First Semester B. Architecture

Course no.	Subject	Periods per week			Credits
		L	T	P	
ARC 111	Design Project - 1*	2	-	10	6
ARC 112	Building Materials and Construction - 1***	2	-	4	4
ARC 113	Structures - 1	3	-	-	3
ARC 114	Architectural Drawing - 1***	2	-	2	3
ARC 115	History of Architecture - 1	2	1	-	3
ARC 116	Art and Graphics - 1**	-	-	4	3
ARC 117	Workshop **	-	-	3	3
	Total Credits				**25**

Second Semester B. Architecture

Course no.	Subject	Periods per week			Credits
		L	T	P	
ARC 121	Design Project - 2*	2	-	8	6
ARC 122	Building Materials and Construction - 2***	2	-	4	4
ARC 123	Structures - 2	3	-	-	3
ARC 124	Architectural Drawing - 2***	2	-	4	3
ARC 125	History of Architecture - 2	2	1	-	3
ARC 126	Art and Graphics - 2**	-	-	4	3
ARC 127	Computer Applications**	-	-	3	3
	Total Credits				**25**

Third Semester B. Architecture

Course no.	Subject	Periods per week			Credits
		L	T	P	
ARC 211	Design Project - 3**	-	2	8	6
ARC 212	Building Materials and Construction - 3***	2	-	4	4
ARC 213	Structures - 3	3	-	-	3
ARC 214	History of Architecture - 3	2	2	-	3
ARC 215	Environmental Science (Climatology)	3	-	-	3
ARC 216	Theory of Design	3	-	-	3
ARC 217	Architectural Graphics**	-	-	6	3
	Total Credits				**25**

Fourth Semester B. Architecture

Course no.	Subject	Periods per week			Credits
		L	T	P	
ARC 221	Design Project - 4*	2	-	8	6
ARC 222	Building Materials and Construction - 4***	2	-	4	4
ARC 223	Structures - 4	3	-	-	3
ARC 224	Building and Energy	3	-	-	3
ARC 225	Surveying and Leveling***	1	-	3	3
ARC 226	Communication Skills**	-	1	3	3
	Elective - 1**	-	2	3	3
	Total Credits				**25**

Elective - 1

ARC 241 Traditional Indian Architecture
ARC 242 Aesthetics, Art and Appreciation
ARC 243 Modern and Contemporary Indian Architecture
ARC 244 Works and Philosophies of Great Masters
ARC 245 Architecture without Architects
ARC 246 Appropriate Architecture
ARC 247 Computer Aided Drafting

Fifth Semester B. Architecture

Course no.	Subject	Periods per week			Credits
		L	T	P	
ARC 311	Design Project - 5**	-		12	6
ARC 312	Building Materials and Construction - 5***	2		4	4
ARC 313	Structures - 5	3		-	3
ARC 314	Specifications and Estimation	2		2	3
ARC 315	Acoustics	3		-	3
ARC 316	Water Supply and Sanitation	2	2		3
ARC 317	Building Appraisal**	-		3	3
	Total Credits				**25**

Sixth Semester B. Architecture

Course no.	Subject	Periods per week			Credits
		L	T	P	
ARC 321	Design Project - 6*	2	-	10	6
ARC 322	Working Drawings**	-	-	8	4
ARC 323	Structures - 6	3	-	-	3
ARC 324	Principles of Human Settlement	3	-	-	3
ARC 325	Electrical Services	3	-	-	3
ARC 326	Mechanical Services	3	-	-	3
ARC 327	Building Bye Laws and Codes**	-	-	3	3
	Total Credits				**25**

Seventh Semester B. Architecture

Course no.	Subject	Periods per week			Credits
		L	T	P	
ARC 411	Design Project - 7**	-	-	12	6
ARC 412	Advance Building Construction***	2	-	4	4
ARC 413	Structures - 7	3	-	-	3
ARC 414	Town Planning	3	-	-	3
ARC 415	Landscape Architecture	3	-	-	3
ARC 416	Building Economics and Sociology	3	-	-	3
	Elective - 2**	-	2	3	3
	Total Credits				**25**

Elective - 2

ARC 431	CAAD and Visualization
ARC 432	Mega Structures
ARC 433	Architectural Journalism
ARC 434	Visual Communication
ARC 435	Hotel Services

Eighth Semester B. Architecture

Course no.	Subject	Periods per week			Credits
		L	T	P	
ARC 421	Design Project - 8**	-	-	10	6
ARC 422	Modern Building Systems	2	-	4	4
ARC 423	Urban Design***	2	-	3	3
ARC 424	Project Management	2	1	-	3
ARC 425	Interior design***	2	-	3	3
ARC 426	Research Principles and Dissertation**	-		3	3
	Elective - 3	3	-	-	3
	Total Credits				**25**

Elective - 3

ARC 441	Auditorium Acoustics, Systems and Services
ARC 442	Institutional Services
ARC 443	---
ARC 444	---
ARC 445	Architectural Conservation
ARC 446	Earthquake Resistant Buildings
ARC 447	---
ARC 448	Hospital Systems and Services

Ninth Semester B. Architecture

Course no.	Subject	Periods per week			Credits
		L	T	P	
ARC 511	Thesis Project**	-	-	20	9
ARC 512	Professional Practice	2	1	-	3
ARC 513	Valuation and Arbitration***	2	2	2	4
	Elective - 4***	2	-	4	4
	Total Credits				**20**

Elective - 4

ARC 531	Urban and Regional Planning
ARC 532	Housing
ARC 533	Remote Sensing and GIS
ARC 534	Infrastructure Planning and Management
ARC 535	Disaster Management and Planning
ARC 536	Environment Impact Assessment
ARC 537	Sustainable Planning and Management
ARC 538	Urban Landscape

Tenth Semester B. Architecture

Course no.	Subject	Periods per week			Credits
		L	T	P	
ARC 521	Training**	-	-	-	8
ARC 522	General Proficiency**	-	-	-	2
	Total Credits				**10**

NOTE:

* Theory subject; six hours end term exam and viva

** Non theory subject; end term viva

*** Theory subject; three hours end exam and viva

DETAILED COURSE - B. ARCHITECTURE

ARC 111: Design Project - 1*

Parameters of design anthropometrics and ergonomics, human activity and the use of spaces. Interrelationship of architectural space to form, structure, materials and to nature as a contextual setting. Understanding the elements of architectural design, concepts of space and form and their perception. Study of a given space through elementary measured drawings, sketching and photography. Synthesis of observations in design of a basic shelter; an architectural form with a specific function.

Design exercise may include spaces like exhibition stall, drinking water fountain, information kiosk, etc.

Study Tour- A study tour should be conducted during the semester as per the requirement of design studio/project.

ARC 112: Building Material and Construction – 1***

Introduction to building elements and materials.

Types, quality tests of stones for construction. Study of properties of constituents, components, manufacturing process, quality tests of types of bricks, cement, lime, sand, aggregate. Types and uses of mortar and concrete.

Superstructure: Types of bonds, ends and junctions, attached and detached piers, jointing and pointing in brick masonry and stone masonry, facing of bricks over stonework, lintels, coping.

Opening and spanning: types of arches in bricks and stone, centering of arches.

Foundation and plinth: Timbering to trenches, foundations for brick and stone walls, brick and stone piers. Plinth work, filling, D.P.C. Details of entrance steps and ramps.

ARC 113: Structures - 1

Basics of Structural Engineering

Elasticity, stress, strain. Centroid and moment of inertia of plain areas, parallel axis theorem, moment of inertia, principal axis. Bending stresses and deflection in simply supported beams and cantilever beams.

Shear force and bending moment diagrams for strained beams subjected to concentrated and distributed loadings. Combined bending and direct strain, eccentric loading, stability of retaining walls and dams, fixed and continuous beams, theorem of three moment.

ARC 114: Architectural Drawing - 1***

Introduction to drafting procedures, graphic codes, symbols and architectural lettering. Construction of architectural scales and their application to real objects and drawings (plain scale, diagonal scale, isometric scale), construction of basic and complex geometrical shapes.

Orthographic projections of simple regular two dimensional shapes, Orthographic projection of simple, complex solids and hollow objects and sections. Study of interpenetration of solids and development of surfaces. Isometric, axonometric and oblique projections.

Visual study of the city - artifacts and the urban arts: Understanding of urban form through study of landmarks and elements of visual interest in the city through interactive learning processes.

ARC 115: History of Architecture -1

Art & culture of pre-historic man, Harappan civilization, Egypt, Mesopotamia, Greece, Roman and pre Columbian American cultures. Art & culture of ancient India (Vedic, Buddhist and Jain) and medieval India (Rajput and Islamic).Spread of Indian culture other parts of the world.

Impact of Christianity on art and culture of Europe. Development and spread of Islam and its influence on art and culture. Influence of renaissance, French, Russian revolutions and Industrial Revolution on art and culture. Folk and tribal art traditions, study of art from Africa, Australia. Modern art movement in West and India.

ARC 116: Art and Graphics - 1**

Introduction to arts, visual arts, and basic design. Developing sketching, drawing and painting skills through hand, eye and mind coordination. Exercises based on indoor and outdoor sketching, live drawing, rapid sketching etc. Drawing and painting geometrical shapes, plants, trees and manmade objects etc.

Making elementary two dimensional geometrical compositions with point, line, shape, form, texture and colour. Colour theory: Introduction to colour theory and various colour schemes. Use of various colouring techniques and medium i.e. pencils, pastels, water colour, crayon, ink etc.

Introduction to various styles of lettering and incorporating lettering as part of graphic design and composition. Basic design and principles of design. Understanding form-space interrelation, negative and positive space, space handling, chaos to order, scale, proportion, proximity, and juxtaposition. Use of contrast, rhythm, harmony, balance, symmetry etc. in design and compositions.

ARC 117: Workshop

Introduction to the carpentry tools, processes, joints and wood working machines. Preparation of various carpentry joints, fixing of plywood, commercial boards etc. and their application in furniture. Model making in various media like clay, thermocol, mount-board, paper, acrylic sheet, etc. Use of clay, Plaster of Paris, metal scrap, jute fiber etc. for study of forms. Painting and polishing on different surfaces and textures.

ARC 121: Design Project - 2*

Design of a simple building in the immediate or observable environment. Exercise relating personal experiences to behavioral needs and translating them into architectural program requirements.
Systematic introduction to issues related with the design of human habitat, its components and space standards. The design exercises may include small shelters like residence, cottage, weekend house, etc.

ARC 122: Building Material and Construction - 2***

Study of types, properties and specifications, seasoning process, techniques of preserving and finishing, quality tests and uses of timber. Study of types, properties, specifications, manufacturing process, techniques of preserving and finishing, quality tests, and uses of ferrous and non-ferrous metals and glass.
Ledged braced and battened, panel, glazed and flush doors. Fixed, side and top-hung, pivoted, louvered windows. Ventilators and fanlights. Pressed steel and M.S. section doors, windows and ventilators. Metal fitting &fixtures. Jamb casing, skirting, architrave, pelmet, moldings in timber.

ARC 123: Structures - 2

Load Bearing and Timber Structures
Structural design and illustrative detailing of load bearing structure; load bearing wall and its foundation, isolated columns and its foundation.
Introduction to structural design of beams, columns, foundations, roof trusses, floors, staircases and balconies in timber. Their functions and inter-relationships through force diagram, joints and connections. Structural design of simple trusses, beams and columns in timber.

ARC 124: Architectural Drawing - 2

SCIOGRAPHY

Introduction of basic principles of sciography and its application to the field of architecture. Sciography of two dimensional objects in plan and elevation. Sciography of three dimensional objects in plan and elevation and views (isometric, axonometric and perspective). Sciography of simple building elements.

PERSPECTIVE

Introduction to basic terms, principles, types and techniques of perspective drawing. One, two and three point perspective of simple objects, (drafted and free hand) presentation of interior and exterior views (drafted and free hand)

ARC 125: History of Architecture - 2

Study of architecture of Indian sub-continent from Harappan civilization through Budhist, Hindu, Jain, Islamic, Mughal, Rajput etc. upto colonial occupation. Introduction to Chinese and Japanese architecture.

ARC 126: Art and Graphics - 2**

Study of two and three dimensional geometrical forms and objects. Study of structure, form and space relation. Exercises based on two dimensional and three dimensional forms as an appropriate base for subsequent architectural designs.

Colour in design and architecture: Psychology of colours, warm and cool colours, colour and light, colour symbolism. Application of different mediums and materials using liquid, transparent, reflective, opaque, flexible and hard materials. Appreciation and use of various colours and textures in the design exercises.

Fundamentals of photography, composition in photography. Elementary exercises based on photography of objects, activities, interior and exterior of buildings. Graphic representations of ideas, concepts and design principles in the form of Ideograms, logo and symbols for selected activities, organizations, themes. Special emphasis may be given on three dimensional expressions. Exercises based on Media exploration, art lettering, poster, collage, sculpture, model, mural making and photography.

ARC 127: Computer Applications**

Fundamentals of computer systems, hardware, peripheral devices, operating systems, application software, etc. in architectural practice. Understanding and application of MS-Word, PowerPoint, etc. Need and tools for design and drafting. Preparation of two dimensional architectural drawings (including plans, elevations

and sections) incorporating layers, line-weights, texts, scale, dimensioning and formatting of drawings for taking prints and plots.

ARC 211: Design Project - 3**

Design of a group of residential and ancillary buildings set in a given context; introduction to concepts of clustering, shared open space, community, aggregation and economy in the context of space utilization. Design exercises may have facilities like housing for elderly, SOS village, transit housing, housing for training institute or similar projects based on community living and shared facilities.
The context may be based on study tour undertaken.

ARC 212: Building Material and Construction - 3***

Manufacturing, specifications of materials and execution process for roofing material such as Mangalore tiles, slate, corrugated sheets etc.
Single, double and triple timber floors. Flat, lean-to, couple, close couple timber floors. Timber trussed roof, king post, queen post, built up truss. Timber staircase, balcony and canopy. Shoring and underpinning.

ARC 213: Structures – 3

Limit State RCC Design -1
Introduction to R.C.C. structure. Type of structures and structural framing, structural components like tie, stirrups, beams, arch, vault, dome etc. Rigid jointed, pin jointed, moment of resistance of homogenous beams of rectangular cross section-under / over and balanced sections for various grades of concrete and types of steel bars. Design of shear, development length and anchor length. Structural design of columns (axially loaded, short and long columns, eccentric loaded), isolated column footings. Structural design of simply supported, continuous, cantilevered, doubly reinforced beams. Structural design of simply supported, continuous, cantilevered, one way slabs.

ARC 214: History of Architecture - 3

Study of European / western architecture starting from Greek and Roman civilization through a time period of Early Christian, Byzantine, Gothic, Early medieval Renaissance, Romanesque, upto Baroque and Rococo. Introduction to Egyptian and West Asiatic architecture.
Comparative study of Indian and world Architecture. Oriental and pre Colombian American Architecture, Mayan and Inca Architecture.

ARC 215: Environmental Science (Climatology)

Elements and types of climate, tools for measurement and understanding of climatic data. Climate balance in built environment. Human thermal comfort, thermal comfort factors and indices. Principles and application of solar passive architecture including natural ventilation design in buildings for thermal comfort, shading devices as per orientation and sun path diagrams. Visual comfort, day light design.

ARC 216: Theory of Design

Studies of folk and crafts, indigenous architectural studies, influence of tradition, culture and socio- economic developments on art and architecture. Introduction to enquires initiated by various western and Indian philosophers

Understanding of determinants of physical form such as concepts of space, structure, organization, symbolism, mass, surface, scale, order, proportion, rhythm, datum, axis, etc., in relation to place time and society with due consideration for perceptual qualities as affected by colours, light conditions, vision angles etc.

Communication and interpretations in architecture; the eloquence, aptness and style in architecture, their judgment and design. Developments in world architecture, environmental design and technology with reference to trend-setting work of architects, designers, ecologists, engineers etc. Design parameters, principles, processes, methods and program formulation. Design matrices and system integration. Process of design synthesis.

ARC 217: Architectural Graphics**

Introduction to various methods of depiction of ideas and concepts in architectural design in different mediums with examples. Methods of rendering and presentation of various elements, textures, designing formats, selection of lettering styles etc.

Rendering two dimensional building drawings, i.e. plans, sections, elevations, site plans, etc. with shade and shadows. Techniques of drawing and rendering different types of views, one point, two point, and three point perspectives and interior views for buildings with shade and shadows. Use of photography, model making, etc. for architectural presentation.

ARC 221: Design Project - 4*

Understanding of vernacular architecture its' social and physical environment and methods of construction emerging out of the traditional way of life of the people in a given place. Study of practices and design principles of vernacular architecture and its application with contemporary architectural interventions. Design of a simple building for public activity, in a non-urban setting, or a situation without urban

regulatory controls such as Panchayat bhawan, rural school, primary health center, anganwadi, extension centres, forest huts, etc. Introduction to other role players in the architectural process viz., the client and the user.

ARC 222: Building Material and Construction - 4***

Specification of constituent materials, processes, techniques of preserving and finishing, quality tests of PCC and RCC. Constructional details of all types of R.C.C. foundations, columns, beams, slabs, lintels, chajjas, staircase etc. Form work in timber and metal. Precast components like masonry blocks, hollow blocks, jalis, shelving units, slabs and pre-stressed units.

ARC 223: Structures - 4

Limit State RCC Design -2
Structural design of T and L beams and other sections, slabs spanning in two directions, flat slab, staircases of different types, combined footings
Introduction to various structural forms, viz. vaults, domes, shells, coffer slabs, folded plates, and foundations like raft, pile and retaining walls with an understanding of structural behavior through force diagrams.

ARC 224: Building and Energy

Basics of Ecology and Environment. Global environmental issues; types of energy, energy sources, energy requirements in buildings
Study of works of various Architects in this area through history; Implication of above in design of energy conscious buildings
Study of relevant standards and codes; Energy Conservation Building Code, energy rating of buildings; GRIHA, LEEDS; simulation of buildings for energy studies, introduction to building energy related software and their applications.

ARC 225: Surveying and Leveling

Objectives of land survey, aspects of surveying instruments and the study of their use. Scales: Plain scales, Diagonal scales, comparative scale, shrunk scale, Vernier scale.
Chain Survey, Compass survey, Plane table method and surveying with theodolite; use and application of Total station.
Leveling and contouring, preparation of contour map in plan and section; slope analysis. Provisions of code and byelaws related to land survey and construction on contoured sites.

ARC 226: Communication Skills**

Technical composition (e.g., reports, papers, essays) writing. Preparing sequences and framework for presentation, importance of posture, gesture, pronunciation, tone etc. on presentation quality. Preparing simple, complex architectural concepts and proposal with the help of text, drawings, transparencies, slides, video, photographs, models etc. Preparing simple and interactive slide shows and presentations using computer software. Public speaking for above types of presentations. Individual and group work on selected theme. Article review, presentations and seminars.

Elective - 1**

ARC 241	Traditional Indian Architecture
ARC 242	Aesthetics, Art and Appreciation
ARC 243	Modern and Contemporary Indian Architecture
ARC 244	Works and Philosophies of Great Masters
ARC 245	Architecture without Architects
ARC 246	Appropriate Architecture
ARC 247	Computer Aided Drafting

ARC 241: Traditional Indian Architecture**

Elements of vernacular architecture and related terms. Chronological development of vernacular architecture in India developed in various regions with different social, economic, cultural and climatic composition.

ARC 242: Aesthetics, Art and Appreciation**

Introduction of aesthetic relevance to architecture and study of influence of culture and socio economic development of architecture and art through history. Study of various masterpieces of art and architecture through paintings, sculpture, buildings etc. Development in environment design and technology in world architecture through study of building materials. To evolve the concept and framework for understanding architecture leading to building of vocabulary to discuss ideas in architecture. Discussion on architecture and social function based on philosophy in architecture. Illustrate, through examples, both, traditional and contemporary buildings.

ARC 243: Modern and Contemporary Indian Architecture**

Modern architecture in colonial and independent India. Works and philosophy of Le Corbusier and Louis Kahn in India and their influence of Indian architecture. Works and philosophy of Indian architects; A. P. Kanvinde, Charles Correa, J. A. Stein, B.

V. Doshi, Anant Raje, Raj Rewal and others. Contemporary architecture in India; works and philosophy of contemporary architects.

ARC 244: Modern and Contemporary World Architecture**

Modern architects' works and philosophies of modern masters or pioneers in Europe and America. Modern architecture and other movements in the world. Contemporary architectural genres and practitioners.

ARC 245: Architecture without Architects**

Many places are designed without Architects but recognized and appreciated in profession; such as space for living in informal sectors; road side shops and kiosks; house based cottage industries within living spaces; Study of such places.

ARC 246: Appropriate Architecture**

Understanding principles of design using natural and low energy materials. Local resources and sustainability. Scope, limitations and constraints for appropriate architecture. Study of works of Hassan Fathy, Laurie Baker etc.

ARC 247 Computer Aided Drafting**

Introduction to basic understanding of other software like Architectural Desktop, Revit, Archicad, etc. 3D modeling (creating shades and shadows, attaching materials and rendering). Cad customization for different project types. Basic understanding of other applicable software for energy auditing, building simulation, BIM software etc.

ARC 311: Design Project - 5**

Study of an urban environment in use; urban activities, services and construction methods, social utilization, growth and change shall be the focus of the study centered in a medium sized town poised for major changes in the near future.
Design of a multi-functional public building in the urban setting; introduction to urban development controls, codes and bye-laws. Exercise in articulation and manipulation of programmed needs, criticism and evaluation of alternative concepts, decision making process. The design exercises may include buildings like Collectorate office, Degree College, navodaya vidyalaya, corporation office, shopping complex, dharamshala, inn, motels, budget hotels, etc.

ARC 312: Building Material and Construction - 5***

Specification of constituent materials, processes, techniques of preserving and finishing, quality tests of aluminum sections, plastic, fiber glass.
Aluminum Doors, windows, grills, partition, casement window, sliding window. Timber sliding door, sliding folding door, Revolving door. M. S. rolling shutter and collapsible grills. Roof light, north light, monitor, tubular, built in trusses

ARC 313: Structures - 5

Advanced Structures
Structural design of water tanks, circular tanks with flexible and rigid bases, rectangular and square tanks resting on ground. Analysis of continuous beams and rigid jointed plans frames by moment distribution.
Introduction to concepts of structural design of modern structures like multistory buildings, auditorium, stadium, railway station, airport by use of large span roofing systems (tubular truss, cantilevered truss, north light truss, monitor roof truss) composite structure (steel with RCC), tensile, membrane, precast and pre stressed structural components and earthquake engineering.

ARC 314: Specifications and Estimation

Introduction and importance of specifications of materials and specifications of items of works. Brief and detailed specifications. Specifications as referred in state PWDs, CPWD schedule of rates and Indian Standards. Introduction, types and importance of estimates and estimation of quantities in project management and financial management of building projects. Introduction to quantity surveying, data required for quantity surveying, standard mode of measurement, and various methods of taking out detailed quantities. Calculating quantities of component materials and manpower in composite items of work and analysis of rates.
Abstract of quantities, bills of quantities, Measurement of works for interim and final payments. Tender document, preparation, estimation, abstract sheet of given project

ARC 315: Acoustics

Introduction to acoustics and general principles of sound. Behavior of sound in free and enclosed spaces. Sound absorbing and sound insulating materials (single and in combination for various frequencies of sound like panel, porous materials and cavity resonators). Design for aural comfort; audible frequencies, dB scale, calculating sound intensity levels, reverberation time etc. Construction and planning measures for good acoustical design. Acoustical defects and remedies, sound reinforcement

systems. Structure-borne and air-borne noise, urban noise; their effects and control. Historic and current case studies for the above aspects.

ARC 316: Water Supply and Sanitation

Sources of water, treatment for domestic use, study of quality of potable water, standards in water supply. Types of water supply pipes and joints. Water Supply distribution networks at municipal and colony level. Fixtures and fittings for water supply. Intake, storage and distribution plumbing layout for single storied, multi-storied, high-rise residences and public buildings. Calculating water quantity requirements, water flow requirements as per standards.

Basic principles and standards of sanitation for urban, semi-urban, rural areas. Types of sanitary pipes, joints and laying and disposal of city effluent through public sewer lines with manholes etc. Treatment of city effluent and recycling of wastewater, storm-water drainage and rain water harvesting at city level.

Types of sanitary systems and layout for a single residence, multistory buildings, public building and cluster houses. Sanitary fixtures and fittings placement and functions. Design and drawing of inspection chambers, septic tank, soak pits, rain water harvesting or disposal etc.

Solid waste management by collection of refuse and recycling of city solid waste; prevailing byelaws for same. Placement of refuse chutes in multi-storied buildings.

ARC 317: Building Appraisal**

Building appraisal of a significant building / complex. The documentation for appraisal shall be done in the form of measured drawing. The appraisal shall be in the form of measured drawing portfolio and a report with photographs and sketches.

ARC 321: Design Project - 6*

Design of closed environments with emphasis on the articulation of interior spaces detailing and finishing materials, textures. Colour and light, acoustics and air-conditioning, exterior spaces formed by buildings, elevations, and fenestration and build form as a moderator of urban space, site planning and landscaping. The design exercise may include buildings like corporate offices, museum, art center, single screen theatres, hospitals, convention centre, auditorium, club, etc.

ARC 322: Working Drawings**

Introduction to need and relevance of working drawings and presentation drawings. Introduction to various graphic, numeric, text components and their precise function

in a set of working drawing. Preparation of check list as guide for list of working drawing. Method of representing various contents and specific information in working drawing. Preparation of details for various building units.

ARC 323: Structures - 6

Steel structures
Understanding of design in steel with various components, their functions and inter relationships. Structural design of tension members like single and built up sections, beams and built up, plate girders and compression members like single and built up sections. Structural design of column bases (slab base and gusseted base) and grillage foundations, roof trusses (including tubular sections). Design of connections.

ARC 324: Principles of Human Settlement

Man's role in designing and developing settlements. Various factors influencing development of settlements. Introduction to settlement planning followed in Bronze Age and Iron Age. Study of various settlement planning principles described in the ancient Indian texts and built examples. Study of city planning during medieval and renaissance period in Europe.

ARC 325: Electrical Services

Brief introduction to generation of electricity; types of power stations
Power distribution system in city; function of sub stations; locational guidelines for substations, land and other infrastructural requirement for substation; power distribution system in locality.
Calculation of electrical load for residential and non - residential building, distribution board, electrical layout of building. Detailed electrical layout in a building, placement of electrical fixtures and fittings; control systems. Solar energy integrated electrical design of buildings and smart buildings.
Illumination standards and artificial lighting design and lighting power density. Daylight integrated lighting system, timers and sensors. Study of lighting fixtures and fittings used in buildings, special lighting systems for museums or displays. Provisions of standards, building byelaws and energy codes related to electrical services. Case study and project work.

ARC 326: Mechanical Services

Thermal comfort parameters. Understanding psychometric for HVAC design. Heat load calculations.

Introduction to air conditioning systems in building, methods of air conditioning, equipment and components used in air conditioning. Selection criteria for air conditioning systems. Ducting principles, layout schemes and placement of air conditioner outlets in central air conditioning systems.
Design and provision of lifts, escalator and walk ways; its integration in buildings. Fire-fighting provisions and its integration in buildings, provision of security systems. Wind and bio mass energy integrated site planning / design of buildings. Provisions of code and byelaws related to mechanical services and firefighting systems. Case study and project work.

ARC 327: Building Byelaws and Codes**

Need of having benchmarks and standards. Study of National Building Code and building byelaws. Methods of enforcement, monitoring and relevant civil laws for legal application. Procedures for development and implementation of acts and byelaws for land development and building design and execution process; preparation and procedure of approval drawings. Applying the knowledge gained in project work.

ARC 411: Design Project - 7**

Design of high-density, large-scale housing. Socio-economic determinants, legislative and economic constraints and technological alternatives shall be studied in detail. Exercises in simulation and conceptual modeling shall be conducted. Application of concepts of community participation, phasing, financing and construction planning computer aided project documentation including basic working drawings, preliminary estimates, outline specifications and scheduling aimed at comprehensive understanding of the implementation process. The design exercises may include apartment blocks, multi-story office building, hospitals, hotels, corporate offices, call centers, etc.
Study Tour- A study tour should be conducted during the semester as per the requirement of design studio/ exercise.

ARC 412: Advance Building Construction***

Advanced foundation types; grillage, pile, raft etc. Advanced slab types; flat slab, waffle slab, steel floor for industries. Reinforced brick construction, glass block construction etc. Patent glazing and curtain wall in steel and aluminum. Exterior finishes and treatments. Water proofing, sound proofing, fire proofing, thermal insulation, expansion joints etc. Design and detailing of shop fronts, show windows using above components.

ARC 413: Structures - 7

Project Design

Structural design, drawings and detailing of a complete building project through RCC, steel or composite structure paradigm.

ARC 414: Town Planning

Introduction to town planning, need and definition. Industrial Revolution era planning. Philosophies of eminent planners and study of their theoretical and executed works. Introduction to survey of planning, planning acts and bye laws, planning process, zoning and documentation.

ARC 415: Landscape Architecture

The landscape elements, design philosophy, structure components and planting design. Landscape design process, major garden styles; Hindu, Buddhist, Mughal, Japanese, Italian etc. Preparation of technical data sheets, study of plant material and preparation of herbarium. Modification, alteration accentuation, grading etc. of landforms. Study of works of major landscape architects and design exercise covering all parts of the above.

ARC 416: Building Economics and Sociology

Economics

Indian economy, economic features of development plans, Money and banking functions, factors of production, macro-economic theory, demand and supply, indifference curve analysis, equilibrium of firm, laws of returns, , theory of growth and models.

Economics of land as limited resource, demand for land acquisition. Economic development in relation to the regional planning, regional economic theories, problems and prospects of balanced regional development. Building Economics: Building Efficiency and cost reduction through planning, design of building components, use of new materials and innovative construction techniques etc. rent and other building acts, economics of high rise buildings.

Sociology

Community social and physical environment, social group and social structure, utility and relation with architecture. Indian Communities- rural and urban communities, their social structures and problems, cultural heritage, rituals and community gatherings etc. Trends and characteristics of urbanization, dynamics of urban growth and social change and attitude, value and behavior, review of Planning Commission reports.

Social aspect of physical environment, its limitations and implications on buildings, neighborhood planning, slum improvements and city fabric. Case study, sociological study of communities with their habitat and built environment.

Elective - 2**

ARC 431	CAAD and Visualization
ARC 432	Mega Structures
ARC 433	Architectural Journalism
ARC 434	Visual Communication
ARC 435	Hotel Services
ARC 436	Universal Design

ARC 431: CAAD and Visualization**

Meaning of CAAD and importance in Architecture, software used in CAAD, introduction to visualization.Preparation of drawings for visualization, understanding concepts of 2D drawings Introduction to the modeling techniques using different software. Rendering, its concepts, material application, setting up lights, camera, back ground, importing images Generating photorealistic images and making animations.

ARC 432: Mega Structures**

Detailed and comprehensive study of any type of mega structure; the structure, systems, services, traffic transportation, parking, erecting and commissioning of components

ARC 433: Architectural Journalism**

Journalism in general, Theories of journalism, techniques and processes. Contemporary architectural reportage for building reviews, article or book reviews, interviews, panel discussions etc. Digital and print Journalism.

ARC 434: Visual Communication**

Communicating architecture by visuals. Psychology; Visual theories; Architectural implications of virtual environment; Digital arts and presentations/ Media Elements of Visual design. Discussion and analysis of various types of communication media including visual identities; Study and application of drawing and other communication skills for architects;

ARC 435: Hotel Services**

Study of comprehensive and specialized services, amenities and infrastructure provisions in hotel; design of hotels integrating services: water, sanitary, garbage, electricity / energy, telecommunication, parking; and site planning; study of Building byelaws, rules and code provisions for various star of hotels; smart hotels

ARC 421: Design Project - 8**

Design of a multi-functional complex of buildings in the metropolitan context. Issues related to the growing problems of urban areas in third world countries and their future development shall be explored. Emphasis on the design with relation to the contextual environment, traffic and planning controls and impact analysis. An understanding of the architectural implications of such developmental scheme should lead to insights in the formulation of political and administrative policies for the development of the physical environment. The design problems may include projects like Re-densification, campus planning, factories, 'place' design etc.

ARC 422: Modern Building Systems

Domes, shells, vaults, arches. Large span roofing for special areas like gymnasium, airport, stadium, etc. space frames, geodesic domes, tensile structures, pneumatic structures. Modern construction systems and techniques adopted like lift-slab, slip-form, shotcrete etc. Principles applied to the design of high rise building form. Structural systems adopted for high rise buildings like rigid frame system, shear wall system, tubular system. Working and consideration for disaster prone area, coastal area structures, subterranean structures etc. Earthquake resistant structures, seismic performance criteria and performance of structure.

ARC 423: Urban Design***

Definition, scope and its integration with urban planning.,
Historical development and approach to urban design - spatial organization, classical, functional, ornamental, etc. Urban form, its elements, visual order of form, sequence, scale, and visual space dynamics, various surveys needed to document visual aspects of environs. Urban structure and design rationale, interrelationship between economic activities, public organization, communication systems, urban conservation and land- use structure.

ARC 424: Project Management

Introduction, need and importance of management. Management principles, theories, concepts, approaches. of managerial roles and skills. Software in management. Project management, acquiring projects, scope of work and Liaoning, feasibility studies, project proposal and reports, financial facilities. Construction management, planning, monitoring and controlling. Planning techniques; Bar chart, CPM, PERT. Selecting appropriate specification, manpower, technology, etc.
Value of work and cash flow costing and life cycle costing, time value of money, Financial Management. Organization and staffing; purpose of organizing and Human resources management, motivation and productivity.

ARC 425: Interior Design***

Theory and practice of interior design; visualperception of interior spaces, function, form, scale, proportion, balance, harmony and rhythm. Importance of anthropometrics and ergonomics in design. Modern interior materials and their applications.
Furniture, color and lighting, object de-art selection. Adapting interior design to architectural spaces. Case studies of outstanding interior design examples. Project work

ARC 426: Research Principles and Dissertation

Basic research principles and research methods, Report writing skills, Dissertation
Students are expected to choose their own topic of research on a specific area / field after consultation with the subject coordinator.

Elective - 3

ARC 441	Auditorium Acoustics, Systems and Services
ARC 442	Institutional Services
ARC 443	---
ARC 444	---
ARC 445	Architectural Conservation
ARC 446	Earthquake Resistant Buildings
ARC 447	---
ARC 448	Hospital Systems and Services

ARC 441: Auditorium Acoustics, Systems and Services

Acoustics design of auditorium and Cinema hall, Study of comprehensive and specialized services, amenities and infrastructure provisions in Auditorium; design of auditorium and cinema hall integrating services: HVAC, sanitary, garbage, electricity / energy, telecommunication, parking; and site planning; study of Building byelaws, rules and code provisions for various types of auditorium and cinema hall;

ARC 442: Institutional Buildings

Study of comprehensive and specialized services, amenities and infrastructure provisions in institution. Design of institution integrating services for water, sanitation, garbage, electricity / energy, telecommunication, parking and site planning. Study of building byelaws, rules and code provisions for institution; smart buildings for institution.

ARC 445: Architectural Conservation

This course intends to develop an understanding in architectural conservation. Meaning of architectural conservation, need and degrees of conservation; History of conservation in India and West, conservation charters. Role of archeological survey of India in conservation of India's cultural heritage listing and documentation, its importance and methods. Urban conservation, methodologies to be adopted for conservation management. Case studies in conservation related to adoptive reuse, building in context, preservation etc.

ARC 446: Earthquake Resistant Buildings

Design, Construction and structures for earthquake resistant buildings; Building codes, standards, byelaws and planning rules; Research and development of techniques and technology by Research Institutions

ARC 448: Hospital Systems and Services

Study of comprehensive and specialized services, amenities and infrastructure provisions in hospital; design of hospitals integrating systems and services: water, sanitary, garbage, electricity / energy, telecommunication, parking; and site planning; study of Building byelaws, rules and code provisions for various types of hospitals; smart hospitals

ARC 511: Thesis Project**

The thesis project shall include an individual's work on an architectural project proposal. Topic shall be selected by the students and approved by the department. Architecture work program and Architecture thesis manual shall be supplied by the department

ARC 512: Professional Practice

Introduction to architectural profession, role of professional bodies, The Architect's act 1972 and amendments; duties, liabilities and relationships of client, contractor and other technicians; The code of professional conduct and conditions of engagement of architects. Scale of remuneration for architectural services and mode of payments. Types of tenders and their process; execution of contract; problems in operation of contract; architectural competitions

ARC 513: Valuation and Arbitration***

Importance of valuation for rental, income/wealth tax, selling/ purchasing. Values, sinking fund, capitalized cost, year purchase, methods of deprecation and valuation tables. Mortgage/ lease, fixation of rent of private/ government, residential, commercial buildings etc. Different methods of valuation, valuation reports, duties and responsibilities as registered government valuer

Role and qualities of an arbitrator. Arbitration act-1940 with amendments till date. Arbitration with reference to competitions, valuation, contract, land disputes and its legal implications.

Elective - 4***

ARC 531	Urban and Regional Planning
ARC 532	Housing
ARC 533	Remote Sensing and GIS
ARC 534	Infrastructure Planning and Management
ARC 535	Disaster Management and Planning
ARC 536	Environmental Impact Assessment
ARC 537	Sustainable Planning and Management
ARC 538	Urban Landscape

ARC 531: Urban and Regional Planning***

Basic components of urban areas and Regions; Role and working of Urban and Regional planning at different levels like national level, state level, district level etc; Different planning theories and models;
Socio-cultural, economic planning, land use planning etc; General principles and working; Planning norms and development norms for urban and Regional approaches / techniques of development for existing areas, renewal schemes and development; Detailed survey and preparation of questionnaire for land use, socio-economic, Transportation planning etc;

ARC 532: Housing***

Housing as a basic need, housing as an integral part of urban & rural development, housing problem and statistics, programme based policies. Qualitative and quantitative demands of housing, housing estimates. Housing survey techniques and standards, sources of data and information etc. Housing cooperative and financing agencies. Objectives and general principles of cooperatives, self-help housing, financing agencies and their functions etc. Introduction to methods and approaches to housing design. Study analysis and design of housing schemes. Redevelopment of slums and squatters settlements

ARC 533: Remote Sensing and GIS***

Basic remote sensing, platform, sensors, and introduction to sensors, basic principal & methods of photo interpretation and techniques of data collection through satellite data; Classification techniques using satellite data; Digital image processing, enhancement techniques in urban information extraction; Aerial photography as a tool for collection of data and preparation of maps, its application in planning and preparation for a project, orientation concept and methodology transformation and adjustment techniques.
Experiments in lab, Instruction for making overlays; Computation of photo scale
Orientation of a stereo pair under a mirror stereoscope; Recognition on aerial photograph of objects indicated on ground photographs; Detection of defined objects, Description and identification of objects. Use of auxiliary features for object identification; Systematic scanning of a photograph, and object identification; Identification of land use with a given classification; Monitoring urban changes, Mosaic preparation. Base map preparation & elementary data analysis using satellite data; Experiments in lab, Instruction for making overlays. Classification preparation; Interpretation & delineation of various land use on satellite data products. GIS techniques and their application in planning field

ARC 535: Disaster Management and Planning***

What is Disaster? Natural & Manmade disasters; Causes, consequences and after effects of disasters;
national and state level Acts, rules, policies, laws, byelaws; Kyoto Framework of disaster mitigation and management; Disaster management policy – national and states; Disaster Management Act – national and states; Disaster Management Mechanisms: national, state and district levels; select global practices; disaster and development; physical planning and disaster management plans; various role players in disaster management – NGOs / CBOs and Armed Forces; Community Based Disaster Preparedness (CBDP), Disaster Risk Mitigation; disaster safe construction practices for different types of disasters, Disaster Preparedness Forecasting and early warning systems for various types of disasters; communication and information technology in disaster management; disaster education and awareness; documentation and case studies on natural disasters.
Post Disaster Management and Cross Cutting Issues, Post disaster management; rehabilitation and reconstruction of disaster affected areas; urban, disaster mitigation; natural resource management for disaster safe habitation; relationship between, disaster and environment; safe hill area development guidelines and coastal zone regulations for safe habitation; human settlement planning for consequence mitigation of global warming and climate change.

ARC 536: Environmental Impact Assessment***

Role of Environmental Impact Assessment in the planning and decision making process; Definition; and need, evolution and objectives, tasks and scope; Methods of Environmental Impact Assessment; Advantages and limitations; Case studies from India and abroad on projects of various types covering different levels of planning; Assessment of impacts on land use, Urban and regional; Assessment of impacts on resources (including air, water, flora and fauna); Case studies from India and abroad on projects of various types covering different levels of planning Assessment of social and health impacts; Case studies from India and abroad on projects of various types covering different levels of planning Public - private - people's participation in Environmental Impact Assessments: definition and concepts, objectives, techniques, advantages and limitation; PRA techniques; Case studies from India and abroad on projects of various types covering different levels of planning; Practical exercises on Environmental Impact Assessments.

ARC 537: Sustainable Planning and Management***

Changing perspectives in man-environment relationship with focus on issues of population, urbanization, resource depletion and pollution; limits to growth vis-a-vis sustainable economy; growth and environmental imperatives of developing vs developed countries; definitions, concepts and parameters in sustainable development with particular reference to Brundtland Commission, Agenda 21, Eco-City approach, etc.

Application of ecological principles in sustainability: energy and resource cycles, food webs, ecological pyramids and evolution and succession of natural ecosystems; Carrying Capacity based planning: concept, parameters and indicator measures, models and case studies in urban and regional development; Environmental Impact and Strategic Environmental; Assessment for urban areas; Ecological Footprint Analysis of cities; Sustainable Lifestyle Assessment and behavioral modifications at household levels.

Land capability and suitability analysis in location and planning of urban land uses; implications of urban form, density, land use pattern and transportation system in land and energy conservation

Urban interference in hydrological cycle, with particular reference to water pollution, water resources, drainage and natural ecosystems; urban water treatment, recycling and harvesting; use of non-conventional energy sources in urban development.

Sources, types and effects of air pollution and solid waste disposal in cavities, urban industrial processes and land use and transportation implications in air and solid waste pollution; norms, standards, laws, organizations and policies in urban air quality control and solid waste management; examples of best practices.

ARC 538: Urban Landscape***

Landscape Planning of urban spaces; Parks, urban open spaces, public places, Massing and heights of built volumes, street scape, roads, road junctions, lanes road side landscape; Urban climate, modification of urban climate, impact of urban climate, Environmental issues, urban services; Geological setup, Topography/ Slope

Introduction to the ideas, issues and concepts of sustainable Architecture, global environment and the built environment; principles of environmentally and ecologically supportive architecture; Study of sustainable architecture, use of energy, materials, health and global environment as related to the construction and operation of buildings. Sustainable and conservation practices – water conservation, sewerage treatment, solid waste treatment, economics and management

Low energy design, hybrid systems, modeling and simulation of energy systems, integration of PV and wind systems in the building, wind solar and other non-conventional energy systems, solar thermal applications for heating and cooling, electricity generation in buildings

Case studies on specific contemporary sustainable architecture.

ARC 521: Training**

The students shall have to complete the practical training for a period of one semester (six months) so as to qualify for obtaining the final B. Arch degree. The candidate shall have to submit to the dept. of architecture, the practical training report along with the certificates by the firm/ office / organization to the effect that he / she has completed training satisfactorily for a period of one semester. The student has to appear for the viva examination as per the exam schedule announced by the university.

ARC 522: General Proficiency**

General proficiency is meant for developing participation in core/ curricular activities in individual students like sports, NCC, student activities, etc.

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