AR Architecture and Planning

Part A: Common Section

Section A.1: Design and Graphics

Architectural Graphics; Visual composition in 20 and 30; Form; Surface development; Anthropometrics; Ergonomics, Ratio and proportion, Scales in design, Organization of space; Plans, elevations, and sections of buildings; Circulation- horizontal and vertical; Universal design; Building bye-laws; Codes and standards, Barrier-free environment; Engineering curves; Orthographic and Isometric projection; One-point and two-point perspectives; Light, shade and shadow;

Section A.2: Environmental Planning and Landscape

Natural and man-made ecosystem; Environmental, ecological, and sustainability principles; Environmental pollution- types, causes, controls and abatement strategies; Sustainable development goals and strategies; Climate change and built environment; Urban ecosystem approach; Ecological footprint and carrying capacity; Resource management; Life cycle analysis; Principles of circular economy; Environmental Impact Assessment; Carbon footprint; Carbon credits; Urban Heat Islands; Sustainable site planning; Contour and slope analysis; Landscape planning and design; Landscape suitability analysis; Plant characteristics and planting designs; Landscape conservation – principles and techniques; Social forestry; Historical gardens;

Section A.3: Urban Design and Conservation

Historical and modern examples of urban design; Elements of urban built environment – urban form, spaces, structure, pattern, fabric, texture, grain; Theories, principles, tools and techniques of urban design; Precincts, character, spatial qualities; Placemaking ; Form-based code; Urban design interventions for sustainable development and transportation; Development controls – FAR, densities and building byelaws; Urban renewal and conservation; Heritage conservation; Historical and contemporary public spaces;

Section A.4: Town Planning, Housing and Real Estate Development

Principles and concepts of town planning; Traditional and modern planned cities in India and abroad; Housing typologies; Concepts of housing need, demand, supply and shortage; Neighbourhood design; Residential densities; Affordable and incremental housing; Slums, squatters and informal housing; Standards for housing and community facilities; Housing for special areas and needs; Real estate valuation; Real estate feasibility studies and market analysis; Real Estate locational decisions and economic analysis; Project phasing and construction phasing;

Part B1: Architecture

Section B1.1 History and Theory of Architecture

World History of Architecture: Egyptian, Greco-Roman classical period, Byzantine, Gothic, Renaissance, Baroque-Rococo; Recent trends in Contemporary Architecture: Art nouveau, Art Deco, Eclecticism, International styles, Postmodernism, Deconstruction in architecture; Influence of Modern art and Design in Architecture; Indian Architecture; Oriental Architecture; Works of renowned national and international architects; Principles of art, design and Architecture;

Section B1.2 Climatology and Environmentally Responsive Design

Climatic factors and classification; Solar architecture; Micro and macro climatic considerations in design; Thermal comfort in built environments; Passive design principles and concepts; Building energy audit and management; Embodied and operational energy; Building energy performance simulation and evaluation; Alternate and renewable sources of energy for buildings; Building Performance Rating

systems; Kinetic architecture; Sustainable buildingtechnologies;

Section B1.3	Building Construction, Materials, and Structural Systems

Building construction techniques, methods and details: foundation, plinth, masonry, bonds, fenestrations, arches, scaffolding, formwork, timber/RCC/Steel frame construction, roof and roof covering; Lightweight construction; Fire protection; Flooring systems; Principles of Modular Coordination; Prefabricated construction; Building materials characteristics & applications; Different types of building materials for walls, floor, roof, finishes, repair and retrofitting, acoustic & insulation materials, damp prevention; Alternative building materials; Building structural systems; Elastic and Limit State design; Structural systems; Design with steel and RCC; Principles of Prestressing; High Rise and Shell structures; Gravity and lateral load resisting systems; Space frames; Long span structures; Suspension structures; Catenary structures; Wind load & seismic considerations in high-rise structures; Disaster resistant structures; Temporary structures for rehabilitation;

Section B1.4	Building Services

Natural and mechanical ventilation; HVAC design principles; Air-Conditioning systems; Water supply and distribution system; Water harvesting systems; Water treatment, recycling and reuse; Storm water drainage; Sewage and waste disposal; Sanitary fittings and fixtures; Plumbing systems; Drainage system; Principles of electrification and illumination and special lighting for buildings; Acoustics in buildings; Vertical transport systems- standards and uses; Building automation systems; Firefighting Systems; Building Safety and Security systems; Building Management Systems; Services for specialised buildings like Hospitals, Indoor Sports Stadiums & High-rise buildings;

Section B1.5	Computer Applications in Architecture

Fundamental principles of computational methods; Logic-based understanding of pattern recognition, simulation, and data analytics; Computer applications in building design and performance analysis; Architectural visualization: 3d Modelling and BIM, Rendering, Virtual Reality, Augmented Reality; Computational design: parametric design, shape grammar and generative design; Visual communication; User Interface and User Experience Design; Digital design and fabrication methods: CNC mining and 3d printing; Artificial Intelligence for architecture.

Section B1.6	Project Management and Professional Practice

Construction planning and equipment; Construction project management techniques e.g. PERT, CPM; Professional practice and ethics; Estimation, costing and specification; Tendering; Arbitration; Role of Council of Architecture; Architecture journalism; Industrial architecture; Human Sociology; Building Economics; Interior design;

Part B2: Planning

Section B2.1	Planning History, Theory and Techniques

Origins of the city; Pre-industrial cities; Post-industrial cities; Garden City, City Beautiful, Broadacre, Radial City, Linear City; Concepts and theories of urban planning; Ekistics; Urban sociology; Theories of urban geography; Regional delineation; Settlement hierarchy; Urban growth models; Industrial location theories; Contemporary planning ideas and trends: Eco- City, Smart City; Network Cities, Global Cities etc.; Global North and South perspectives; Land use and land cover classification; Types, tools, and techniques of surveys; Sampling techniques; Demography – definition and variables; Techniques of population projections; Estimation and forecasting techniques in planning; Socio-economic analysis; Goal formulation and scenario analysis; Planning indicators, norms, and standards; Public perception and user behaviour;

Section B2.2	Planning Policy and Practice

Concepts, factors and trends of urbanization; International charters and mandates for planning; Constitutional and legal provision for planning; Planning as a state subject; Policies and programs for planning in India; Types and hierarchy of plans; Development norms, standards and guidelines such as URDPFI; Eminent

domain; Land pooling and readjustment; Land acquisition; Laws governing land; Institutions of urban governance; Composition and functions of local self-governments and statutory institutions; Urban reforms and good governance; Participatory planning and use of technology; Municipal information systems, land information systems, cadastral systems;

Section B2.3	Infrastructure, Services and Utilities

Water supply demand; Sources of water and intakes; Groundwater yield and recharge; Service Reservoir and Pumps; Water distribution system layout and network design; Water treatment; Water quality and testing; Water sensitive urban planning; Off-site and on-site sanitation; Decentralized sewerage system; Water carriage systems; Sewage quantity; Sewerage layout and network design; Sewer section and sewer design; Sewer appurtenances; Waste water treatment; Sewage disposal; Surface water runoff estimate, Discharge from streams and rivers; Flood protection measures; Layout and design of storm water drains; Rain water harvesting;

Solid waste management: collection, storage, transportation and disposal; Waste composition and characteristics; Recycling and Reuse of solid waste; Processing and treatment of solid wastes; Area requirements and location choice criteria for different facilities and infrastructure; Standards, rules and Codes; Fundamentals of power transmission & distribution; Transformers, Feeders, Substation;

Section B2.4	Urban Land Use and Transportation

Land Use-Transport-Urban form interaction; Urban structures and land use pattern; Economics concepts of land, rent, land use and land values; Land value capture; Transit Oriented Development, Urban regeneration and brown field redevelopment; Real estate pricing; Accessibility measures; Residence and employment location choice; Aggregate and disaggregate transport demand models and forecasting; Traffic and travel demand management and control in urban areas; Process and principles of traffic engineering; Design of roads, intersections, grade separators and parking areas; Hierarchy of roads and level of service; Modes of transportation; Pedestrian and non-motorized transport planning; Traffic survey methods, Traffic flow Analysis; Transport infrastructure and allied facilities planning; Intelligent transportation systems;

Section B2.5	Data Analysis, Remote Sensing and Geo-informatics

Types of data and sources of data for planning; Descriptive statistics; Tests of normality; Inferential statistics: linear and multiple regression, testing of hypothesis, testing of error, ANOVA etc.; Decision Problem Structuring: Analytical Hierarchical Process, Multi-Criteria Analysis etc.; Basic concepts in satellite remote sensing, satellites, sensors, and coverage; Principles of digital image processing; Satellite data products and their use; Aerial photography; Principles of photogrammetry; Application of remote sensing in urban and regional studies; G.l.S applications in planning; Georeferencing; Storage of spatial data; Processing tools; 2d(spatial), 3d(elevation) and 4d(temporal) data analysis and modeling; Database management systems; Structured query Language; Spatial queries; Application of Machine Learning in urban planning; Smart city loT applications; Python basics; Urban Analytics; Spatial Data Infrastructure;

Section B2.6	Project Implementation and Financing

Reforms in municipal finance; Municipal tax administration; Municipal budgeting; Fiscal indicators for finance; Municipal bonds/debentures; Loans and credit rating; Recovery mechanisms and pricing of services and infrastructure; Partnership approaches and types of contracts; Financial Viability & cost-benefit analysis; Project implementation, monitoring and evaluation; Asset management; Operation and maintenance; Institutional organizational structures and capacity building;