FIRST YEAR / SEMESTER ONE

ARC 1101 ARCHITECTURAL DESIGN & DETAILING – I (BASIC DESIGN):

(2 5 0 10)

Focus: Single-User Space Design

Objectives

- To introduce the fundamentals of basic design composition and principles.
- To develop skills to translate abstract ideas into two-dimensional and three-dimensional spatial compositions.
- To create a basic Single-User Space Design such as Kiosk, Stall, etc. using the fundamentals of basic design principles and 2D/3D translation and composition skills.

Outline

Introduction to the fundamental elements and principles of 'Architectural Design' such as form, space and order; spatial standards such as user anthropometrics; and spatial/ building components; etc. The students need to create a 'single user space' using basic principles of 'Architectural Design' and spatial composition with design qualities for aesthetics, function or use, colour and texture, movement, circulation and materiality.

References

1. Ching, F. (1996). Architecture, form, space & order. John Wiley.
2. Neufert, E., Sturge, D., & Luhman, N. Architects' data.
3. Watson, D., & Crosbie, M. (2005). Time-saver standards for architectural design. McGraw-Hill.
4. Unwin. (1997). Analysing architecture. Routledge.

ARC 1103: ARCHITECTURAL REPRESENTATION - I (MANUAL): (1 0 4 3)

Objectives

- To communicate through graphic language and geometrical construction.
- To understand the basics of planes and their representation.
- To understand solid geometry through exercises of increasing complexity.

Outline

Introduction to Architectural Graphics and sign conventions and scales. Conic sections, Construction and Architectural applications, Orthographic Projections of architectural built elements and built forms, Pictorial representations like Isometric and Axonometric, Sections of solids, the concept of section planes.

References

1. Ching, F. D. (2015). Architectural graphics. John Wiley & Sons.
2. Bhatt, N. D. (1980). Engineering Drawing. Charotar Publishing House, 50th Edition, 2010.
3. Mathur, M. L., & Vaishwanar, R. S. (2002). Engineering Drawing and Graphics. Jain Bros.
4. Pelletier, L. (2000). Architectural Representation and the Perspective Hinge. MIT Press.

ARC 1105 BUILDING CONSTRUCTION & MATERIALS - I (MASONRY): (2 0 4 4)

Objectives

- To categorize various building materials as applied in construction.
- To understand the standard nomenclature and classify the various types of bricks, brick masonry bonds & demonstrate the application of the same.
- To classify the various types of stones, stone masonry & understand and relate the application of same.
- To interpret relevant building standards for the selection of masonry materials & good practices for construction.
- To identify various building components such as walls, floors, columns, beams, foundations etc. through graphic representation.

Outline

Rocks / Stones: Classification; Characteristics of a good stone; Processes involved in dressing stones; Uses; Deterioration & Preservation of stones and Stone masonry. Clay: Classification; Composition; Manufacturing process; Properties; Products; Qualities of Clay bricks, Terracotta tiles & Clay blocks. Foundations: Types of Masonry (Stone & Brick) and construction details. Openings in Masonry Works: Arches & Lintels. Building components: Walls, Floors and Roofs with their types & uses; Overview of their structural behavior.

References

1. McKay, W. B., & McKay, J. K. (1975). Building construction. London: Longman.
2. Ambrose, J. (1993). Building structures. John Wiley & Sons.
3. Chudley, R., & Greeno, R. (2005). Construction Technology. Pearson Education.
4. Rangwala, S. C., Rangwala, K. S., & Rangwala, P. S. (1992). Engineering Materials. Charotar Publishing House, New Delhi.

ARC 1107 COMPUTATION & DATA ANALYSIS: (2 0 2 3)

Objectives

- To develop design thinking using mathematical functions in terms of architectural aspects.
- To apply the optimal decision-making in the architectural design process through computational methods.
- To compile and analyse architectural data sets.
- To evaluate various architectural design decisions using different microeconomic concepts.
- To simplify the associated processes in terms of algorithms.

Outline

Interpreting derivatives considering variables from architecture, Maxima-minima of functions (single-variable), Basics of Multivariate Calculus considering architectural variables up to solution-plane. Problem-solving in architecture using linear/non-linear programming, evolutionary optimization etc. Data Analysis using MS-Excel - Formulas, Conditional Formatting, Curve plotting, Solver, Sensitivity Analysis, Macro Recording Programming (VBA), etc.Demand and Supply Curve, Market Equilibrium, Total Cost (Fixed and Variable), NPV-IRR, Marginal Cost, Pareto efficiency, Price Elasticity, Marginal Rate of Technical Substitution, Utility Curve, Dominance Strategy, Game Theory. Architectural Design based application exercise expressed in process flowchart design and Algorithm Development.

References

1. Radford, A. D., & Gero, J. S. (1987). Design by optimization in architecture, building, and construction. John Wiley & Sons, Inc. (721.0281519 RAD).
2. Varian, H. R. (2016). Intermediate Microeconomics with Calculus: A Modern Approach: Ninth International Student Edition. WW Norton & Company.
3. Williams, H. P. (2013). Model building in mathematical programming. John Wiley & Sons. (519.7 WIL)
4. S Skiena, S. (2008). The Algorithm designs. Manual 2nd edition, Springer, Verlag London. (005.1 SKI)

ARC 1109 HISTORY THEORY & CRITICISM-I: (2 0 2 3)

Objectives

- To study the architectural style, with regards to its architectural component, nomenclature and major features of the style being studied.
- To understand the settlement patterns and their physicality in relation to the geographical, and geological aspects.
- To understand the built environment, techniques and materials used for the construction.
- To relate to the climatic aspects of the region and understand the importance of the evolution of architecture that manifested as a result.

- To study the importance of the socio-political influences on the city and built environment.

Outline

The course intends to introduce and understand ancient civilizations. The topics to be covered this semester are from Mesopotamia to Roman based on prominent examples. Mesopotomia: Sumer City of Warka & Ur; Ziggurats - e.g. Ziggurat of Ur-Nammu, White Temple; City of Babylon in that era and followed by the Egyptian civilisation typology like tomb complexes, temples, mortuary, cult temples & typical residences Mesopotamia:, Egyptian Civilization Typology. Indus Valley Civilization and prominent examples of the era. Greek Civilization -Aegean, Mycenaean - Types of masonry, Tholoso beehive Tombs Roman Civilization –The Roman orders; Temples - Pantheon; Public buildings; The Forums.

References

1. Fletcher, S. B. (1987). A History of Architecture, edited by John Musgrove, Butterworth Heinemann, UK.
2. Brown, P. (1949). Indian architecture (Vol. 1). Taraporevala Sons.
3. Grover, S. (2003). Buddhist and Hindu Architecture in India. CBS Publishers & Distributors.
4. Fazio, M. W., Moffett, M., & Wodehouse, L. (2007). Buildings across time: An introduction to World Architecture. McGraw-Hill.
5. Collins, M. R. (1979). Encyclopedia of Architectural Technology, JSTOR

ARC 1111 ENVIRONMENTAL SCIENCE: (2 0 2 3)

Objectives

- To understand the basic principles of Ecosystem and to have an overview of the underlined aspects related to the environment.
- To identify the issues pertaining to the built environment and study the basic principles and their applications in environmental design.
- To understand biodiversity and policies related to environmental issues.

Outline

Fundamentals of Environment, Issues and Potentials of the Environment Relationship between built and natural environment, Study of renewable and non-renewable resources.

Analyse various human impacts on the environment and study its implications. Introduction to Environmental management practices and policies.

References

1. DeKay, M., & Brown, G. Z. (2013). Sun, wind, and light: architectural design strategies. John Wiley & Sons.
2. Evans, M. (1980). Housing, climate, and comfort. Halsted Press.
3. Koeningsberger, O. T. (1974). Ingersoll, T. G, Mayhew, A, Szokolay, SV Manual for tropical housing: Part I: Climatic Design. Orient Longman, UK.
4. Mani, A. (2008). Handbook of solar radiation data for India. Resonance.
5. Erach Bharcuha. (2004). Environmental Studies for Undergraduate courses. University Grants Commission.

FIRST YEAR / SEMESTER TWO

ARC 1102 ARCHITECTURAL DESIGN & DETAILING - II (SINGLE USER SPACE): (2 5 0 10)

Focus: Residential Design

Objectives

- To understand and explore architectural design principles for programmatic, context and site response.
- To develop a design thinking towards the spatial planning and architecture design of small-scale spaces in a residential typology.
- To develop an understanding of the scale, function, and design approaches for 'Residential Design'.

Outline

The students need to explore and create an Architectural Design Solution for a 'single-family residence', as a creative response to the given or defined design brief, site context, available building regulations and bye-laws as applicable to the given site context and location. The solutions should incorporate an understanding of the functional requirements of essential small-scale spaces in residences such as Living, Bedrooms, Kitchen, Dining, toilets as well as ancillary spaces such as Staircases, balconies, terraces, porch, hallways etc. Design Solutions to have compulsory provisions for support spaces and programmatic requirements for services. (Site extent up to 500 sqm)

References

1. Neufert, E., Sturge, D., & Luhman, N. Architects' data.
2. Watson, D., & Crosbie, M. (2005). Time-saver standards for architectural design. McGraw-Hill.
3. Panero, J., & Zelnik, M. (1979). Human dimension & interior space: a source book of design reference standards. Watson-Guptill.
4. Lynch, K., Lynch, K. R., & Hack, G. (1984). Site planning. MIT press.

ARC 1104 ARCHITECTURAL REPRESENTATION - II (CAD): (1 0 4 3)

Objectives

- To develop the skills of visual representation and conceptual communication in the field of spatial design through 3D drawing techniques.
- To develop the skills required to represent a given design with shades and shadows.
- To impart training in the use of CAD techniques in architectural design and detailing.

Outline

Development of surfaces. Interpenetration of solids. Perspective Projections. Sciography, Introduction to CAD, Use of any CAD package to prepare Architectural Drawings.

References

1. Ching, F. D. (2015). Architectural graphics. John Wiley & Sons.
2. Bhatt, N. D. (1980). Engineering Drawing. Engineer, 4, 2. Charotar Publishing House, New Delhi.
3. D'amelio, J. (2004). Perspective drawing handbook. Courier Corporation.
4. Shankar Malik (1994). Perspective & Sciography. Allied Publisher.

ARC 1106 BUILDING CONSTRUCTION & MATERIALS - II (TIMBER): (2 0 4 4)

Objectives

- To explain the classification of commercial timber & its products in India.
- To categorize 'Timber Doors & Windows' and its components.
- To classify on types, applications, and configuration of timber stairs.
- To illustrate timber floors and its components with joinery detail.
- To analyze timber components, fixing, joinery, and construction details.

Outline

Timber: Classification of timber (Natural & Engineered) in India; Qualities of good timber; Seasoning of timber; Defects & Decay; Preservation; Various sizes & uses of timber; Market forms of Timber; Timber Products – Plywood, Particle & Fibre boards. Openings: Timber Doors, Windows & Ventilators - Types, Uses & Applications; Components; Fixing & Joinery details; Structural concepts. Timber Stairs – Types; Applications; Various configurations; Components; Fixing & Joinery details; Structural Concepts. Timber Flooring: Types; Applications; Components; Fixing & Joinery details; Construction details. Timber Roofs: Types; Applications; Components; Fixing & Joinery details; Construction details.

References

1. McKay, W. B., & McKay, J. K. (1975). Building construction. London: Longman.
2. Ambrose, J. (1993). Building structures. John Wiley & Sons.
3. Chudley, R., & Greeno, R. (2005). Construction technology. Pearson Education.
4. Rangwala, S. C., Rangwala, K. S., & Rangwala, P. S. (1992). Engineering Materials. Charotar Publishing House, New Delhi.

ARC 1108 STRUCTURES - I (APPLIED MECHANICS): (2 0 2 3)

Objectives

- To understand various types of loads pertaining to building construction
- To understand the composition & resolution of forces.
- To study the interaction of various building loads and structural elements

- To study structural geometrical properties in building design.

Outline

Introduction to fundamentals of structures for Buildings; Classification; Natural structures; Building loads; Effects on Buildings; Force Systems, Conditions for Equilibrium; Elementary Analysis of Structural Response; Study of Geometric Properties of Structural Sections.

References

1. Mariam and Craige (1987), Statics John Wiley, New York.
2. Salvadori Mario and Heller Robert, Structure in Architecture – the building of buildings, Prentice Hall, New Jersey.
3. Ramamrutham, Applied Mechanics, Dhanpat Rai & Sons.
4. Prasad I.B., Applied Mechanics, Khanna Publishers, Delhi.
5. Bhavikatti S. S., 2011, 'Basic Civil Engineering and Engineering Mechanics, New age International Private Ltd.

ARC 1110 HISTORY THEORY & CRITICISM – II (EARLY INDIAN ARCHITECTURE): (2 0 2 3)

Objectives

- To study the Indian temple architectural style, with regards to its architectural component, nomenclature, and major features of the Nagara, Vesara, Dravida and Buddhist architecture being studied.
- To understand the settlement patterns and their physicality in relation to the geographical, geological aspects.
- To understand the built environment, techniques and materials used for the construction and relate to the climatic aspects.
- To understand the importance of the evolution of typologies as a result of various influences like socio/political/cultural aspects.

Outline

The course intends to introduce and understand the Styles of Indian Temple Architecture over time. The different schools of thought to be studied are Buddhists, Nagara, Dravida, etc. Examples may include but are not restricted only to - 322-185 BC Ashokan capital, Pataliputra; establishment of Buddhist school 2 - 2 BC - 6 AD Ajanta Ellora, Bhaja Caves, Kanheri caves, Udayagiri & Khandagiri caves, Sannati, Amravathi and Gupta era, 3 - 8th AD, Shore temple and Rathas at Mammalapuram, Kailasnatha etc , 13th AD: Nalanda, Chalukyan Architecture at Badami, temples at Aihole, etc. 9–13th AD: Nagara & Dravida temples Nagara(Odisha, Khajuraho and Solanki) & Dravida (Temple at Tanjore & Gangai Konda Cholapuram, Temples at Kumbakonam, Temple towns of Madhurai, Thanjavur and Kumbhakonam. Kakatiyas of Warangal, ex Thousand pillared temple, Kakatiya Toranas and Warangal Fort).

References

1. Brown, Percy. (1976). Indian Architecture (Buddhist and Hindu period). 7th reprint, Taraporevala Sons & Co. Pvt. Ltd. Mumbai.
2. Fergusson, James. (1997). History of Indian and Eastern Architecture, revised and edited with additions, Indian architecture by James Burgess and Eastern architecture by R. Phene Spiers, reprint, vol. I and vol. II. Low Price Publications, Delhi.
3. Fisher, Robert E. (1993). Buddhist Art and Architecture. Thames and Hudson Ltd, London.
4. Grover, Satish. (2003). Buddhist and Hindu Architecture in India, 2nd edition. CBS publishers and distributors, New Delhi.
5. Deva, Krishna. (1995). Temples of India, vol. I and II. Aryan Books International, Delhi.

ARC 1112 CLIMATOLOGY & LAB (INTERIOR): (2 0 2 3)

Objectives

- To study global climate and classification of tropical climates and study human heat balance and comfort.
- To understand sun path diagrams and the design of shading.
- To understand the need of daylighting & its relationship with shading devices
- To learn heat and heat transfer in buildings.
- To learn climatic responsive architecture with related codes and regulations.

Outline

Sunpath, daylighting and design of shading devices. Heat and heat transfer in buildings, use of tools & equipment to analyse the built environment in relation to climatic parameters. Climate responsive architecture- bioclimatic design, climate response study of traditional and modern buildings, introduction to green building codes and regulations/ energy conservation act in India.

References

1. Brown, G. Z. (1985). Sun, wind, and light. Architectural design strategies. John Wiley & Sons, New York.
2. Evans, M. (1980). Housing, climate, and comfort. Halsted Press. London.
3. Koenigsberger, O. H. (1975). Manual of tropical housing & building. Orient Blackswan Ltd, Hyderabad.
4. Mani, A. (2008). Handbook of solar radiation data for India. Resonance. Allied Publishers, New Delhi.
5. Olgyay, A. (1957). Solar control and shading devices. Princeton University Press, New Jersey.

SECOND YEAR/ SEMESTER THREE

ARC 2101 ARCHITECTURAL DESIGN & DETAILING - III (CAMPUS DESIGN):

(2 5 0 10)

Focus: Institutional Design

Objectives

- To develop a detailed design integrating timber and masonry as underlying construction systems.
- To appraise the site and its context and their value as prime attributes of design.
- To formulate a design Program through the study & analyse various user types & their activities in small-scale institutional facility e.g., preschool, welfare center, library, post office etc.

Outline

Ability to identify user needs, translate them into a program, and thereafter implement the program to manifest them in a feasible design solution in terms of spatial, materials and construction technique using timber and masonry that is appropriated to a particular context. Incorporating phenomena and aspects of services, site conditions and building regulations in the design solution. The engagement should help in the comprehension of design program development with articulation of multi-user spaces focusing on site planning and landscape as a moderator in institutional design. (Site extent up to 8000 sqm)

References

1. Edwards, B. W. (2006). Environmental design and educational performance: with particular reference to ‘green’ schools in Hampshire and Essex. Research in Education, 76(1), 14-32.
2. Aspelund, K. (2014). The design process. Bloomsbury Publishing.
3. Redstone, L. G. (Ed.). (1980). Institutional buildings: Architecture of the controlled environment. McGraw-Hill Companies.
4. Arya, A. S. (2018). Earthquake-resistant design of masonry buildings. In Advances in Indian Earthquake Engineering and Seismology (pp. 259-271). Springer, Cham.
5. Kanvinde, A., & Miller, H. J. (1969). Campus design in India: experience of a developing nation. Jostens/American Yearbook Company.

ARC 2103 ARCHITECTURAL REPRESENTATION - III (BIM): (1 0 4 3)

Objectives

- To develop awareness and familiarity with Advanced Computer applications in Architecture.
- To equip students with skills required in using digital tools to conceive, develop and present architectural ideas.

- To introduce the students with the concept of Building Information Modelling and the software used to develop the BIM models.

Outline

3D Modelling software and Introduction to Animation, Building Information Modelling. Introduction to Virtual Reality.

References

Relevant software Tutorials available on the web at the time.

ARC 2105 BUILDING CONSTRUCTION & MATERIALS - III (RCC): (2 0 4 4)

Focus: RCC Structures

Objectives

- To demonstrate the understanding of the basics of RCC, its types, compositions, and properties.
- To identify the use of RCC as a building material.
- To demonstrate the understanding of methods of different RCC construction, their uses, and limitations.
- To choose several building components practicable to be built with RCC.
- To utilize the knowledge of RCC as a building material in architectural design.

Outline

Fundamentals of RCC : Concept; Composition; Importance of RCC; Types of Concrete; Properties of Concrete & Steel; Substitutes for Sand & Lime; Classification of Cement, Mortar & Concrete; Related BIS & SP Codes. RCC Footings & Columns: Types; Properties; Selection criteria for various contexts; Uses and Limitations; Related BIS & SP Codes. RCC Slabs & Beams: Design & Detailing of Slabs - One way, two way, Simply supported, Continuous & Cantilever; Beams for framed structures & construction practices. RCC Stairs – Types & construction details of Cast-in-situ stairs & Pre-cast stairs with reinforcement detailing; Related BIS & SP Codes. RCC Wall Structures: Retaining wall; Shear wall & Cantilever structures with their properties, uses and limitations; Related BIS & SP Codes. Miscellaneous Structures & Formwork: UG & OHT Tanks; Formwork – Shoring; underpinning; Scaffolding; Column & Beam, Slabs & Stairs.

References

1. Prabhu, B. T. (1987). Building Drawing and Detailing, SPADES, Calicut.
2. Rangwala, S. C. (1998) Fundamentals of Water Supply and Sanitary Engineering, Charotar Publishing House, New Delhi.
3. Deplazes, A. (Ed.). (2005). Constructing architecture: materials, processes, structures. Springer Science & Business Media.

4. Snyder, V. (2005). Refabricating Architecture: How Manufacturing Methodologies are Poised to Transform Building Construction. Journal of Architectural Education, 59(1), 51-52.
5. Foster, J. S. (1963). Mitchell's Structure & Fabric Part 2. Routledge.

ARC 2107 STRUCTURES - II (STRENGTH OF MATERIALS): (2 0 2 3)

Objectives

- To learn the application of stress and strain in various structural elements.
- To understand the flexural behaviour of the beams.
- To understand the behaviour of columns under axial and eccentric loads.

Outline

Study of stress and strain in building materials – structural behaviour of beams, shear force, bending moment – theory of simple bending, elementary stress analysis for bending and shear, the concept of flitched beam and analysis of deflections in beam.

Column behavior - short columns, behavior under axial and eccentric loads, Euler's and Rankine's method for analysis of columns.

References

1. Basavarajaiah, B.S. and Mahadeveappa, P. (1990), Strength of Materials. CBS Publishers, New Delhi.
2. Rao, D. P. (2002). Introduction to Strength of Materials. Universities Press.
3. Ramamrutham, S., & Narayanan, R. (1999). Elements of Strength of Materials. Dhanpat Rai Publishing Company (P) Ltd.
4. Bhavikatti, S. S. (2013). Strength of Materials. Vikas Publishing House.

ARC 2109 BUILDING SERVICES - I (PLUMBING & WATER SERVICES): (2 0 0 2)

Objectives

- To provide fundamental knowledge of water distribution at the Building and neighbourhood level
- To provide fundamental knowledge of drainage systems at Building and neighbourhood level
- To provide fundamental knowledge of Sanitation and Waste Management systems at the Building and neighbourhood level.

Outline

Water Supply System, Components and Networking of Water Supply, Sanitation Systems and Network, Water Drainage System, Solid Waste Management, Recycling; Best practices and Economic benefits.

References

1. Bureau of Indian Standards. (2016). National Building Code of India. New Delhi.
2. Shah, C. S. (1998). Architectural handbook series Water Supply and Sanitation. Galgotia Publishing Company.
3. Hammer, Hammer Jr. (2011). Water and Waste Water Technology. PHI Learning Private Limited.
4. Rangwala, S. C. (1998). Fundamentals of Water Supply and Sanitary Engineering. Charotar Publishing House, New Delhi.
5. Panchdhari, A. C. (1993). Water Supply and Sanitary Installations :(within Building) Design, Construction and Maintenance. Wiley Eastern.

ARC 2111 LANDSCAPE & LAB (EXTERIOR): (2 0 2 3)

Objectives

- To understand the Landscape elements, the relationship between the built environment and open spaces.
- To understand and analyze small-scale site planning aspects.
- To understand the concept of ecology.

Outline

Learning landscape tools, understanding the relation of built-unbuilt forms, understanding site inventory.

Understanding the ecology and renewable resources.

References

1. Harris, C. W., & Dines, N. T. (1998). Time-saver standards for landscape architecture. McGraw-Hill.
2. LaGro, J. A. (2013). Site analysis: Informing context-sensitive and sustainable site planning and design. John Wiley & Sons.
3. Reid, G. (2012). Landscape graphics: plan, section, and perspective drawing of landscape spaces. Watson-Guptill.
4. Strom, S., Nathan, K., & Woland, J. (2013). Site engineering for landscape architects. John Wiley & Sons.
5. Woland, J. (2013). Site Engineering Workbook. John Wiley & Sons.

ARC 2113 OPEN ELECTIVE – I: (3 0 0 3)

Open elective coursework can be selected from any of the available courses from other disciplines from MAHE, NPTEL, SWAYAM or any other approved courses by the Institution. The selected course shall be justifiable and equitable in terms of course credited and expected involvement in terms of no. of hours. The guidelines shall be as per the details specified by the respective course conductors.

SECOND YEAR/ SEMESTER FOUR

ARC 2102 ARCHITECTURAL DESIGN & DETAILING - IV (CLIMATE RESPONSIVE DESIGN): (4 4 0 10)

Focus: Hospitality Design

- To develop a detailed design integrating aspects of climate responsive design adopting alternative building technologies as an underlying construction system.
- To appraise the site and its context and their value as prime attributes of design towards incorporating passive design strategies as a design solution.
- To implement passive design concepts and techniques with their application in hospitality projects like resorts, hotels, public buildings etc. in a given climatic zone.

Outline

The building project should be of minimal service complexity largely relying on passive design strategies and natural systems of lighting and ventilation. Students are expected to apply appropriate passive design strategies such as building orientation, shading devices and insulating walls and roofs in the design of the given studio project. The engagement should help in the comprehension of design program development with the articulation of multi-user spaces focusing on adopting alternative building technologies as a moderator in hospitality design. (Site extent up to 8000 sqm-contoured site).

References

1. Hyde, R. (2013). Climate responsive design: A study of buildings in moderate and hot humid climates. Taylor & Francis.
2. Krishan, A. (Ed.). (2001). Climate responsive architecture: a design handbook for energy efficient buildings. Tata McGraw-Hill Education.
3. Chand, I., & Bhargava, P. K. (1990). Studies on design and performance of a non-conventional system of natural ventilation in buildings. Solar & wind technology, 7(2-3), 203-212.
4. Majumdar, M. (Ed.). (2001). Energy-efficient buildings in India. The Energy and Resources Institute (TERI).
5. Jagadish, K. S. (2008). Alternative Building Materials Technology. New Age International. Publishers.

ARC 2104 SURVEY & LEVELLING: (1 0 2 2)

Objectives

- To understand the principles and Objectives of surveying.
- To study chain & plane table surveying for preparation of maps.
- To study levelling to prepare topographical maps.
- To study instruments which help in traverse survey.

Outline

Introduction to chain survey, principles, classification, instruments used. Plane table survey, Levelling, methods of levelling, booking and reduction of levels Contouring, definitions, properties of contours, different methods of contouring, use of contours Theodolite survey, measurement of horizontal and vertical angles, Tachometric Surveying, Total Station and its application.

References

1. Arora, K. R. (2010). Surveying Vol.I. Standard Book House, New Delhi.
2. De, A. (2006). Plane Surveying. S. Chand and Company, New Delhi.
3. Kanetkar, T. P. & Kulkarni, S. V. (2014). Surveying and Levelling. Vol.I. Vidyarthi Griha Prakashan, Pune.
4. Punmia, B. C. (2016). Surveying. Laxmi Publications Private Limited, Bangalore.

ARC 2106 BUILDING CONSTRUCTION & MATERIALS - IV (STEEL): (2 0 4 4)

Objectives

- To summarize the building material steel and various construction techniques with respect to classification and composition.
- To identify the chemical, physical properties leading to structural strength and aesthetic qualities.
- To analyze the constructional systems and detailing of metal building components.
- To demonstrate the construction practices and details pertaining to the curtain wall.
- To determine the appropriate structural system and conceptual design of long-span structures.

Outline

Steel: Introduction to Steel & its alloys; Types; Composition; Mechanical & Physical properties; Uses; Defects & Treatments; Market forms of steel & its uses. Steel Roofing - Space frames; Trusses - Angular & Tubular; Fabrication & Erection Details; GI Sheets. Openings: Steel Doors (Special Doors – Sliding, Sliding & Folding etc.) & Windows (Casement Window); Specialized structural systems - Geodesic Domes, Single & Double layered grids. Curtain walls and Façade systems: Curtain walls & Structural Glazing – Types, Uses & Applications. Stairs & Other openings: Collapsible gates & Rolling Shutter – Components; Uses & Applications.

References

1. Rangwala, S. C. (1998). Engineering Materials. Charotar Publishing House.
2. Deplazes, A. (Ed.). (2005). Constructing Architecture: Materials, Processes, Structures. Springer Science & Business Media.
3. Ching, F. D. (2014). Building construction illustrated. John Wiley & Sons.
4. Kumar, S. (1991). Building Construction. Standard Publishers and Distributors, New Delhi.
5. Singh, G. (1981). Building Construction Engineering. Standard Book House, New Delhi.

ARC 2108 STRUCTURES - III (INDETERMINATE STRUCTURES AND DISASTER RESISTANT STRUCTURES): (2 0 2 3)

Objectives

- To study different types of indeterminate structures and their analysis.
- To analyze the structural behavior of indeterminate structures under different types of loadings.
- To understand the basic design criteria for disaster-resistant structures

Outline

Introduction to indeterminate structures, analysis of fixed, continuous beams, Clapeyron's theorem of three moments, application to continuous beams, drawing shear force and bending moment diagrams. Moment distribution method of analysing indeterminate structures, application to solve continuous beams, single bay single storey portal frames. Disaster resistant structures for earthquake and cyclones-concepts of soil building relationships, response of built form to seismic and wind forces

References

1. Wang C.K., (1953) Indeterminate Structural Analysis, McGraw Hill Book Company.
2. Punmia B.C., Jain A. K. (1970) Soil Mechanics and Foundations. Laxmi Publications.
3. Ramamrutham, (1986) Theory of Structures, Dhanpat Rai and Sons, Delhi
4. Khurmi R.S., Khurmi N., (2000) Theory of Structures. S.Chand and Company Limited, New Delhi.
5. Murty CVR., (2002) IITK-BMTPC EQ Tips. National Information Center of Earthquake Engineering Indian Institute of Technology Kanpur Publication.

ARC 2110 HISTORY THEORY & CRITICISM-III: (2 0 2 3)

Objectives

- To study the different forts and Indian Islamic architectural styles built in various timelines and, with regard to its architectural component, nomenclature and major features.
- To understand the importance of the evolution of architectural typologies as a result of various influences like socio/political/cultural aspects.
- To understand the fort architecture and other built environments with respect to the techniques and materials used for the construction.
- To understand the settlement patterns with respect to the forts and their physicality in relation to the geographical, geological aspects.

Outline

The course intent is to introduce and understand the fort and Islamic architecture styles that prevailed in India. The different built typologies that may include but not restricted only to 600-1206 AD: Chittorgarh Fort, Cheraman Jama Masjid, Kerala,

Qutub Complex, 1228 -1336 AD: Sayyids and Lodis, Tombs of Lodis, Khirki Mosque1336- 1565 AD: Golconda fort, Gol Gumbaz, Ibrahim Rauza 1526-1707 AD: Tipu's Dynasty, Mysore palace, Jama Masjid at Srirangapatna, Charminar 16th-1857 AD: Maratha Forts Sindudurg, Pratapgadh and Raigad, etc.

References

1. Asher, C. B. (2008). The New Cambridge History of India. Architecture of Mughal India, 1, 4. Cambridge University Press.
2. Brown, P. (1976). Indian Architecture (Islamic period). Taraporevala Sons & Co. Pvt. Ltd. Mumbai.
3. Tadgell, C. (1990). The History of Architecture in India from the Dawn of civilization to the end of the Raj. Longmon Group, U.K. Ltd., London.
4. Nanda, R. (2017). Humayun's Tomb: Conservation and Restoration. In Authenticity in Architectural Heritage Conservation (pp. 93-114). Springer, Cham.

ARC 2112 BUILDING PERFORMANCE & COMPLIANCE: (2 0 2 3)

Objectives

- To analyze building performance for various parameters.
- To apply the constraints from building energy codes in various building components.
- To decide the design outcome using an integrated design approach for code compliance
- To understand the role of design/architectural variables using energy simulation software.
- To develop the code-compliant building design using codes like ECBC, NBC, BIS SP 41, etc.

Outline

Building performance assessment, Comfort Systems; Lighting systems, Energy Plus™ to model both energy consumptions for heating, cooling, ventilation, lighting, and process loads in buildings.
Building envelope detailing with constraints from building codes, such as, ECBC.
Compliance approaches covering prescriptive (as a constraint) and whole building performance method (through appropriate Objectives functions) as per ECBC.
Shoebox modelling for optimizing various variables of associated Objectives functions.
ECM/EEM assessments using Heat balance-based solutions of radiant and convective effects, Electrical and renewable energy systems for addressing solutions from both demand and supply sides.

References

1. Kubba, S. (2012). Handbook of green building design and construction: LEED, BREEAM, and Green Globes. Butterworth-Heinemann.
2. Haselbach, L. (2010). The engineering guide to LEED—New construction. McGRAW-HILL'S.
3. Garg, V., Mathur, J., & Bhatia, A. (2020). Building Energy Simulation: A Workbook Using Designbuilder™. CRC Press. (697.00285 GAR)

4. Clarke, J. (2007). Energy simulation in building design. Routledge. (696.011 CLA)

Elective – I (Program Elective): (3 0 0 3)

Interior Design		Architecture		Fashion Design	
DOD 4001	Advanced Computer Graphics	ARC 3002	Creative Photography	DOD 4009	Surface Ornamentation
DOD 4003	Cinematic Design	ARC 3004	Vastuvidya	DOD 4011	Material Exploration
DOD 4005	Graphic Design	ARC 3006	Architectural Journalism	DOD 4013	Fashion Accessories
DOD 4007	Interior Illumination	ARC 3008	Disaster Management		

DOD4001: ADVANCED COMPUTER GRAPHICS

Objectives

- The course shares an In-depth understanding of 3D modeling through digital software to enable the student to make effective audio-visual presentations, create three-dimensional models and visualization of interiors. The intent is to possess intermediate to the advanced skill with improvement in the speed and quality of modeling.

Outline

Creating solid models and surfaces using 3d modelling software such as 3dsmax, Revit, Rhino etc. Developing Interior Views and simple designs, applying materials and creating rendered images through rendering software such as Lumion, VRay, etc. Introduction to Animation.

References

1. Oscar Riera Ojed , Lucast Guerre, Hyper realistic Computer Generated Architectural Renderings .
2. Giuliano Zampi Conway Lloyd Morgan, Virtual Architecture.
3. Aidan Chopra, Rebecca Huehls, SketchUp For Dummies.
4. Bonnie Roskes, Modeling with SketchUp for Interior Design.
5. Daniel Tal, Rendering in SketchUp.
6. Inside Rhinoceros 5 Ron K.C. Cheng.

DOD4003 :CINEMATIC DESIGN

Objectives

- This course explores the world of production design and art direction for film. Students will also gain a historical perspective of how the role of production design has evolved and how advances in technology have influenced various crafts.

Outline

The course focuses on the development of visual solutions based on in-depth text analysis, character study, the use of research to explore historical and sociological aspects of cultures, and the collaborative nature of the theatre.

The course focuses on developing the student in five separate areas: design, dramaturgy, production, and 2D/3D skills. The student is taught the importance of developing a project from the initial idea and presentation to making it a reality. It includes an introduction to the many and varied techniques available to support the scenic design process for theater and film scenery.

Coursework also includes scale model-building techniques, Representation techniques, photography and rendering techniques, as well as presentation methodologies.

By watching films, analyzing concepts, using a series of practical paper/model projects this course includes the fundamentals of a production designer's approach towards visualizing and conceptualizing a story including text interpretation, scenery for the studio, location, color concepts and the collaborative relationship between direction, production designer, and cinematographer.

References

1. Ulrich, Karl, and Steven Eppinger, Product Design and Development.
2. Thomke, Stefan, and Ashok Nimgade, "IDEO Product Development.

DOD4005 : GRAPHIC DESIGN

Objectives

- To explore and investigate the visual representation of data through a range of techniques and to understand the basic working of elements and principles for composition in various mediums.

Outline

Fundamentals of graphic design: To convey denotative and connotative messages using analog and digital image-making techniques. A Radical approach to learning typographic terminology and rules for creating typography in both functional and expressive manner. Using elements – Shapes, Textures, patterns and colors, an abstract design is processed by composing work that ranges from complex to minimal. Plan, Grids and layout.

Progress in graphic design: Awareness of the relationship of design history in order to create new designs in digital art. An outline of the evolution of Graphics from Industrialization to the present day: Various stylistic transformations, branding and other movements. Understanding the current design trends, tools, and techniques for future visions in the field of graphic design.

Branding & advertisement: To explore various types of logo design and study of brand and its identity. To comprehend and analyze different products, their material - medium of packaging and scheming based on the fundamentals of graphics to appeal to the end-users.

Application of graphics in Interior w.r.t colour

Infographics & web design: To acquire knowledge on Plans, Grids and layouts applied in infographics. To explore making maps and various charts that focus on bar, line, pie using software mediums like Adobe Photoshop, Illustrator and other page layout softwares etc.

References

1. Mendiritta B D, Composing and typography today, 1983 Knuth Donald E, Digital typography, 1999.
2. Heller Steven; Fernandes Teresa, Becoming a graphic designer, 2007.
3. Gill Bob, Graphic design as a second language, 2003.
4. Gordon Bob; Gordon Maggic, Complete guide to digital graphic design, 2002.
5. Street Rita; Lewis Ferdinand, Touch: Graphic design with tactile appeal, 2001.

DOD4007 : INTERIOR ILLUMINATION

Objectives

- To acquire lighting design skills that provide a quality luminous environment using electric lighting, and its integration with daylighting, as a material that provides form and sensory qualities to spaces.

Outline

Introduction to Interior lighting - Overview of interior illumination and layers of lighting; Lighting fixtures and fittings.
Design systems - Analysis of various Lighting design and layouts in various commercial spaces, such as Museum, gallery, Retail showroom, Offices, etc.
Understanding the implications of electric lighting on place making, spatial ordering, health, and human activities in indoor spaces.
Planning lighting - General aims, lighting needs, calculation of lighting levels, intensity levels, energy and installation costs and other factors, selection of fixtures, location and placing of fixtures. Principle of schematic lighting design and energy codes.
Smart lighting systems - Exploration of current tools, trends, materials, technology and energy-efficient designs in lighting systems.
Design scheme - Project-oriented for lighting design based on research investigation and conceptual approach with detailing and prototype.

References

1. John.F. Pile, Interior Design, 2nd edition, illustrated, H.N.Abrams, 1995.
2. Wanda Jankowski, Lighting: In Architecture and Interior Design, pbc intl, 1995. Moore Fuller, Concepts and practice of Architectural Day lighting, Van Nostrand Reinhold co., New York, 1985.
3. David Egan. M. Concepts in Architectural lighting Mcgraw Hill Book company, New York, 1983.Edward Lucie-Smith, Furniture: A Concise History (World of Art) , Thames and Hudson, 1985
4. Robert J.Alonzo ,P.E.,Elsevier, Electrical Codes, Standards, Recommended Practices and Regulations.
5. National Lighting Code- Published by Govt of India,2011.

ARC 3002: Creative Photography

Outline

principles, recent advancements; significance, scope & purpose; types, composition, tools & equipment, technology, techniques, processes, presentation; categories- themes, location, objects, patterns, light & shade, nature, still photography, actions & expressions, details, culture, panorama, frames, metaphor, etc.

ARC 3004: Vastuvidya

Outline

Introduction: Planning, designing & construction aspects of traditional Architecture in India- evaluation with the Understanding of context- relevance.
Concepts of Vastuvidya; Definition; Resource materials; Roles & duties of Silpis evolutionary nature of the discipline, basic unit of measurements- purushapramanam. Hastham. Padmam, angulam & yavam; vertical proportioning & Thalam concept.
Concept of Vastu: basic geometry, town planning; Planning, design & construction of temples & halls; secular buildings; Case studies. Investigation of Land: tests for suitability & determination of cardinal direction.
Classification of villages & towns; types of planned settlements, Landuse patterns; the position of temples & other uses, street patterns; Planning of residential buildings, Evolution of residential types from Vastupurusha Mandala.
Concept of Mandala, technology in Vastuvidya, classification of materials, brief description of the characteristics & uses of sila, istaka, daru, loha, mrilsna, sudha; Assembly & joinery; Construction methods- Foundations. Walls, columns, utharam & roof structure, the system of proportional measurements & thumb rules.

ARC 3006: Architectural Journalism

Overview – Definition, Significance, scope, purpose, structure, principles, techniques, processes, mediums, the study of potential readers, contemporary architectural journalism.

Documentation: study & analysis – Photo journalism, Book reviews Electronic media; checklist, observations, field studies, interviews, questionnaires; Post-occupancy evaluation, public perception, designer's opinions.
Writing techniques – Styles, format, purpose, medium, frequency, clear structure, coherent & distinctive look, visual appearance, graphic design, genres, image, descriptive & analytical reports.
Ethics, laws & legislations – Plagiarism, Intellectual property rights, Disclaimers, copyright, author's rights, patents & royalties, trademark, legal boundaries, libel & invasions of privacy, permissions, references & credits.
Editing & Publishing – Proofreading, Editing techniques, Page make-up, Layout, color scheme, Font, Abstract, Pictures, Ads, News, Photo editing - Book previews, Publishing – Print & Electronic.

ARC 3008: Disaster Management

Outline

Introduction: Disaster Management & its necessity; Types, characteristics, causes & impacts; Natural disasters, Manmade disasters, Epidemics; Institutional & Legal arrangement; NDMA; Financial arrangement; Role of Architect at all stages of Disaster Management.
Disaster Prevention & Mitigation: Risk Assessment & Vulnerability Mapping; Long-term measures; Review & revision of building bye-laws & codes; Hospital Preparedness; Retrofitting; Mitigation strategies, Trigger Mechanism; Capacity building; Awareness programs. Architectural Design considerations.
Preparedness: Forecasting & Early Warning Systems: Plans of action for probable disasters; emergency, medical, casualty management systems; Resources needed; Training, Simulation & Mock Drills; Partnerships for Mitigation & Preparedness; Audit of buildings & infrastructure; Architectural Design considerations.
Response: Role of various agencies; St&ard Operating Procedures (SOPs); Levels of Disasters; Incident Comm& System (ICS); First & Other Key Responders; Medical Response; Information & Media Partnership; Search & rescue; Architectural Design considerations.
Relief & Rehabilitation: Temporary Relief Camps; Management of Relief Supplies; Provision of Intermediate Shelters; Relocation & reconstruction, repair & retrofitting of buildings & infrastructure; Socio-cultural-economic considerations; Capacity building for self-help construction; training & awareness programs. Architectural Design considerations.

DOD 4009: SURFACE ORNAMENTATION

Objectives

- The course aims to explore the various techniques of fabric manipulation for creating surface ornamentation on fabric.

Outline

Special embroideries, Patch work and Applique work, Smocking and Honey comb, Creative surface ornamentation techniques
Project: Developing a product with a creative surface ornamentation technique
The portfolio should include – Swatches developed for each module, Digital boards and the product.

References:

1. Tomoko Nakamichi, Pattern Magic, (2010). Laurence King Publishers.
2. Barden B.(2003). Embroidery Stitch Bible. Search Press Publishers.
3. Gail Lather.(1993). Inspirational Ideas for Embroidery on cloths and Accessories.Search Press Publishers

DOD 4011: MATERIAL EXPLORATION

Objectives

- The course exposes the students to various materials in design and encourages the student to explore the use of different materials in 3D forms.

Outline

Fabric Painting, Form construction with paper, Construction with wire or wood, Macramé work, Paper quilling work, Clay work
The portfolio should include – Developmental sketches and stage-wise photographs of the forms developed under the above modules.

DOD 4013: FASHION ACCESSORIES

Objectives

- The course introduces the students to the different segments of accessory industry. Designing of the accessory as per the user requirement is the key element of the course.

Outline

Fashion Accessories: Introduction, segments, materials of fashion accessories.
Designing fashion accessories: Design process in designing the fashion accessories as per the concept given. Developing the prototype of the accessory.

References:

1. Celia Stall-Meadows. Know Your Fashion Accessories. Fairchild Publications
2. Craik, J. (2011). The Fashion Accessories Book. BERG Publications.
3. Gerval, O. (2010). Fashion Accessories (Studies in Fashion). Firefly Books.
4. Genova, A. (2011). Accessory Design. Fairchild Publications.
5. Meadows, C.S. (2004). Know Your Fashion Accessories. Fairchild Publications.
6. Peacock, J. (2000). Fashion Accessories: The Complete 20th Century Sourcebook. Thames and Hudson.

THIRD YEAR/ FIFTH SEMESTER

ARC 3101 ARCHITECTURAL DESIGN & DETAILING - V (ENVIRONMENT DESIGN): (2 4 4 10)

Focus: Commercial Design

Objectives

- To understand the concept of green building assessment systems.
- To understand and analyze the best practices in sustainable and green buildings through case studies suggesting a sustainable design.
- To design and evaluate through energy optimization and simulation in commercial ex. Office buildings, shopping malls, retail buildings.

Outline

Study of Contemporary green building assessment systems in relation with interior with the exterior environment through the building skin in the built environment. The design should attempt to bring out comprehension of the framework that outlines a building interior, services core, the structural system and the construction system for the said typology. The design should have the application of National Building Codes, Bureau of Energy Efficiency Codes and building bylaws and regulations. (Site extent up to 20,000 sqm)

References

1. Hegger, M., Fuchs, M., Stark, T., & Zeumer, M. (2012). Energy manual: sustainable architecture. Walter de Gruyter.
2. Ching, F. D., & Shapiro, I. M. (2014). Green Building Illustrated. Hoboken.
3. Council, U. G. B. (2005). LEED for new construction and major renovation Version 2.2 Reference Guide. USGBC: Washington, DC.
4. Vol, G. M. (2010). Introduction to National Rating System–GRIHA An evaluation tool to help design, build, operate, and maintain a resource-efficient built environment. Ministry of New and Renewable Energy, Government of India & TERI-The Energy and Resources Institute, New Delhi.
5. Bureau of Energy Efficiency (2007) Code E. C. B. C, Bureau of Energy Efficiency Publications-Rating System, New Delhi.

ARC 3103 MEASURED DRAWING: (1 0 5 4)

Objectives

- To learn various measurement techniques.
- To understand a selected building / Structure / Interior space / Landscape etc. through literature study.
- To measure the selected` existing building / Structure / Interior space / Landscape etc. as near to the actual.
- To organize the collected field data.
- To draw and analyze the measured built structure.

Outline

Identification of Tools & Methodology for measurement and the site for the study. Collection of Secondary Information, Reconnaissance Survey. Site measurements, Mapping of Structural details, Materials, Building Elements, Activities, Supporting Sketches. Preparation of drawings through collected field data. Analysis and inferences from measured drawing.

References

1. Tanigawa, M. (1984). Measured drawing: Frank Lloyd Wright in Japan. Nippon.
2. Robson, D. (2016). Architectural heritage of Sri Lanka measured drawing from the Anjalendran Studio. Tailsman Publishing Pte. Ltd.
3. Bean, S. (1990). Conservation of The Indian Heritage. Edited by B. Allchin, F. R. Allchin, B. K. Thapar. New Delhi: Cosmo Publications, 1989. 275 pp. The Journal of Asian Studies, 49(4).

ARC 3105 BUILDING CONSTRUCTION & MATERIALS - V (ALTERNATIVE):

(2 0 4 4)

Objectives

- To identify, categorize and list various alternative building materials as applied in construction.
- To classify the various construction methods & understand and relate the application of same.
- To identify various finishes and insulations for walls, floors, roof foundations, etc. through graphic representation.
- To develop an understanding of alternative materials construction techniques.
- To choose an appropriate construction method using alternative materials.

Outline

Alternative Materials - Mud; Bamboo; Cob; Rammed earth; Adobe; Wattle & Daub; Stabilized Mud Blocks (SMB); Compressed Stabilized Mud Blocks (CSMB); Filler slab with their Properties, Uses, Applications & Construction methods & techniques. Finishes: Wall finishes; Floor finishes; Roof finishes; Waterproofing; Insulations – Thermal & Acoustical. False ceilings & Paneling.

References

1. Minke, G. (2012). Building with bamboo: design and technology of sustainable architecture. Walter de Gruyter.
2. Collins, P. (1978). Ferrocement. Building with Cement, Sand, and Wire Mesh. Stanley Abercrombie.
3. Naaman, A. E. (2000). Ferrocement and laminated cementitious composites (Vol. 3000, No. 1). Ann Arbor: Techno Press.
4. Van Uffelen, C. (2014). Bamboo Architecture & Design (Architecture & Materials). Braun, Switzerland.

ARC 3107 BUILDING SERVICES – II (HVAC & ELECTRICAL): (2 0 0 2)

Objectives

- To study the concepts of natural and mechanical ventilation.
- To understand the concept of the refrigeration cycle and the mechanical system components involved in Air Distribution, zoning and ducting.
- To study electrification from its source to building level.
- To study electrification and related components from its source to the building level.
- To learn the Fundamentals of electrical drawings, load estimation, etc.

Outline

Fundamentals of Ventilation & Air Conditioning: Air Conditioning Systems; Types and equipment. Building Electrification, I: Power generation & transmission; lighting & power circuit; Building Electrification II: Basic quantification; Electrical drawing, symbols; Case studies/ Site visits & Lectures from Companies/Experts

References

1. Flynn, J. E. (1992). Architectural interior systems: Lighting, acoustics, air conditioning. Van Nostrand Reinhold Company.
2. Dagostino, F. R., & Wujek, J. B. (1978). Mechanical and electrical systems in construction and architecture. Reston Publishing Company.
3. Jones, W.P. (1985). Air Conditioning Engineering. ELBS (Edward Arnold).
4. BIS (2005) National Building Code of India. (2005). Bureau of Indian Standards, New Delhi.
5. Stein/Raynolds and Mc Guinnes. (1966). Mechanical and Electrical Equipment for Buildings, Vol.1. John Wiley and Sons, NY.

ARC 3109 ESTIMATION SPECIFICATION & COSTING: (2 0 2 3)

Objectives

- To understand types of Estimations, calculations and writing.
- To learn analysis of rates and costing.
- To understand the types of specification for building materials and works.
- To learn specification writing.
- To Learn about Tenders and Contracts.

Outline

Types and Method of Estimation. Rate Analysis & Costing. Types of Specification & Specification Writing. Types Tenders & Contracts

References

1. Hornung, W. J. (1970). Estimating Building Construction. United States: Prentice-Hall.
2. Regener, J. R., Weygant, R. S., Kalin, M., Rosen, H. J. (2010). Construction Specifications Writing: Principles and Procedures. United Kingdom: Wiley.
3. Rangwala, C. (2015). Estimating, Costing and Valuation.
4. Singh Gurucharan ; Singh Jagadish (2004). Estimating costing and valuation. Delhi Standard Publishers Distributors.

ARC 3111 OPEN ELECTIVE – II: (3 0 0 3)

Open elective coursework can be selected from any of the available courses from other disciplines from MAHE, NPTEL, SWAYAM or any other approved courses by the Institution. The selected course shall be justifiable and equitable in terms of course credited and expected involvement in terms of no. of hours. The guidelines shall be s per the details specified by the respective course conductors.

THIRD YEAR / SIXTH SEMESTER

ARC 3102 ARCHITECTURAL DESIGN & DETAILING - VI (PUBLIC BUILDINGS): (4 4 4 12)

Focus: Public Building

- To understand the planning and design of a large public building using concepts of green buildings, smart building systems, alternative materials, techniques, and their structural integration.
- To develop building design including site level services, ancillary details and costing using appropriate medium.
- To develop design solutions from the understanding of best sustainable design practices relevant for public buildings design such as Library, Museum buildings, Conventional centers, Hospitals, Stadiums, Banks, etc.

Outline

Building & site-level services as an integral part of the design of large public buildings. The design should attempt the basic components through the exploration of sustainable resource and waste management methods. The design solution should have detailing such as Building & site services - water, electricity, acoustics, sanitation, drainage, RWH, etc., climate-responsive building. The design solution must follow universal design guidelines. (Site extent up to 20,000 sqm

References

1. Miller, R. L., Miller, R. L., & Swensson, E. S. (2002). Hospital and healthcare facility design. WW Norton & Company.
2. Kunders, G. D. (2004). Hospitals: facilities planning and management. Tata McGraw-Hill Education.
3. Tatton-Brown, W., James, W. P. (1986). Hospitals: Design and Development. United Kingdom: Architectural Press.
4. Wester, L. M. (1990). Design communication for landscape architects. Van Nostrand Reinhold Company.
5. Sasikumar, K., & Krishna, S. G. (2009). Solid waste management. PHI Learning Pvt. Ltd.

ARC 3104 WORKING DRAWING: (1 0 3 3)

Objectives

- To understand the importance and making of Working Drawings.
- To explore various details required for the preparation of production drawings.
- To produce Good for Construction drawings and prepare Centre Line Plans, Floor Plans, Elevations, Sections, etc.
- To understand the importance of building engineering services (Electrical, plumbing, etc.) and prepare related detailed drawings.

- To understand the importance of Site and Site services and develop Site Marking Layout.

Outline

Preparation of working drawing and details for a selected self-designed project through the following drawings: Set-out marking, Centerline, Excavation Layout, Plinth Beam Layout, Floor Plans – Ground Floor, First Floor, Terrace, Sections, Elevations, Detailed Section (Structure, Materials, Finishes, Joinery, etc.), Stairs, Electrical, Plumbing, Kitchen & Toilet, Site Services & Development, Door, and Window details.

References

1. Bisharat, K. A. (2008). Construction graphics: A practical guide to interpreting working drawings. John Wiley & Sons.
2. Wakita, O. A., & Linde, R. M. (1994). The professional practice of architectural working drawings. John Wiley & Sons.
3. Thomas, M. L. (1978). Architectural Working Drawings: A Professional Technique. McGraw-Hill.
4. Spence, W. P. (1993). Architectural working drawings: Residential and commercial buildings. John Wiley & Sons.
5. BIS (1993) Code of Practice for Architectural and Building Drawings (is.962:1989). Bureau of Indian Standards, New Delhi.

ARC 3106 BUILDING CONSTRUCTION & MATERIALS - VI (INNOVATIVE): (2 0 4 4)

Objectives

- To compare structural concepts and identify suitable construction systems.
- To identify and recommend joinery details for roofing, paneling.
- To identify Glass and Ceramics as construction materials. Relate types, compositions, physical & mechanical properties.
- To develop an understanding about advanced materials and the latest technologies.
- To recommend construction equipment for various stages in the process of building construction (pre and during the construction process). Recommend transportation & erection methods.

Outline

Innovative Materials: Ferro Crete; Fiber-reinforced concrete; Prefab & Pre-Cast - Substructure & support system; precast foundations. Roof & wall systems; Glass and Ceramics; other innovative materials - properties & uses. Paints & Varnishes: Types & Characteristics. Construction Equipment for various stages in the process of building construction (pre and during the construction process).

References

1. McKay, G.B. (1972). Building Construction (Metric). Longman, London.
2. Gurucharan Singh. (1981). Building Construction Engineering. Standard Book House, New Delhi.
3. Dr.T.S.Balagopal Prabhu. (1987). Building Drawing and Detailing. Spades Publishers Pvt Ltd Calicut.
4. Chudley R. (1998). Construction technology. ELBS, England.
5. Ambrose James. (1987). Building construction. Van Nostrand Reinhold, New York.

ARC 3108 BUILDING SERVICES – III (ACOUSTICS ILLUMINATION & CONTROLS): (2 0 0 2)

Objectives

- To study the acoustical properties of materials and Sound Amplification systems used in the acoustical design of closed spaces.
- To learn the Fundamentals of artificial lighting for the preparation of lighting schemes.
- To learn fundamental types and requirements of mechanical transport systems in a built environment.
- To learn fundamentals of 'Fire and Life Safety Systems' in-built environments.
- To learn various intelligent systems in building types.

Outline

Physics of sound - Sound propagation; Sound Acoustical design for performance spaces- drama hall, music, etc. Acoustical treatment materials, Case studies; Calculations & designing of various spaces. Artificial Lighting: Mechanical Transport Systems, Elevators, Parking. Escalators - basic components, working & operation, types.

References

1. Egan, David. (1988). Architectural Acoustics. McGraw Hill Book Co., NY.
2. Kinsleter, Lawrence E. and Frey Austin R. (1989). Fundamentals of Acoustics (ed.2). Wiley Eastern Ltd., New Delhi.
3. Templeton and Saunders. (1987). Acoustic Design. Architectural Press, London.
4. Flynn, J.E. et. al. (1992). Architectural Interior Systems: Lighting, Acoustics and Air conditioning. Van Nostrand Reinhold Co.
5. Dagostino, F. R. (1978). Mechanical and Electrical Systems in Construction in Architecture. Reston Publishing Company, Prentice Hill Co., Virginia.

ARC 3110 HISTORY THEORY & CRITICISM-IV: (2 0 2 3)

Objectives

- To study the concepts and features of Christian architecture of Europe and understand key elements.
- To understand the importance of the evolution of church architectural typologies as a result of various influences like socio/political/cultural aspects.
- To understand Christian architecture, with respect to the techniques and materials used for the construction.
- To compare various styles to understand the distinct changes in the architectural form of Christian architecture.

Outline

The intent of the course is to understand and analyze the styles in Church architecture. It aims to understand the styles of architecture that emerged from the early Christian to Neo classical era. The course may look into the details of Early Christian 4th to 13th Century AD: Evolution of church Gothic 12th - 15th AD: Early & late Gothic churches & regional variations Renaissance 15th- 17th AD Ideologies & Works Baroque Works Baroque 17th to Mid-19th AD, Ideologies & Works Neo-Classicism mid18th to mid-20th Century AD.

References

1. Fletcher, S. B. (1987). A History of Architecture, edited by John Musgrove. Butterworth-Heinemann.
2. Gympel, J. (1996). The story of architecture. Goodfellow & Egan, Cambridge.
3. Moffett, M., Fazio, M. W., & Wodehouse, L. (2003). A world history of architecture. Laurence King Publishing.
4. Guedes, P. (1979). Encyclopedia of architectural technology. McGraw-Hill Companies.
5. Wölfflin, Heinrich (1971). Renaissance and Baroque. Harper Collins, London.

ELECTIVE – II (PROGRAM ELECTIVE) (3 0 0 3)

Interior Design		**Architecture**		**Fashion Design**	
DOD 4001	Advanced Computer Graphics	ARC 3002	Creative Photography	DOD 4009	Surface Ornamentation
DOD 4003	Cinematic Design	ARC 3004	Vastuvidya	DOD 4011	Material Exploration
DOD 4005	Graphic Design	ARC 3006	Architectural Journalism	DOD 4013	Fashion Accessories
DOD 4007	Interior Illumination	ARC 3008	Disaster Management		

DOD4001: ADVANCED COMPUTER GRAPHICS

Objectives

- The course shares an In-depth understanding of 3D modeling through digital software to enable the student to make effective audio-visual presentations, create three-dimensional models and visualization of interiors. The intent is to possess intermediate to the advanced skill with improvement in the speed and quality of modeling.

Outline

Creating solid models and surfaces using 3d modelling software such as 3dsmax, Revit, Rhino etc. Developing Interior Views and simple designs, applying materials and creating rendered images through rendering software such as Lumion, VRay, etc. Introduction to Animation.

References

1. Oscar Riera Ojed , Lucast Guerre, Hyper realistic Computer Generated Architectural Renderings .
2. Giuliano Zampi Conway Lloyd Morgan, Virtual Architecture.
3. Aidan Chopra, Rebecca Huehls, SketchUp For Dummies.
4. Bonnie Roskes, Modeling with SketchUp for Interior Design.
5. Daniel Tal, Rendering in SketchUp.
6. Inside Rhinoceros 5 Ron K.C. Cheng.

DOD4003 :CINEMATIC DESIGN

Objectives

- This course explores the world of production design and art direction for film. Students will also gain a historical perspective of how the role of production design has evolved and how advances in technology have influenced various crafts.

Outline

The course focuses on the development of visual solutions based on in-depth text analysis, character study, the use of research to explore historical and sociological aspects of cultures, and the collaborative nature of the theatre.

The course focuses on developing the student in five separate areas: design, dramaturgy, production, and 2D/3D skills. The student is taught the importance of developing a project from the initial idea and presentation to making it a reality. It includes an introduction to the many and varied techniques available to support the scenic design process for theater and film scenery.

Coursework also includes scale model-building techniques, Representation techniques, photography and rendering techniques, as well as presentation methodologies.

By watching films, analyzing concepts, using a series of practical paper/model projects this course includes the fundamentals of a production designer's approach towards visualizing and conceptualizing a story including text interpretation, scenery for the studio, location, color concepts and the collaborative relationship between direction, production designer, and cinematographer.

References

1. Ulrich, Karl, and Steven Eppinger, Product Design and Development.
2. Thomke, Stefan, and Ashok Nimgade, "IDEO Product Development.

DOD4005 : GRAPHIC DESIGN

Objectives

- To explore and investigate the visual representation of data through a range of techniques and to understand the basic working of elements and principles for composition in various mediums.

Outline

Fundamentals of graphic design: To convey denotative and connotative messages using analog and digital image-making techniques. A Radical approach to learning typographic terminology and rules for creating typography in both functional and expressive manner. Using elements – Shapes, Textures, patterns and colors, an abstract design is processed by composing work that ranges from complex to minimal. Plan, Grids and layout.

Progress in graphic design: Awareness of the relationship of design history in order to create new designs in digital art. An outline of the evolution of Graphics from Industrialization to the present day: Various stylistic transformations, branding and other movements. Understanding the current design trends, tools, and techniques for future visions in the field of graphic design.

Branding & advertisement: To explore various types of logo design and study of brand and its identity. To comprehend and analyze different products, their material - medium of packaging and scheming based on the fundamentals of graphics to appeal to the end-users.

Application of graphics in Interior w.r.t colour

Infographics & web design: To acquire knowledge on Plans, Grids and layouts applied in infographics. To explore making maps and various charts that focus on bar, line, pie using software mediums like Adobe Photoshop, Illustrator and other page layout softwares etc.

References

1. Mendiritta B D, Composing and typography today, 1983 Knuth Donald E, Digital typography, 1999.
2. Heller Steven; Fernandes Teresa, Becoming a graphic designer, 2007.
3. Gill Bob, Graphic design as a second language, 2003.
4. Gordon Bob; Gordon Maggic, Complete guide to digital graphic design, 2002.
5. Street Rita; Lewis Ferdinand, Touch: Graphic design with tactile appeal, 2001.

DOD4007 : INTERIOR ILLUMINATION

Objectives

- To acquire lighting design skills that provide a quality luminous environment using electric lighting, and its integration with daylighting, as a material that provides form and sensory qualities to spaces.

Outline

Introduction to Interior lighting - Overview of interior illumination and layers of lighting; Lighting fixtures and fittings.
Design systems - Analysis of various Lighting design and layouts in various commercial spaces, such as Museum, gallery, Retail showroom, Offices, etc.
Understanding the implications of electric lighting on place making, spatial ordering, health, and human activities in indoor spaces.
Planning lighting - General aims, lighting needs, calculation of lighting levels, intensity levels, energy and installation costs and other factors, selection of fixtures, location and placing of fixtures. Principle of schematic lighting design and energy codes.
Smart lighting systems - Exploration of current tools, trends, materials, technology and energy-efficient designs in lighting systems.
Design scheme - Project-oriented for lighting design based on research investigation and conceptual approach with detailing and prototype.

References

1. John.F. Pile, Interior Design, 2nd edition, illustrated, H.N.Abrams, 1995.
2. Wanda Jankowski, Lighting: In Architecture and Interior Design, pbc intl, 1995. Moore Fuller, Concepts and practice of Architectural Day lighting, Van Nostrand Reinhold co., New York, 1985.
3. David Egan. M. Concepts in Architectural lighting Mcgraw Hill Book company, New York, 1983.Edward Lucie-Smith, Furniture: A Concise History (World of Art) , Thames and Hudson, 1985 Robbie. G. Blakemore, History of Interior Design and Furniture: From Ancient Egypt to Nineteenth-Century Europe, Wiley publishers, 2005.
4. Robert J.Alonzo ,P.E.,Elsevier, Electrical Codes, Standards, Recommended Practices and Regulations.
5. National Lighting Code- Published by Govt of India,2011.

ARC 3002: Creative Photography

Outline

principles, recent advancements; significance, scope & purpose; types, composition, tools & equipment, technology, techniques, processes, presentation; categories- themes, location, objects, patterns, light & shade, nature, still photography, actions & expressions, details, culture, panorama, frames, metaphor, etc.

ARC 3004: Vastuvidya

Outline

Introduction: Planning, designing & construction aspects of traditional Architecture in India- evaluation with the Understanding of context- relevance.
Concepts of Vastuvidya; Definition; Resource materials; Roles & duties of Silpis evolutionary nature of the discipline, basic unit of measurements- purushapramanam. Hastham. Padmam, angulam & yavam; vertical proportioning & Thalam concept.
Concept of Vastu: basic geometry, town planning; Planning, design & construction of temples & halls; secular buildings; Case studies. Investigation of Land: tests for suitability & determination of cardinal direction.
Classification of villages & towns; types of planned settlements, Landuse patterns; the position of temples & other uses, street patterns; Planning of residential buildings, Evolution of residential types from Vastupurusha Mandala.
Concept of Mandala, technology in Vastuvidya, classification of materials, brief description of the characteristics & uses of sila, istaka, daru, loha, mrilsna, sudha; Assembly & joinery; Construction methods- Foundations. Walls, columns, utharam & roof structure, the system of proportional measurements & thumb rules.

ARC 3006: Architectural Journalism

Overview – Definition, Significance, scope, purpose, structure, principles, techniques, processes, mediums, the study of potential readers, contemporary architectural journalism.
Documentation: study & analysis – Photo journalism, Book reviews Electronic media; checklist, observations, field studies, interviews, questionnaires; Post-occupancy evaluation, public perception, designer’s opinions.
Writing techniques – Styles, format, purpose, medium, frequency, clear structure, coherent & distinctive look, visual appearance, graphic design, genres, image, descriptive & analytical reports.
Ethics, laws & legislations – Plagiarism, Intellectual property rights, Disclaimers, copyright, author’s rights, patents & royalties, trademark, legal boundaries, libel & invasions of privacy, permissions, references & credits.
Editing & Publishing – Proofreading, Editing techniques, Page make-up, Layout, color scheme, Font, Abstract, Pictures, Ads, News, Photo editing - Book previews, Publishing – Print & Electronic.

ARC 3008: Disaster Management

Outline

Introduction: Disaster Management & its necessity; Types, characteristics, causes & impacts; Natural disasters, Manmade disasters, Epidemics; Institutional & Legal arrangement; NDMA; Financial arrangement; Role of Architect at all stages of Disaster Management.
Disaster Prevention & Mitigation: Risk Assessment & Vulnerability Mapping; Long-term measures; Review & revision of building bye-laws & codes; Hospital Preparedness; Retrofitting; Mitigation strategies, Trigger Mechanism; Capacity building; Awareness programs. Architectural Design considerations.
Preparedness: Forecasting & Early Warning Systems: Plans of action for probable disasters; emergency, medical, casualty management systems; Resources needed; Training, Simulation & Mock Drills; Partnerships for Mitigation & Preparedness; Audit of buildings & infrastructure; Architectural Design considerations.
Response: Role of various agencies; St&ard Operating Procedures (SOPs); Levels of Disasters; Incident Comm& System (ICS); First & Other Key Responders; Medical Response; Information & Media Partnership; Search & rescue; Architectural Design considerations.
Relief & Rehabilitation: Temporary Relief Camps; Management of Relief Supplies; Provision of Intermediate Shelters; Relocation & reconstruction, repair & retrofitting of buildings & infrastructure; Socio-cultural-economic considerations; Capacity building for self-help construction; training & awareness programs. Architectural Design considerations.

DOD 4009: SURFACE ORNAMENTATION

Objectives

- The course aims to explore the various techniques of fabric manipulation for creating surface ornamentation on fabric.

Outline

Special embroideries, Patch work and Applique work, Smocking and Honey comb, Creative surface ornamentation techniques
Project: Developing a product with a creative surface ornamentation technique
The portfolio should include – Swatches developed for each module, Digital boards and the product.

References:

1. Tomoko Nakamichi, Pattern Magic, (2010). Laurence King Publishers.
2. Barden B.(2003). Embroidery Stitch Bible. Search Press Publishers.
3. Gail Lather.(1993). Inspirational Ideas for Embroidery on cloths and Accessories.Search Press Publishers

DOD 4011: MATERIAL EXPLORATION

Objectives

- The course exposes the students to various materials in design and encourages the student to explore the use of different materials in 3D forms.

Outline

Fabric Painting, Form construction with paper, Construction with wire or wood, Macramé work, Paper quilling work, Clay work
The portfolio should include – Developmental sketches and stage-wise photographs of the forms developed under the above modules.

DOD 4013: FASHION ACCESSORIES

Objectives

- The course introduces the students to the different segments of accessory industry. Designing of the accessory as per the user requirement is the key element of the course.

Outline

Fashion Accessories: Introduction, segments, materials of fashion accessories.
Designing fashion accessories: Design process in designing the fashion accessories as per the concept given. Developing the prototype of the accessory.

References:

1. Celia Stall-Meadows. Know Your Fashion Accessories. Fairchild Publications
2. Craik, J. (2011). The Fashion Accessories Book. BERG Publications.
3. Gerval, O. (2010). Fashion Accessories (Studies in Fashion). Firefly Books.
4. Genova, A. (2011). Accessory Design. Fairchild Publications.
5. Meadows, C.S. (2004). Know Your Fashion Accessories. Fairchild Publications.
6. Peacock, J. (2000). Fashion Accessories: The Complete 20th Century Sourcebook. Thames and Hudson.

FOURTH YEAR / SEMESTER SEVEN

ARC 4101 ARCHITECTURAL DESIGN & DETAILING - VII (HUMAN CENTRIC CAMPUS DESIGN): (2 8 0 14)

Focus: Housing Design

Objectives

- To understand context, user perception, multiple stakeholders needs in community specific mass housing.
- To understand master planning tools and techniques in large-scale sites and to explore the feasibility of the project.
- To design a mass housing scheme for given context such as Community specific housing, training campus, Slum rehabilitation projects, mass housing layouts etc.

Outline

This studio is focused on people-centric design and sustainability. This design exercise focuses on understanding the stakeholders, their perceptions, and the needs to define the design guidelines. They would learn about Master planning, vertical & horizontal circulation, grid planning, structural system and detailing, application of contemporary materials, and construction techniques. detailing: site planning, building & site services - water, electricity, sanitation, drainage, RWH, solid waste management, innovative practices, etc., landscape detailing and ecological services, universal design, financial feasibility of the project, design communication. Site extent: Up to 30000 m2.

References

1. Correa, C. (1999). Housing & urbanisation. Urban Design Research Institute.
2. Kanvinde, A., & Miller, H. J. (1969). Campus design in India: experience of a developing nation. Jostens/American Yearbook Company.
3. Pugh, C. (1990). Housing and urbanisation: A study of India. SAGE Publications Pvt. Limited.
4. Lal, A. K. (1996). Handbook of low cost housing. New Age International.
5. Desai, V. (1995). Community Participation and Slum Housing: A Study of Bombay. Sage publications.

ARC 4103 SETTLEMENT STUDIES: (3 0 0 3)

Objectives

- To understand the evolution of different settlement patterns and their impact on shaping the contemporary development.
- To understand the governance, financial and legislative framework of development.

Outline

Human Settlements - Terminologies and definition types, patterns, indicators of the settlements, chronological pattern of settlements, settlements, and basic services. Overview of various settlements, including Civilization and the Pattern of Settlement and the Effects of Urbanization and Industrialization on Planning Methods. Economies - Concepts, issues, aspects; Land & housing economics - valuation, rent, sinking fund, development cost; sources of finance, market characteristics, key constraints, Evaluation Tools - Survey techniques; Evolution analysis; Townscape analysis; Perceptual structure; Permeability study (privacy & accessibility) & visual analysis. Constraints & possibilities; Legislation - National & State Housing Policy, Development control regulations, Acts & Bye-laws, Strategies, Government & non-governmental agencies, Competent authorities, Schemes- PPP, SRA, Redevelopment, Sites & services, etc.

References

1. Banargee Tridib Southworth Michael, (1990), City Sense and City Design, M I T Press.
2. Broadbent Geoffrey, (1990), Emerging concepts in urban space design, Van Nostrand Reinhold, London.
3. Caminos Horacio; Goethert Reinhard, (1983), Urbanization Primer, M I T Press
4. Catanese Anthony J; Snyder James C;(1979), Introduction to urban planning, McGraw Hill.
5. Geddes, P., LeGates, R., & Stout, F. (2021). Cities in evolution. Routledge.

BASIC ELECTIVE (TOWARDS MINORS): (2 0 0 2)

ARC 4105.1 BASIC ELECTIVE (INTERIOR DESIGN): (2 0 0 2)

Objectives

- To equip the students with thorough knowledge about basic concepts of interior design.
- To enable students to use tools of interior design based on Aesthetical and Functional aspects.
- To understand the various aspects of spatial and visual quality through Design, Colors, Lighting, Materials, etc.

Outline

Design Basics, Understanding aesthetical and functional aspects of interior design-elements of design, Principles of Design & Gestalt's theory of Visual perception concerning interior design. Ergonomics, factors influencing living space, Color and Lighting in Interior - Warm, cool, and neutral colors, color, and light, color and surface qualities, psychology of colors, Lighting-Importance, classification based on sources, use, factors to be considered in lighting for different areas of the house. Interior Design Materials & Applications - Understanding the visual quality of materials in terms of finishes through color and texture, its application in the construction of floors, walls,

ceilings, doors, windows, staircases, built-in furniture, Partitions, and other interior components, material, workmanship, specifications, etc. Interior Perceptions - Visual analysis of designed spaces noted for comfort and spatial quality; analysis of solid and void relations, positive and negative spaces. Integration of spaces and function in the design. Insight of various products and lifestyle accessories in the interiors. Role and Integration of accessories in interior design.

References

1. Chiara J., Panero J., & Zelnick M. (2001), Time Saver standards for Interior Design & space planning, 2nd edition, Mc-Graw Hill professional.
2. Ching F. & Bingelli C. (2004), Interior Design Illustrared, 2nd edition, Wiley publishers (Call no.690 CHI).
3. Mark K., Ruggeri K. & Hahn P. (2003), Space Planning Basics, Wiley publishers (Call no.729 KAR).
4. Panero J. & Zelnick M. (1979), Human Dimension & Interior Space: A source book of Design Reference standards, Watson – Guptill (Call no.729 PAN).

ARC 4105.2 BASIC ELECTIVE (SMART CITIES): (2 0 0 2)

Objectives

- To understand the fundamentals of the smart city.
- To study smart city solutions and technologies.
- To study best practices through the global and Indian case studies related to smart city.

Outline

This course will introduce the smart city's definition, idea, and components. It will explore global standards of Smart cities and why the smart city has emerged as a solution to urban problems. This course also explores the major technology, service, application, and development of smart cities. The construction of smart cities and the new services offered by smart cities, such as autonomous driving, green energy, smart living, and smart governance infrastructure, are introduced. These cutting-edge innovative technologies include artificial intelligence (AI), big data, IoT, 5G mobility, and others. Additionally, this course will introduce many Smart City case studies from around the world and India.

References

1. Smart Cities: Foundations, Principles, and Applications. (2017). United Kingdom: Wiley.
2. Sustainable Smart Cities in India: Challenges and Future Perspectives. (2017). Germany: Springer International Publishing.
3. Smart Cities: Issues and Challenges: Mapping Political, Social and Economic Risks and Threats. (2019). Netherlands: Elsevier Science.
4. Gassmann, O., Palmié, M., Böhm, J. (2019). Smart Cities: Introducing Digital Innovation to Cities. United Kingdom: Emerald Publishing Limited.

5. Zhiyong, F., Kirwan, C. G. (2020). Smart Cities and Artificial Intelligence: Convergent Systems for Planning, Design, and Operations. Netherlands: Elsevier Science.

ARC 4105.3 BASIC ELECTIVE (URBANISM): (2 0 0 2)

Objectives

- To study Habitat Design and its scope relating to spatial. Socio-economic and cultural aspects.
- To understand the concept of Community and its various aspects in Habitat Design.
- To understand the role of Government in policymaking.

Outline

Basics of Habitat Design Terminologies; Stakeholders & their role in the process of Habitat Design; Habitat Design as a Multidisciplinary field; Necessity & benefits of quality Habitat design; Scope, strategies, levels, legislation & scale of Habitat Design. People's Perception: Users and activities in a city and their analysis. Behavioral studies and user needs. Socio-cultural and socio-economic aspects. Different zones and activities in an urban area. Memory and mental mapping, the Five Elements in a city. People-centric design and public participation. Anatomy of an Urban Area: Urban morphology & urban character; Elements & aspects of Urban Design; Built & Unbuilt spaces; Buildings, public spaces, streets & transport; pedestrianization & street scape; movement pattern; services; safety & sensitive urban development – defensible spaces. Nature and urban design - open spaces; Environment & urban design. Overview of housing: Concept of shelter, Timeline, Dynamics of housing- users, need, supply & demography & providers, economic forces, terminologies; migration, urbanization, scale, scope, types & ownership; construction industry, current trends, realty sector. Housing Issues: Significance in National Development; Urban & Rural housing in India: statistics, problems-slums, shortage, etc., Issues, Challenges; Current scenario; Planning principles & policies; Demography &, Role of different institutions; Stake holder analysis, current typologies, appropriate housing requirements, best practices.

References

1. Lynch, K. (1995). City sense and city design: writings and projects of Kevin Lynch. MIT press.
2. Watson, D. (2003). Time-saver standards for urban design. McGraw-Hill Education.
3. Alexander, C. (1977). A pattern language: towns, buildings, construction. Oxford university press.
4. Larice, M., & Macdonald, E. (Eds.). (2013). The urban design reader (p. 78). London: Routledge.

ARC 4105.4 BASIC ELECTIVE (SUSTAINABLITY): (2 0 0 2)

Objectives

- To familiarise the students with the processes of Environmental Impact Assessment, Environmental Clearance, and Auditing.
- To understand the regulatory bodies associated with the above process.
- To learn various concepts & factors related to Environmental sustainability depending on the project.

Outline

Introduction to Environment Clearance (EC) process: History of Environment Clearance process (EC), Development Projects requiring EC, Framework, and Validity of EC, Case studies of different types of projects with EIA (Environment Impact Assessment). Understanding the Screening and Scoping process of EC: Project Identification and formulation, Delineation of Study Area, Project Description & profiling, Understanding of Environment Auditing process: Introduction, Methodology, Elements of the Audit process, such as Waste Audits and Pollution prevention assessments, Liability Audit and Site Assessments, Framing of Terms of Reference (TORs) like Site design, Landscaping, Water management, Noise analysis, Waste management, etc. Institutional Framework, Identification of Assessment parameters for data collection, Impact Assessment. Stakeholder Consultation, Preparation of Environment Management Plan & EIA Report for Appraisal.

References

1. Glasson, J., Therival, R., & Andrew, C. (2005). Introduction to environmental impact assessment. Routledge (3rd Ed.).
2. MoEF. EIA Notification of 2006, 1070Gazette of India 1–43 (2006).
3. Santamouris, “Energy Performance of Residential Buildings”, James & James, London 2005.
4. Moncef Krarti, “Energy Audit of Building Systems: an Engineering approach” CRC Press, LLC, Florida 2000.
5. Kulkarni, V., & Ramachandra, T. V. (2009). Environmental management, Commonwealth of learning, Canada and Indian Institute of Science, Bangalore.

ARC 4105.5 BASIC ELECTIVE – I (Structures): (2 0 0 2)

Objectives

- To understand the importance of concrete and RCC as a building material and to understand its versatility, application in design.
- To understand the analysis of various RCC structural elements like slabs and beams.
- To understand the design and detailing of reinforcement in RCC beams and slabs.

Outline

Concrete as a viable material for building construction, History of concrete making; Components and stages of concreting works; Properties of fresh and hardened concrete, Tests on concrete, Admixtures.

Introduction to RCC; Advantages of RCC in construction, Analysis of RC sections, Design approaches, Design of reinforced concrete sections for bending and shear; Bond strength, development length; deflection and cracking. Design & detailing of beams, one-way slabs, and two-way slabs

References

1. Punmia B C & others. (2016). Reinforced concrete structure. Laxmi Publications, Bangalore.
2. A.M.Neville and J.J.Brooks. (2019). Concrete Technology. Pearson Education, Delhi.
3. Unnikrishna Pillai, Devdas Menon, “Reinforced Concrete Design”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.
4. Raju N Krishna. (2019). Design of reinforced concrete structures. CBS Publishers, Delhi.
5. Shah M G, Kale C M. (2014). R C C theory and design. Charotar Publicity House, Anand, India.

Code books:

1. IS 456 - 2000, “Code of practice for plain and Reinforced concrete”, Bureau of Indian Standards, New Delhi.
2. SP-16 1984, “Design Aids for Reinforced concrete IS 456, Bureau of Indian Standards”, New Delhi.

ARC 4107 RESEARCH TECHNIQUES: (2 0 2 3)

Objectives

- To understand the fundamentals of research in built environment aspects.
- To acquaint with the research types and methods related to the built environment.
- To apply appropriate data collection methods, sampling techniques, and hypotheses testing.
- To understand how to prepare and communicate a feasible research article.

Outline

Fundamentals of research; types of research, research processes, and literature review. Qualitative and quantitative methods; research design – need, components, and consideration. Methods of data collection; Survey and observation; Questionnaires - types, the validity of Observation- types, characteristics, advantages, limitations, etc., recording observations. Sampling-determining sample size, time, event sampling, etc., Nature of hypothesis, characteristics, and types, the procedure for hypothesis testing, graphical representation of analysis. Parametric and non-parametric tests. Research report: Dissertation and thesis, review article, etc. Structure and organization of research reports: Title, abstract, keywords, introduction, methodology, results, discussion, conclusion, acknowledgment, references, footnotes, tables, and illustrations.

References

1. Kothari, C. R. (2004). Research methodology: Methods and techniques. New Age International.
2. Groat, L. N., & Wang, D. (2013). Architectural research methods. John Wiley & Sons.
3. Deming, E. M., & Swaffield, S. (2010). Landscape architectural research: Inquiry, strategy, design. John Wiley & Sons.
4. Sanoff, H. (2016). Visual Research Methods in Design (Routledge Revivals). Routledge.

ARC 4109 HISTORY THEORY & CRITICISM-V: (2 0 2 3)

Objectives

- To study the concepts of transitional architecture during the industrial revolution worldwide and in India.
- To understand the new school of thought that evolved post-Industrial era across the world and India.
- To explore the contributions of Master Architects in contemporary architectural practice.
- To understand the importance of evolution of contemporary architecture as a result of various influences like socio/political/cultural aspects.
- To create a portfolio illustrating the importance of the evolution of architectural styles from the industrial revolution to Contemporary architecture, mentioning the key contributions.

Outline

The intent of this course is to understand the theories of Architecture styles that emerged during the Industrial revolution on the global level. The course also looks at contemporary practices in India's pre- and post-Independence to contemporary times. Late Moghul period & Industrial revolution, 18th Century to Mid-19th Century; Old New Delhi Station, Dara Shikoh Library in Delhi, St. James Church, Shahjahanabad, Industrial revolution and its impact on cities, transportation, architecture, and

communication. Colonial India and Princely states- Indo Saracenic, Gothic and Neo-Classical Architecture with examples, London, Crystal Palace, Paris- Eiffel tower, etc Pre-Modernism and Modernism, Late 19th Century AD to 20th Century AD; Arts and Crafts movement, Art Noveau, Art Deco; Expressionism; De Still movement; Cubism; Organic Architecture & works of Frank Lloyd Wright & Antonio Gaudi; Works of other significant architects. Modernism: Development of Rationalism & Functionalism; Bauhaus; Principles of Modernism; International style; Schools of thought; Ideas & works of Great Masters: Le-Corbusier, Walter Gropius, Mies Van Der Rohe, Frank Lloyd Wright, Alvar Alto, Oscar Niemeyer & others; Case studies from across the world.

Theories of Post Modernism in the Twentieth Century; Theory of Post Modernism and Expression through Important Works; Inspiration for Other Concurrent Theories: Structuralism, Metabolism, Minimalism, Hi-Tech, Novelty, Critical Regionalism; Exploring Principles of Different Theories Through Important Examples. Post independent India, 20th century;

Post Independent India: Overview; Development of the new state; Role of Government for infrastructure development; Influences of various movements & works of Great Masters-Language & works of first-generation architects of Independent India.

Post Liberalized era, 20th and 21st century AD; Understanding the major market paradigm shift across Indiapost-1975. Understanding the Impact and trends in the construction field and architecture. Contribution of second-generation architects.

References

1. Morris, A. E. J. (2013). History of urban form before the industrial revolution. Routledge.
2. Tillotson, G. H. R. (1989). The tradition of Indian architecture: Continuity, controversy and change since 1850 (p. 66). New Haven: Yale University Press.
3. Havell, E. B. (1913). Indian architecture: its psychology, structure, and history from the first Muhammadan invasion to the present day. J. Murray.
4. Lang, J. T., Desai, M., & Desai, M. (1997). Architecture and independence: the search for identity--India 1880 to 1980. Oxford University Press, USA.
5. Jencks, C., Jencks, C., Jencks, C., & Jencks, C. (1977). The language of post-modern architecture.
6. Mehrotra, R. (2011). Architecture in India: Since 1990. Mumbai: Pictor.
7. Scriver, P., & Bhatt, V. (1990). After the Masters: Contemporary Indian Architecture. Ahmedabad, India: Mapin; Middletown, NJ: Grantha.

ARC 4111 PROJECT MANAGEMENT: (3 0 0 3)

Objectives

- To enhance the professional ability of the student to manage a project by exposing them to the current prevalent project management principles.
- To apply project management processes (initiate, plan, execute, monitor, control, and closure of projects) and coordinate for the successful completion of projects.
- To apply project management tools and techniques in projects efficiently.
- To estimate duration, sequence, and schedule deliverables of projects to track progress.

Outline

Introduction to project management, types of construction projects, planning, scheduling, controlling, and monitoring stages of projects - life cycle stages of a construction project, project constraints, co-ordination of various teams involved in the project and their roles and responsibilities, work break-down structure (WBS), methods of scheduling, preparation of project schedules, project feasibility analysis. Network techniques Project management through the network, Objectives of network techniques, terms and definitions Activity on Node (AON) and Activity on Arrow (AOA), rules of drawing a network, Project management techniques Program Evaluation & Review Technique: Terms and definition - Critical Path Method: Terms and definition, Activity times Precedence network for construction projects –Project cost analysis - Indirect project cost and direct project cost, optimization of cost through network contraction; Application of project management techniques for the construction project.

References

1. Choudhury S. (1992), Project management, Tata McGraw Hill, Delhi.
2. Joseph Phillips (2004), Project Management Professional Study Guide, TATA McGraw-Hill Edition.
3. Moder; others (1986), Project management with CPM PERT and precedence diagramming, CBS, Delhi.
4. Stallworthy O P; Kharbanda Ernest A (1983), Total Project management from concept to completion, Gower Publishing, England.
5. Stevens James D (1990), Techniques for construction network scheduling, McGraw Hill, 1990.

FOURTH YEAR / SEMESTER EIGHT

ARC 4102 PRACTICAL TRAINING: (0 0 0 15)

Objectives

- To understand the organizational structure, ethics, and aspects of teamwork to coordinate and execute various tasks assigned in an architect's office.
- To participate in the design and decision-making process through various tools for effective communication.
- To recommend best practices and solutions for a given context.
- To develop and represent the architectural knowledge gained from the internship experience in the form of a Portfolio.

Outline

Every student must work in an Office of an experienced Architect registered with the Council of Architecture/Governing body of any other country (if undertaking training outside India) or trained professional of the relevant field as a full-time trainee for 16 calendar weeks in the Eighth Semester (excluding Viva-voce) from the date of commencement of training. The student should involve themself in various aspects of work in an office-like working drawings, presentation drawings, quantity & cost estimation, site supervision, etc. The student needs to prepare & submit a Training Report Portfolio as per the Training Manual.

ARC 4104 STUDY REPORT

Objectives

- To explain his role, responsibilities, and code of conduct as an architect.
- Apply the professional aspects of an architecture office/company and the multiple issues in the conception, preparation, and execution of a project on a site.
- Interpret and theorize the principles into practices.
- Develop skills that help to design for special requirements and situation-specific problems

Outline

A "Study Report" that summarises the student's comprehension of their roles and responsibilities as interns, their participation in various tasks like project conception, preparation, and execution, an independent critical study of a built environment that translates theory into best practices, and a demonstration of their newly acquired problem-solving abilities will be required.

FIFTH YEAR/ SEMESTER NINE

ARC 5101 ARCHITECTURAL DESIGN AND DETAILING – VIII: (2 8 0 14)

Focus: Urban Context Studio

Objectives

- To create an opportunity for coordinated group tasks to understand various urban attributes.
- To conduct physical, socio-economic, cultural, etc. studies through data collection, analysis, and presentations to identify various urban issues
- To propose urban design interventions concerning the urban context with architectural design solutions through specialized aspects of Landscaping, Town planning, Place Making, Community design, etc.

Outline

Understanding the Correlation of design issues to land and surrounding areas the influences of neighborhoods on the design development. Consideration of topics such as human behavior, socio-economics, environment, and technology concerning urban context through the study of history, morphology, typology, people's perception, land use, transportation, byelaws, environmental resources/ status. Documenting and analyzing infrastructure, ecological services, status of resources, condition of livability and deriving meaning, relating to physical form, depicting concepts of development/ change. A design proposal that addresses needs, resource management, environmental management, infrastructure development, principles for sustainable development, form-based codes, smart technologies, urban inserts, conservation strategies, heritage management, and design demonstration.

References

1. De Chiara, J., & Koppelman, L. (1975). Urban planning and design criteria. Van Nostrand Reinhold Company.
2. Correa, C. (1999). Housing & urbanisation. Urban Design Research Institute.
3. Farr, D. (2011). Sustainable urbanism: Urban design with nature. John Wiley & Sons.
4. Cartwright, R. M. (1980). The design of urban space. The design of urban space.
5. Gosling, D., & Maitland, B. (1984). Concepts of urban design.

ARC 5103 DISSERTATION: (0 4 0 6)

Objectives

- To encourage students to select the topic related to architecture or allied courses, focusing on critical understanding, logical reasoning, and structured writing.
- To emphasize novel ideas, experimentation as a part of research process.
- To encourage students to identify relevant research questions on the selected topic and undertake study in consultation with the allotted guide.

- To build an evidence-based study, develop the research paper for the identified area through methodological framework (investigation, interpretation, comparison, analysis and results) for the chosen area of study from diverse perspectives.

Outline

To illustrate the selected research topic through systematic investigation and methodology for literature review, data collection, analysis, and results. Understand the various facts and scope of research in architecture and allied fields by selecting an appropriate analytical tool for data analysis and conclusion. Develop a research paper.

References

1. Anderson, J. and Poole, M. (1998). Thesis and assignment writing. Brisbane: John Wiley.
2. Borden, I. and Ray, K. R. (2006). The dissertation: an architecture student's handbook. 2nd Ed. Oxford: Architectural Press.
3. Fink, A. (1998). Conducting research literature reviews: from paper to the Internet. Thousand Oaks: Sage.
4. Murray, R. (2005). Writing for academic journals. Berkshire: Maidenhead, Open University Press.

ADVANCED ELECTIVE - I (TOWARDS MINORS): (3 0 2 4)

ARC 5105.1 ADVANCED ELECTIVE - I (INTERIOR DESIGN): (3 0 2 4)

Objectives

- To learn craftsmanship techniques through the study and presentation of historical, and contemporary precedent works.
- To develop the skill necessary to design by understanding the user, user activity, materials, and their essential characteristics.
- To understand the design approach of modular furniture.

Outline

Understanding furniture categories - Exploration of the idea of furniture, the role of furniture in interior design, Design approaches in furniture design. Styles of furniture – traditional, contemporary, and modern design. Furniture for different purposes – meaning need, factors influencing – climatic conditions, family needs and preferences, availability, principles of Design, and financial limit. Seating Design - Several types of seating focus on the following – Functionality, Aesthetics, Style, Human factors, and ergonomics. The modular approach to furniture design: types of knockdown and modular furniture such as seats and seating, tables and counters; storage units, trolley, partitions, and other furniture systems. Soft furnishings. Importance – the relationship of furnishings with space, selection and use of furnishings, functional and decorative Window Treatments, Carpets, and Rugs.

References

1. Bradley Quinn, (2006) Mid-Century Modern: Interiors, Furniture, Design Details, Conran Octopus Interiors.
2. Jim Postell, (2007) Furniture Design, Wiley publishers.
3. John.F. Pile (2005) Interior Design, 2nd edition and 4th edition, illustrated, H.N.Abrams. (Call no. 747 PIL).
4. Robbie. G. Blakemore, (2005) History of Interior Design and Furniture: From Ancient Egypt to Nineteenth-Century Europe, Wiley publishers.
5. Jim Postell, Gesimondo Nancy (2011) Materiality and interior construction, Wiley publishers (Call no. 691 GES).

ARC 5105.2 ADVANCED ELECTIVE – I (SMART CITIES): (3 0 2 4)

Objectives

- To study planning and development of smart city Infrastructure.
- To study and understand urban infrastructure management principles related to smart cities.
- To understand the concepts, methods, and models of e-Governance, Citizenship, ICT acts, and Initiatives.

Outline

This course will introduce smart city infrastructure in the context of housing, solar energy, sustainable green building, safety and cyber security, and solid waste management. It will also emphasize the concepts, methods, and models of e-Governance, Citizenship, ICT acts, and Initiatives.

References

1. Singh, I. B., Pelton, J. N. (2018). Smart Cities of Today and Tomorrow: Better Technology, Infrastructure and Security. Germany: Springer International Publishing.
2. Vacca, J. R. (2020). Solving Urban Infrastructure Problems Using Smart City Technologies: Handbook on Planning, Design, Development, and Regulation. Netherlands: Elsevier Science.
3. Smart Infrastructure and Applications: Foundations for Smarter Cities and Societies. (2020). Switzerland: Springer International Publishing.
4. Handbook of Smart Cities: Software Services and Cyber Infrastructure. (2018). Germany: Springer International Publishing.
5. The Rise of Smart Cities: Advanced Structural Sensing and Monitoring Systems. (2022). United Kingdom: Elsevier Science.

ARC 5105.3 ADVANCED ELECTIVES - I (URBANISM): (3 0 2 4)

Objectives

- To understand various attributes of habitat design
- To understand multiple attributes perception of space
- To understand the attributes of transport and environmental interface
- To understand the feasibility of a Planning Project
- To study the Socio-Economic Impact Assessment

Outline

Basic of Land use planning Introduction to the Terminologies Basics of transportation Planning Concepts of accessibility versus mobility; Traffic Surveys, Travel demand analysis; Parking demand estimation; Pedestrianization; Mass Transit Systems – Basics of Environmental Planning Sustainable Planning Approach (SDG Goals in the Global as well as the Indian Context), Green and Clean Approach for planning Future Cities, Compact City Concept, Global Warming Measures (Public Transport over Private Ones), Vulnerability Quotient.

Basics of Planning Economics Definitions and Terminologies related to Land Economics, Different types of Industries (Primary, Secondary, etc.), Types of Market, Globalization and its effect on the economics of the country, Land Value Capture, Policies related to Land Economics (Urban Land Ceiling Act, etc.). Socio - Economic Assessment Health and well-being, Sustainable land access and use, Protecting heritage and cultural resources, Equitable business and employment opportunities, Population sustainability, Adequate services and infrastructure, Adequate, sustainable income and lifestyle.

References

1. Allen G. Noble, et.al, (eds). (1998). Regional Development nt and Planning for the 21st Century: New priorities New Philosophies'. Aldershot, USA.
2. David Mosse, et.al. (1998). Development Process; concepts and Methods for working with complexity. Loutledge, London.
3. Haughton, G., & Hunter, C. (2004). Sustainable cities. Routledge.
4. Jenks, M., & Dempsey, N. (2005). Future forms and design for sustainable cities. Routledge.
5. Tiwari, G. (2002). Urban transport priorities: meeting the challenge of socio-economic diversity in cities, a case study of Delhi, India. Cities, 19(2), 95-103.

ARC 5105.4 ADVANCED ELECTIVE – I (SUSTAINABILITY): (3 0 2 4)

Objectives

- To equip the basics of environmental modeling in GIS.
- To familiarize with the Environmental Design principles for sustainable products.
- To familiarize with the Environmental Design principles for Green Building frameworks.

Outline

Environment Management Techniques – Environment Monitoring, Modelling – (Forecasting and Growth Modelling), Application of Remote Sensing and GIS in Environment Management, Environmental Profile, Environmental Risk Assessment – ERA in Industry, Ecosystem Approach to Risk Assessment; Rapid Urban Environmental Assessment; Eco-Mapping Environmental Design – Principles, Benefits, Motivation, ED and Other Environmental Practices; ED for Manufactured Products – ED consideration in Product Life Stages. ED Tools for Products, Concept of Eco Labelling. ED for Buildings – Green Buildings, Principles of Green Buildings, ED strategies for Building Construction; ED for Development Planning – Framework and examples in Indian Context.

References

1. ISO 1997. Environmental Management – Life Cycle Assessment – Life Cycle Assessment – Life Cycle Impact Assessment. ISO/ CD 14 042.1, 1997.01.15.
2. Global Green Standards: ISO 14000 and Sustainable Development, International Institute for Sustainable Development, http:/www.iisd1.iisd.ca.
3. Ghosh, S. (2010). Examining carbon emissions economic growth nexus for India: a multivariate cointegration approach. Energy Policy, 38(6), 3008-3014.
4. Pacheco-Torgal, F., Cabeza, L. F., Labrincha, J., & De Magalhaes, A. G. (2014). Eco-efficient construction and building materials: life cycle assessment (LCA), eco-labelling and case studies. woodhead Publishing.
5. Wernet, G., Stucki, M., Shenoy, M., & Muthusezhiyan, N. (2011). Establishing a data framework for life cycle management in India. In LCM 2011 Conference.

ARC 5105.5 ADVANCED ELECTIVE - I (REINFORCED CONCRETE DESIGN –II): (3 0 2 4)

Objectives

- To understand analysis of various RCC stuctral elements like columns, footings, and staircase.
- To understand structural behavior of long span structures.
- To understand design principles of flat slabs, grid floor and retaining walls, portal frame, water tanks.

Outline

Analysis, design and detailing of columns, footings, staircases. Structural behavior, design principles and detailing of Flat slabs, grid floors, retaining walls, portal frame, Water Tanks resting on the ground, overhead tanks. Large span structures; Structural behavior, design principles and detailing of shells and folded plates.

References

1. Krishnaraju N, “Advanced Reinforced Concrete Design”, CBI Publishers, New Delhi, 2016.
2. Punmia B. C, Reinforced Concrete Structures”, Lakshmi Publications Pvt. Ltd., New Delhi, 2016.

3. Verghese P. C., “Advanced Reinforced Concrete”, Prentice HI New Delhi, 2014.
4. Unnikrishna Pillai., Devadas Menon., “Reinforced concrete Design”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.
5. Raju N Krishna. (2019). Design of reinforced concrete structures. CBS Publishers, Delhi
6. Shah M G , Kale C M. (2014). R C C theory and design. Charotar Publicity House, Anand, India.

Code books:

1. IS:456 2000, “Code of practice for plain and Reinforced concrete”, Bureau of Indian Standards, New Delhi.
2. SP-16 1984, “Design Aids for Reinforced concrete IS 456”, Bureau of Indian Standards, New Delhi.
3. IS: 3370-Part II & Part IV, “Code of practice for Concrete Structures for The Storage of Liquids”, Bureau of Indian Standards, New Delhi.

ARC 5107 PROFESSIONAL PRACTICE AND MANAGEMENT: (3 0 0 3)

Objectives

- To understand the basic concepts and terminology in architectural practice; the difference between the architectural profession and other professional disciplines, Professional bodies, and statutory bodies.
- To understand Interdisciplinary Practice.
- To learn various stages of project construction to meet Objectives of clients and Users, requirements and process of taking up work.
- To learn the legal aspects of the architectural profession and the role of an architect in the same.

Outline

Roles and Duties of an Architect, Architect's role in society, stakeholders in a project, Architect- client- contractor responsibilities. Office administration, Recruitment, manpower management, selection for various posts, resource-leveling. Architects act 1972, COA, IIA Legal aspects of professional practice- Architects Act 1972, code of conduct and ethics in the profession, COA, IIA- structure, and organization. Professional Fee- charges, stages of payment. Tenders & Contracts Definition, types of Tender notices, Documents required for tendering, types and components of the Contract. Terms and conditions, violation of contract, penalty, government bodies. Architectural Competitions conditions of Architectural competitions, types of competitions, procedures, honorariums, etc. Legal Aspects in Profession, Arbitration: Clauses of arbitration, the role of architect, Valuation- Bylaws, FAR, TDR and their effects on property, Market Value, Value Classification factors, Land Acquisition, Easement.

References

1. Deobhakta, M. (1997). Architectural Practice in India. Super Book House, Mumbai.
2. Roshan Namavati, (1984) Professional practice, Lakhani Book Depot, Mumbai
3. Demkin, J. A. (2001). The architect's handbook of professional practice. John Wiley & Sons.
4. Hyde, R. (2012). Future practice: Conversations from the edge of architecture. Routledge.
5. Emmitt, S., Prins, M., & Den Otter, A. (Eds.). (2009). Architectural Management: International research and practice. John Wiley & Sons.
6. Wakita, O. A., & Linde, R. M. (2003). The professional practice of architectural working drawings. John Wiley & Sons.

FIFTH YEAR/ SEMESTER TEN

ARC 5102 THESIS: (0 12 0 18)

Objectives

- To allow students to study and demonstrate the project based on their inclinations.
- To illustrate the proposal for the selected architectural design problem in consultation with the allotted guide.
- To communicate and represent the proposed design solutions systematically at different stages in the form of sketches, conceptual drawings, design drawings, technical drawings, models & reports.

Outline

Demonstration of the ability of design through an architectural design project. This may include form development, development of spaces, aesthetics, services, Landscape, sustainability, barrier-free etc. They are represented through various mediums such as sketches, conceptual drawings, design drawings, technical drawings, models & reports. The Individual Guides, the Institutional Panel and course experts progressively mentor and progressively assess the process.

References

All references will be specific to the project and will cover a wide range of topics (history, theory, services, materials, and construction) from architecture and related fields, as well as critical papers, essays, recorded studies, and books.

ADVANCED ELECTIVE - II (TOWARDS MINORS): (3 0 2 4)

ARC 5104.1 ADVANCED ELECTIVE - II (INTERIOR DESIGN): (3 0 2 4)

Objectives

- To acquire the knowledge to design a space based on the user's perception and behavior of the space.
- To understand the Integration of psychology and user behavior in space planning.
- To be able to integrate services as per the space typologies.

Outline

Perception of space - Understanding associative aspects relating to space. Understanding cognitive theories related to the field of space making to develop skills of place-making. Kinesthetic - Understanding perception while in movement and space organization around such a phenomenon. Human behavior in a group Understanding activities and their relationship with groups of people. Privacy, Territoriality & defensible space. Behavioral Patterns- Reflection of behavior patterns of human beings in space planning for public areas. Integration of services in interiors. Qualitative, quantitative, and technical aspects as per the typology. Critical case

studies of different typologies related to (i) user perception of space. (ii) Integration of services.

References

1. Bryan Lawson,(2001) Language of Space, Architectural Press.
2. Low M S ,Lawrence D (2003) Anthropology of Space and place : Locating Culture, Wiley – Blackwell publishers.
3. Yi- Fu Tuan,Hoelscher S (2001) ,Space and Place : The perspective of experience, University of Minnesota Press.
4. Bryan Lawson,(2019) Design student's journey understanding how designers think, Taylor and Francis (Call no. 745.4 LAW).

ARC 5104.2 ADVANCED ELECTIVE - II (SMART CITIES): (3 0 2 4)

Objectives

- To study planning for smart cities in developing nations.
- To study smart and intelligent transport systems.
- To study smart energy systems in smart cities.

Outline

This course shall introduce planning for smarter cities to revolutionize how cities are planned and executed. It will explore smart city implementation process in developing countries by highlighting the challenges and opportunities of smart cities. It shall emphasize smart and intelligent transport systems. It will also give an overview of smart energy systems adopted in smart cities.

References

1. E. De Grande, R., A. F. Loureiro, A., I. Meneguette, R. (2018). Intelligent Transport System in Smart Cities: Aspects and Challenges of Vehicular Networks and Cloud. Germany: Springer International Publishing.
2. Smart City Emergence: Cases From Around the World. (2019). Netherlands: Elsevier Science.
3. Smart Environment for Smart Cities. (2019). Germany: Springer Singapore.
4. Sustainable Energy for Smart Cities: First EAI International Conference, SESC 2019, Braga, Portugal, December 4–6, 2019, Proceedings. (2020). Germany: Springer International Publishing.
5. Zoughbi, S. G. (2022). Planning and Designing Smart Cities in Developing Nations. United States: IGI Global.

ARC 5104.3 ADVANCED ELECTIVE - II (URBANISM): (3 0 2 4)

Objectives

- To study the process of quantification and assessment in planning strategies.
- To understand various neo-modernist urban strategies as the call of need and time.
- To understand environmental sensitivity in terms of socio-economic betterment.

- To read and examine various participant elements contributing to environmental design.

Outline

Introduction to Socio-Economic aspect of Planning Importance of socio-economic perspective and outcomes. Holistic development and socio-economic inclusions. Existing cases as examples and frameworks. Indexing principles methodologies - Introduction to Social and economic resilience indexing; introduction to social and economic vulnerability indexing; inter-relation of resilience and vulnerability Introduction to Neo modernist Urban strategies concerning current issues; Human-Centric Development through the perspective of Socio-Economic paradigm. Role of Communication and technology in planning evolution and habitat management; Impact assessment Environmental Sustainability & Socio-Economic Planning Form & ecology, footprint assessments; waste management; assessment of services; environmental ecology. Self Sufficiency and attributes.

Concept of Self Sufficiency in planning. Core area identification- Information, Matter, Water, Mobility, Energy, Buildings, nature; Identification of consumers in terms of Housing, facilities, public space, and tertiary consumptions; Waste as a resource.

References

1. Bramley, G., & Power, S. (2009). Urban form and social sustainability: the role of density and housing type. Environment and Planning B: Planning and Design, 36(1), 30-48.
2. Knox, P., & Pinch, S. (2014). Urban social geography: an introduction. Routledge.
3. Manzi, T., Lucas, K., Jones, T. L., & Allen, J. (Eds.). (2010). Social sustainability in urban areas: Communities, connectivity and the urban fabric. Routledge.
4. Shaftoe, H. (2012). Convivial urban spaces: Creating effective public places. Routledge.
5. Aurigi, A. (2016). Making the digital city: the early shaping of urban internet space. Routledge.

ARC 5104.4 ADVANCE ELECTIVE - II (SUSTAINABILITY): (3 0 2 4)

Objectives

- To familiarize the processes of Life Cycle Assessments (LCA).
- To equip with the computation skills for LCA.
- To familiarize the processes of ISO 14001 Environmental Management Systems.

Outline

Life Cycle Assessment – Evolution, Stages in Product of LCA, Code of Good Conduct for LCA Procedure for LCA - Defining the Goal and Scope, Analysing the Inventory, Assessing Environmental Impact, Evaluating Environmental Profiles Applications of LCA, Use of software / Computational Skills for LCA, Case Studies for LCA Environment Management System Standards – Core elements of EMS, Benefits of EMS, Certification Body Assessments of EMS, Documentation for EMS; EMS

Standards: ISO 14000 series – Evolution, Principles, and Structures, Supporting Systems, EMS Specification Standards: ISO:14001 Implementation of EMS Conforming to ISO 14001; Benefits of Implementing ISO 14001: An Indian Scenario

References

1. ISO 1997. Environmental Management – Life Cycle Assessment – Life Cycle Assessment – Life Cycle Impact Assessment. ISO/ CD 14 042.1, 1997.01.15.
2. Global Green Standards: ISO 14000 and Sustainable Development, International Institute for Sustainable Development, http:/www.iisd1.iisd.ca.
3. Ghosh, S. (2010). Examining carbon emissions economic growth nexus for India: a multivariate cointegration approach. Energy Policy, 38(6), 3008-3014.
4. Pacheco-Torgal, F., Cabeza, L. F., Labrincha, J., & De Magalhaes, A. G. (2014). Eco-efficient construction and building materials: life cycle assessment (LCA), eco-labeling, and case studies. woodhead Publishing.
5. Wernet, G., Stucki, M., Shenoy, M., & Muthusezhiyan, N. (2011). Establishing a data framework for life cycle management in India. In LCM 2011 Conference.

ARC 5104.5 ADVANCED ELECTIVE - I (Pre-Stressed Concrete Structures): (3 0 2 4)

Objectives

- To understand the importance of pre-stressed concrete as a building material and to understand its versatility, application in design
- To understand the analysis of various pre-stressed structural elements like beams.
- To understand design concepts of pre-stressed elements like beams.

Outline

Concept of pre-stressed concrete, pre-tensioning, post-tensioning; Analysis and design of prestressed concrete members. Introduction to prestressed concrete structures, advantages, types of pre-stressing, pre-tensioning, and post-tensioning systems and devices, stages of pre-tensioning & post-tensioning, and comparison. Loss of pre-stress, elastic shortening, friction, anchorage slip, Creep of Concrete, Shrinkage of Concrete, Relaxation of Steel. Analysis of PSC members under axial loads and flexure. Design of PSC members, design concepts, and simple numerical examples. A study on Transmission of pre-stress, Cantilever, and Continuous PSC beams

References

1. Lin T Y & Burns N H. (2010) Deign of prestressed concrete structures. MGH, Singapore.
2. N. Krishna Raju. (2018). Pre-stressed Concrete. Tata McGraw Hill, New Delhi.
3. Dayaratnam P. (2017). Pre-stressed concrete structures. Oxford and IBH, Delhi.

Code books

1. IS: 1343-1980, “Code of Practice for Pre-stressed concrete”, Bureau of Indian Standards, New Delhi, 1981.
2. practice for plain and Reinforced concrete”, Bureau of Indian Standards, New Delhi.
3. SP-16 1984, “Design Aids for Reinforced concrete IS 456”, Bureau of Indian Standards, New Delhi.
4. IS: 3370-Part II & Part IV, “Code of practice for Concrete Structures for The Storage of Liquids”, Bureau of Indian Standards, New Delhi.

ADVANCED ELECTIVE - III (TOWARDS MINORS): (3 0 2 4)

ARC 5106.1 ADVANCED ELECTIVE - III (INTERIOR DESIGN): (3 0 2 4)

Objectives

- To understand human perceptions & interpretations of the spaces in the physical environment.
- To provide skills for a comprehensive design approach with custom designs.
- To develop detailed drawings and specification writing etc., for the design project.

Outline

Students must select any one of the topics enlisted (Hospitality Interiors, Health Facility Interiors, Office/Corporate Interiors, and residential Interiors) and explore along with the faculty to create a coherent study plan. The students will explore human activity, perceptions & interpretations of space along with the factors of the physical environment. The study's focus should be on preparing schematic, detailed drawings, specification writing, and contract documents. Study of user types, user behavior, and concepts integrating the required services. Concepts, themes, ambiance, and aesthetics in designing. Study of interior visual attributes of physiological indicators of wellbeing and health-related indicators. Design involves the competency to mix design elements with industry-standard systems furniture. The course emphasizes space planning and volumetric study relating to the human body and ergonomics in the work environment. Develop holistic concepts with the ability to integrate various individual spaces into one theme.

References

1. Karlen Mark, Space planning Basics, Van Nostrand Reinhold, New York, 1992. (Call no. 729 KAR).
2. Francis.D. Ching & Corky Bingelli, Interior Design Illustrared, 2nd edition, Wiley publishers, 2004. (Call no. 747 CHI).
3. Kopec, D. A. (2006). Environmental psychology for design. New York: Fairchild. (Call no. 720.47 KOP).

4. Penner, R. H., Adams, L., & Rutes, W. (2013). Hotel design, planning and development. Routledge. (Call no. 725.21 REE).
5. Nussbaumer, L. L. (2014), Human factors in Built environment, New York: Fairchild. (Call no. 720.82 NUS).

ARC 5106.2 ADVANCED ELECTIVE - III (SMART CITIES): (3 0 2 4)

Objectives

- To acquaint the students with project design and management of smart cities.
- To study about economics and finances involved in smart cities.
- To study about implementation and risk analysis of smart Infrastructure for efficient resource management and deployment.

Outline

Smart cities and sustainability transitions; Beckert's Fictional Expectation Model, visioning transition management through smart cities. Resource management, Project design, Costing, Financial feasibility (Cost-Benefit Analysis, IRR) and tariff management structures; tariff designs for demand response. Economics and finances involved in smart cities (The business plan of one to two infrastructures) on various payback periods; Cash flow analysis; Risk identification, Risk analysis - Qualitative (risk metrics) and Quantitative, and Risk Evaluation; Sensitivity Analysis. Project management and project analysis for smart infrastructure; Operation & Management (O&M) Models, Financial modeling - Public-Private Partnerships (PPP), use of VGF, Life cycle analysis for implementation, etc.

References

1. Al-Hader, M., & Rodzi, A. (2009). The smart city infrastructure development & monitoring , Theoretical and Empirical Researches in Urban Management, 4(2 (11), 87-94.
2. Ansell, J., & Wharton, F. (1992). Risk: analysis, assessment, management, John Wiley & Sons Inc.
3. Hajer, M. A., & Pelzer, P. (2018). 2050—An Energetic Odyssey: Understanding 'Techniques of Futuring'in the transition towards renewable energy. Energy Research & Social Science, 44, 222-231.
4. Kneifel, J. (2010). Life-cycle carbon and cost analysis of energy efficiency measures in new commercial buildings, Energy and Buildings, 42(3), 333-340.
5. Picon, A. (2015). Smart Cities: A Spatialized Intelligence, John Wiley & Sons.

ARC 5106.3 ADVANCED ELECTIVE – III (SUSTAINABLE URBANISM): (3 0 2 4)

Objectives

- To analyze various attributes of sustainable urbanism.
- To understand the role of the participatory process in Sustainable development.
- To analyze different sustainable development typologies.
- To understand the role of technology in sustainable development.

Outline

Introduction to Sustainable Urbanism: Introduction to the environment as a combination; sustainability as term and concept, introduction to sustainable Urban Development through practices; resource efficiency management- Community, economy & environment; Ecological services Introduction of newly evolved words in conscious- sustainable urbanism- Green City, Regional city, Dispersed city, Compact city, Virtual city, informational city; attributes of Sustainable urbanism concept- Co design-Co relations; Interventions; Metabolism; Layers Approach; Proximity. Guiding principles and derivations of Sustainable urbanism concept- Spatial; Content and Process, Environmental Education, Eco - Mapping, Environmental Profile, Lighting principles related to Urbanism – Light imprint Urbanism, Circadian lighting strategies, U.C. Davis protocol on lighting, Participatory process in Sustainable development: Sustainable practices & Environmental Management Techniques: Keys and modern practices to resource respect, management, and allocation- Conservation & urban development; Mixed-use development as a concept to efficiency; Digital parametrizes as a tool to volumetric efficiency; Environmental - Monitoring, Modelling (Forecasting & Growth), Sensitivity Analysis, Application of Remote Sensing & GIS in EM, Environment Technology Assessment, Environment Risk Management.

References

1. Farr, D. (2011). Sustainable urbanism: Urban design with nature. John Wiley & Sons.
2. Wheeler, S. M., & Beatley, T. (Eds.). (2014). Sustainable urban development reader. Routledge.
3. Burton, E., Jenks, M., & Williams, K. (2003). The compact city: a sustainable urban form? Routledge.
4. Ferrão, P., & Fernández, J. E. (2013). Sustainable urban metabolism. MIT press.

ARC 5106.4 ADVANCED ELECTIVE - III (SUSTAINABILITY): (3 0 2 4)

Objectives

- To familiarise with the macro and microeconomics of Natural Resources.
- To familiarise with Environmental Taxation.
- To understand various Environmental valuation and accounting techniques.

Outline

Economics and the Environment - Introduction, Environmental Costs, and Benefits, Environmental Taxes, Environmental Accounting. Environmental Valuation - Categorizing Environmental Values, Valuation Techniques, Valuing Environmental Amenities. Economics of Natural Resources - Fisheries, Forestry, Water Use, and Agriculture. Environment and Regional Economics, Ecological Economics.

References

1. Kahn, M. E. (2007). Green cities: urban growth and the environment. Brookings Institution Press.
2. Kulkarni, V., & Ramachandra, T. V. (2009). Environmental management, Commonwealth of learning, Canada and Indian Institute of Science, Bangalore.
3. Goodstein, E. S., & Polasky, S. (2005). Economics and the Environment (p. 32). Hoboken, NJ: Wiley.
4. Pearce, D. W., & Warford, J. J. (1993). World without end: economics, environment, and sustainable development. Oxford University Press.
5. Pearce, D., Barbier, E., & Markandya, A. (2013). Sustainable development: economics and environment in the Third World. Routledge.

ARC 5106.5 ADVANCED ELECTIVE - III (Steel Structures): (3 0 2 4)

Objectives

- To understand the importance of steel as a building material and to understand its versatility, application in design.
- To understand the analysis and behavior of various steel structural elements like tension members and compression members.
- To understand various types of connections in steel structures.

Outline

Advantages and Disadvantages of Steel structures, Loads and Load combinations, Design considerations, Failure criteria for steel, Codes, Specifications, and section classification. Structural Connections, Welded connections, Advantages of Welding, Types, and Properties of Welds, Types of joints, Weld specifications, Design of welds. Tension members, types, Behaviour of tension members, Modes of failure, Factors affecting the strength of tension members, Angles under tension, and Design of the tension member. Compression members, failure modes, Behaviour of compression members, Sections used for compression members, Effective length of compression members, and Design of compression members. Built-up compression members. Beam types, Lateral stability of beams, Behaviour of simple and built-up beams in bending, Design strength, Shear strength, Maximum deflection, Design of beams and purlins. Understanding the application of steel as construction material in tall buildings.

References

1. Subramanian N. (2018). “Design of Steel Structures”, Oxford University Press, New Delhi.
2. Duggal S.K. (2017), “Limit State method of design of steel structures”, Tata McGraw-Hill, New Delhi, 2017.
3. Bhavikatti S. S., “Design of Steel structures”, I. K. International Publishing House, New Delhi, 2010.

Code books:

1. “IS 800-2007: General construction in steel-Code of practice” (third revision), Bureau of Indian Standards, New Delhi.
2. “IS 875-1987 (Part III): Code of practice for design loads (other than earthquake) for building structures”, Bureau of Indian Standards, New Delhi.
3. “BS 5950 (part I) - 1985: Structural use of steelwork in buildings”, British Standards Institution, London.
4. “SP: (6)-1964: Hand book for Structural Engineers”, Bureau of Indian Standards, New Delhi.