCTION TO ARCHITECTURAL JOURNALISM**

4 Hrs.

Key concepts and objectives of Journalism; Theories of journalism, techniques and processes. Skills for contemporary architectural reportage: documentation, research, reporting, writing, editing, photography, columnists, interviewing, networking, public relationships, critiquing & criticism, media & publishing. Regional, National and International discussion forums, Discussions on topics needed in an architectural journal and current issues; Types of journals, works of key architectural journalists.

**UNIT 2 ARCHITECTURAL WRITING AND CRITICISM**

10 Hrs.

Introduction to various types of writing- News stories, critical essays on particular buildings, social issues, etc. Interviewing techniques, Argument and debate; critical thinking, evidence, proof, refutation, persuasion; Editing for print and web - Text preparation, formatting, page composition, Mode of presentation, Standards and Guidelines for documentation, Code of ethics. Basic knowledge on Press laws, Press Council of India, Multimedia/online journalism and digital developments. Introduction importance of Criticism. Relationship between Architecture and Criticism, Criticism and social commentary. Failures of Architectural Criticism. Analysis of various critical themes and their comparison, criticizing the built environment in various aspects and writing about criticism. Seminars on Indian architectural writers, journalists and critics.

**UNIT 3 PHOTOGRAPHIC TECHNIQUES**

8 Hrs.

Introduction to architectural photography: concepts of colour, lighting, distance, visual angle and perspective, Framing and composition: Visual weight, Rule of thirds, Leading lines, Symmetry, Abstraction; Context, Subject, Background and foreground relationships. Technical definitions and settings; Types of cameras and lenses, properties and priorities; Shooting parameters, Exposure, Aperture, Shutter Speed, ISO; Use of various post processing tools and controls; printing techniques.

**UNIT 4 PHOTO JOURNALISM**

6 Hrs.

Analysis of subject and content, Photo-documentation techniques for buildings highlighting quality of architectural spaces. Supporting the write-ups about the built environment with photographs, Understanding pictorial, verbal and visual relationship of architecture journalism. Expression and Imagery, Time and space in Image

**UNIT 5 CONSTRUCTIVE ASSIGNMENT**

2 Hrs.

Writing Case studies, book reviews, literature reviews- Analysis of newspaper, magazine, or website articles and students will have to respond with their own piece of writing- Evaluation of historical and contemporary examples of written and journalistic criticism of architecture, analysis of major critical themes - Presentations, discussions and debates on works of Indian and international writers and critics - Looking at and explaining a building in today's scenario and what is happening now and what should be the future, reflecting on and criticizing architectural projects - Writing about the new technologies and construction techniques in today's architecture - Students will be assessed by the quality of their writing, the level of understanding they bring to the readings and topics, and the quality of their in-class presentations and participation.

MAX. 30 HOURS

**COURSE OUTCOME:**

On completion of the course the student will be able to

- CO1** Understand importance of analysing architecture and its interpretation through journalism.
- CO2** Structure architectural journals, write descriptive and analytical reports, edit write ups, book reviews, pagecompositions and printing processes.
- CO3** Analyse recent historical and contemporary examples of written and journalistic criticism of architecture, including selected writings by Indian and overseas critics
- CO4** Distinguish major critical themes and thematic categories in historical and contemporary architectural writing.
- CO5** Apply elements and principles of architectural photographic work that effectively communicates ideas.
- CO6** Post-process digital images to create various outcomes.

**TEXT / REFERENCE BOOKS**

1. Bender, T. (1988). Architecture and the Journalism of Ideas. *Design Book Review*, (15), 47-49
2. Waugh, P., & Fuller, D. (Eds.). (1999). The arts and sciences of criticism. Oxford University Press
3. Al-Asad, M., Musa, M., & Aga Khan Trust for Culture. (2006). Architectural criticism and journalism: global perspectives:

proceedings of an international seminar organised by the Aga Khan Award for Architecture in association with the Kuwait Society of Engineers, 6-7 December 2005, Kuwait. Aga Khan Trust for Culture.

4. Fisher, T. (2011). The death and life of great architecture criticism. *Places Journal*.
5. Wiseman, C. (2014). *Writing Architecture: A Practical Guide to Clear Communication about the Built Environment*. Trinity University Press.
6. Heinrich, M. (2017). *Basics Architectural Photography*. Birkhäuser.
7. Harris, M. G. (2002). *Professional architectural photography*. Taylor & Francis.
8. Nieman Reports: Architectural Criticism: Dead or Alive by Blair Kamin.

| SARA8307 | TALL BUILDINGS | L | T | P | Credits | Total Marks |
|----------|----------------|---|---|---|---------|-------------|
|          |                | 3 | 0 | 0 | 3       | 100         |

**COURSE OBJECTIVES:**

- To acquire knowledge of advanced structural systems and analysis techniques for tall buildings.  
To study the behavior and failure modes associated with different structural forms.
- To be familiar with construction techniques and materials used in building assemblies.

**UNIT 1 DESIGN PRINCIPLES**

9 Hrs.

Design philosophy, Reliability Based design, introduction to working stress design, limit state design, plastic design. loading, sequential loading, Gravity loading, dead load, live load, Construction load, Combined loading, Wind Loading - Static and dynamic approach – an insight into Analytical and wind tunnel experimental method. Earth quake loading

**UNIT2 VARIOUS STRUCTURAL SYSTEMS**

9 Hrs.

Factors affecting growth, Height and structural form - types- braced forms - infilled frames, shear walls, coupled shear walls, wall frames, tubular, cores, outrigger - braced and hybrid mega systems.

**UNIT3 ANALYSIS AND DESIGN**

9 Hrs.

Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of a building as total structural system considering overall integrity and major sub system interaction.

**UNIT 4 SITE INVESTIGATION**

9 Hrs.

Assembly of buildings, Safety Policy, Stages of Site investigation, On site tests, Foundation, Basement construction and Water proofing, Materials, Selection & handling, Wall & Floor construction, Roof Construction.

**UNIT 5 CONSTRUCTIVE ASSIGNMENT**

9 Hrs.

Case study presentation of tall buildings around the world.

**Max.45 Hrs.****COURSE OUTCOME**

On the end of the course, student will be able to

**C01** Demonstrate a comprehensive understanding of the principles and considerations underlying different design approaches

**C02** Comprehend the various types of forms safety of high-rise structures.

**C03** An insight into modeling techniques that can be used for approximate and accurate analysis of building structures

**C04** Oversees the assembly process, ensuring adherence to safety regulations, and maintaining the structural integrity and quality of the building.

**C05** Adopt modern materials and methods for constructing tall buildings.

**TEXT /REFERENCE BOOKS**

1. Taranath. B. S. "Structural Analysis in tall buildings", McGraw Hill, 1988.
2. Bryan Stafford Smith, Alexcoull. "Tall building structures", Analysis and Design, John Wiley and Sons inc., 1991.
3. Beedle. L.S. "Advances in Tall Buildings" , CBS Publishers & Distributors, Delhi, 1986.
4. Lin T.Y., States Burry D., "Structural Concepts and systems for Architects and Engineers",1981.
5. Chew Yit Lin, Micheal, "Construction Technology for Tall Buildings", Singapore University Press, 2nd Edition, 2006.

| SAR1603 | FILM SET AND TEMPORARY STRUCTURES<br>DESIGN | L | T | P | Credits | Total Marks |
|---------|---------------------------------------------|---|---|---|---------|-------------|
|         |                                             | 2 | 0 | 0 | 2       | 100         |

**Course objectives:**

- To explore and synthesize the various elements involved in a set.
- To give an insight to approach to art direction.
- To understand the process of designing and creating a set.

**UNIT 1 ELEMENTS OF A SET****6 Hrs.**

Elements of Image Making - stage craft, Accessories, Props, Design of Space - elements of Form, Colour, Light, Sound, Time, Graphic, Location, themes and materials, graphics design, reuse and set design.

**UNIT 2 THEORY OF ART DIRECTION****8 Hrs**

Drawing and Design, Theory for Art Direction, Relations between Scene vs Characters, Scene vs Painting, Scene vs Script, Scene vs Drama, translation from 2D to 3D.

**UNIT 3 PROCESS OF DESIGNING AND CREATING A SET****8 Hrs**

Analyze scripts to determine theme, concept, mood, location, style, period, special needs, Character, setting of the drama/movie, initial sketches of the design, materials and construction of the set and execution.

**UNIT 4 CASE STUDIES****8 Hrs.**

Diverse concepts, philosophies and set designs of known art directors, movie reviews, case studies of different film cities in different contexts.

**Max. 30 Hours****Course Outcomes:****On completion of the course the student will be able to**

- CO1:** Exploring the various elements to be included while designing sets.
- CO2:** Comprehending the relationship between the various aspects involved in art direction.
- CO3:** Ability to understand and sequence the processes involved in the designing and creation of sets.
- CO4:** Constructing knowledge to review the sets created in movies.
- CO5:** Critically analyze the philosophies of known art directors in documenting cities, buildings etc.

**TEXT / REFERENCE BOOKS**

1. Neumann D., Film Architecture: Set Designs from "Metropolis" to "Blade Runner", Prestel, 1997
2. Fear B., Architecture + Film II, Architectural Design, Wiley Academy, 2000
3. Lamster M., Architecture and Film, Princeton Architectural Press, 2013
4. Nystorm H., Creativity and Innovation, John Wiley & Sons, 1979

| S102APRO1 | CAPSTONE PROJECT | L | T | P  | Credits | Total Marks |
|-----------|------------------|---|---|----|---------|-------------|
|           |                  | 0 | 0 | 28 | 18      | 800         |

**COURSE OBJECTIVES:**

To evaluate the students to demonstrate the comprehensive understanding and knowledge gained through various semesters in an Architectural project. Students shall be permitted to undertake any live/ competition/ Government projects, which was approved as the pre thesis topic in the previous semester.

**FOCUS**

To deal the design problem in a real life like situation.

**METHODOLOGY PROPOSED**

Students will be encouraged to approach the design problem identified by him/her in a systematic way with guidance from a Supervisor on a one-to-one basis. There shall be five continuous assessments during the semester by the review committee comprising of The Internal thesis coordinator, internal guide and External guide.

The stages are:

- Concept and Site Zoning along with the previous semester Pre-Thesis report and study sheets to be presented.
- Conceptual sketches, models, plans, sections, elevations.
- Scheme I of the Design Drawings
- Scheme II of the Design Drawings
- Pre- Final stage
- Final University Viva Voce

The review marks obtained in the five assessments shall be taken into account for the internal marks. A jury comprising of internal and external examiners shall conduct the final Viva-Voce examination of the Thesis/Project in the institution at the end of the Eight semester as a final Viva Voce. The total marks scored shall be the sum of marks secured in the continuous assessments and the final university viva-voce examination.

The development of thesis is to enable the students to handle all the phases of building/interior design. It is a subject for scholastic study through analysis and should reflect the knowledge gained from all the courses undertaken by the student in all the previous semesters. It is a development of design and detailing with integration of all the technical aspects. The thesis project shall be submitted in the form of drawings, project report and material charts. Each student is required to submit two hard copies of the report along with a soft copy of the report and sheets. The report shall be based on the literature review, Case Study analysis and inferences, Standards, Site Analysis, Requirements and area statements along with the concepts, design processes and the final design.