PART - I - (60 Marks)

1. Architectural Design

Study of distinctive aspects of Architecture, inter-linkage between Architecture, Nature and Culture, unique aspects of Architectural profession, Introduction to the Concept of design in everyday life, Objectives of design, Elements of design such as Point-Line-Form-Space-Texture- Colour etc. Detailed study of color theory and its applications through geometric compositions, Principles of design such as Scale, -Balance, -Proportion, -Hierarchy -Rhythm, -Harmony -Contrast etc. Application of the same in two and three dimensional compositions.

2. Anthropometrics

Introduction to Anthropology, Anthropometric data for adults & Children: Static and dynamic for working spaces. Habitable space such as Living Room, Dining Room, Bedroom, Kitchen & Toilet with furniture layout. Arch of conversation. Spaces for assembly, like auditorium, stadium etc.

Demography., Density, Method for calculation of Density for planning, Dwelling, Household. Floor Area Ratio/ Floor Space Index,

3. Climatology

Solar Path, Wind Direction, Rain Etc. Temperature pattern in specific area, emphasis should be given on climatically and environmentally responsive architecture.

4. Barrier Free Environment

Design consideration for with Barrier Free Environment, Toilet design , pathway cladding and signage and standards for Differently able person. .

5. Designing & planning of Neighbourhood Unit

Designing & planning of Neighbourhood Unit in urban area or suburbs with respect to unit orientation, Cluster housing, row housing, high-rise housing. Open space park, circulation etc. Pedestrian, walkway, cycle tracks, hierarchy of roads, road layout system, integrating building services in a unit cluster. Rainwater drainage as well harvesting.

6. Terms of Drawing used in Architecture

Dimensions, Scales, Free hand drawing, lettering, sketching etc. Terminologies: viz; Cone of Vision, Centre line of Vision; Horizon line; Distortion; Station Point; Visual rays; Picture Plane; Ground line; Height line; and Vanishing Points; Types of Perspective projection: One Point Perspective; Two Point Perspective; There point Perspective, Horizon line & Ground line.

7. Architectural Mathematics

Curve Tracing: Asymptotes, Curves in Cartesian and Polar form, Standard curves- Cartesian & Polar curves, Parametric curves, standard Parametric Curves,

Three Dimensional Geometry: Review: Line, plane, sphere, vectors, Tangent plane to sphere, cone, cylinder, Quadric Surfaces- (Ellipsoids, Hyperboloid of one and two sheets, cone, elliptic paraboloid, hyperbolic paraboloid, cylinder), surface of revolution, some standard surfaces of revolution, Spherical Trigonometry: Sections of spheres, great circles, spherical triangle and its properties, relations in angles and sides of spherical triangle, spherical right triangle,

8. Art and Architecture

Introduction to application of art in Architecture, Purpose of Applied Architecture principles and nature, Paintings, Murals and Sculptures, Materials and techniques study of styles and changing trends in India from ancient times, Decorative elements such as *Jali* Design; *Inlay* work; Relief art work; Study of changing needs in different periods- *Dravidian, Gandhara, Gupta, Mughal, Rajput.*

Materials and techniques, Application of colors and textures in sculptures, murals, paintings, fountains etc., psychological effects of colors and textures, Art expression, appreciation and symbolism; two and three dimensional

forms; Aesthetic order; functional Importance, Interior and exterior space organization, graphic techniques of communication, form-space relation, Modern trends in applied art, contribution of science and technology in terms of new materials Styles and techniques of modern masters.

9. Building Services

Water Supply:- Detailed studies such as sources and treatment of water, Water demand & Calculations, storage and conveyance of water at municipal level, Water supply systems and various fittings Hot and Cold water supply layouts, Water supply design of a resident: connection with water mains, design of underground & overhead water tanks, pump capacity, calculations for diameter of pipe, Introduction to water supply in a multi-storied building, Wastewater:- Definition of sub soil water, storm water, might soil, sewage sanitary, domestic & industrial, sewer, sewerage & waste water, Various drainage & sanitary fixtures & fitting, Types of pipes and drains in different materials and their usage, diameter of pipes, slope standards inspection and intercepting chambers, manholes etc., Sewage and effluent treatment, innovative and cost effective sanitation concepts e.g. Sewage systems for a small project, wastewater recycling methods etc. Introduction to STP's & ETP's. Waste Management techniques, Electrical energy and its generation Electrical distribution systems and safety devices types of wiring systems, advantages and disadvantages, safety and precautions, internal wiring, loads, demand, tariffs and rules,

Types of electrical equipments used in building such as motors, fuses, switchboards etc., Introduction to Indian Electricity rules related to buildings, Introduction to wiring System in multi-storied building, Detailed studies of the electrical Fittings such as MCB's , ELCB's.

Introduction to Building Acoustics with reference to various building types such as studios, auditoriums etc., Detailed studies of various types of Acoustical materials and their application,

Detailed studies of Natural and artificial ventilation, Introduction to the concept of Air-conditioning and detailed studies regarding different types of Air-conditioning systems and their working -Window, Split, Central Systems etc.,

Introduction to Fire Fighting systems, Fire detection, Fire sprinklers, Fire Extinguishers and Fire Hydrants system. Wet Riser, Dry riser etc. Buildings where fire fitting provisions are required.

Vertical Circulation Systems in Building: Dimensions and design of Lift (Elevator) system in a building, Escalators, Travelator - Different Types available in market. ,

10. Housing

Introduction of housing & Human settlements, Housing policies and programs, settlements in the development of human civilisation, role of Housing in social and economic development of the nation, Housing in five-year plans & social Housing plans, National housing Policy, Major elements of housing policy; land, finance, material, technology & legislation, Development concepts and human settlement planning, Slum area development, Housing design & standards, units of housing design form and structure of housing.

11. Low Cost Building

Needs for low cost construction, both in the rural and the urban sectors, An introduction to various building techniques adopted in different climatic zones of the country, which result in varied vernacular expressions, Use of cost effective technologies including the use of local materials, up gradation of traditional technologies, prefabrication etc., Innovations of building techniques for low cost construction, Analysis of space norms for low cost buildings, Study of usage pattern of low cost buildings by the habitants, Comparative analysis of building materials and costing.

11. **Hill Architecture**

Historical perspective of hill architecture and its unique attributes and concerns, Major hill settlements in various regions. A broad view of traditional hill architecture. Vernacular practices in hill settlements in India, An overview of vernacular hill architecture of Himachal Pradesh, Building Types, Techniques and materials of vernacular architecture of Himachal Pradesh, Lessons from vernacular architecture and their time-tested indigenous technology, Modern buildings on hills in India, Constraints of climate, topography and availability of materials, Design factors such as access, circulation, gradients, slope analysis,, Environmental and ecological concerns and used as safeguards.

12. Interior Design

Introduction, Purpose, scope, objectives and history of interior design, Principles and Elements of Interior Design: Space making elements like wall, column, partition screen, floor, furniture, interior landscaping etc. their design value, color theories and schemes, light, Interior-Design: Exposure to diverse traditional, folk and contemporary crafts and their role in creating and enhancing interior spaces, Surface treatments, materials and their application techniques, Period Furniture, modern furniture etc. Illumination , general illumination, task light. Different illumination devices in use.

13. Landscape Architecture

Characteristics, structure and color of foliage, History, nature, scope and purpose of designed open space, Exposure to historical landscape. Introduction to ecology and its importance to Landscape designers, Advanced knowledge of elements of landscape Design and their effects in context to the environmental concerns, Soft Landscape and Hard Landscape. Use of Landscape in adding color. Identification of seasons and color of different foliage used in Landscape design.

14. Architectural Conservation:-approaches

Legal framework for Architectural Conservation. Various Act protecting architectural heritage.
The concepts and approaches to conservation in India and other countries, Institutional Aspects of Conservation, Conservation related Charters, World Heritage legislation, Conservation Acts & Legislation and Archaeological Acts, Conservation Area practice,
Re-adaptive reuse, up gradation programs in old areas, infill design, Upgrading infrastructure, finding and implementation framework for redevelopment and revitalisation projects.
Conservation Area Practice as well Re-adaptive Use technique used for architectural conservation.

PART – II - (60 Marks)

1. **History of Architecture**

Introduction of Indus Valley Civilisation, Study of Architectural characteristics, Introduction to the Vedic village, Study of its building typology and construction, Introduction to Buddhist settlement in India, Detailed studies of Architectural characteristics of various building types such as *Stupas*, *Chaityas* and *Viharas* through suitable examples from each geographical context to illustrate differences in Form, Construction methods and Ornamentation.
Rock-cut architecture, cave architecture.
Architecture of the Medieval period in India. From *Sultanate* period to *Mughal* period, different building typology, ornamentation etc. Different typology of buildings, like *forts, palaces, Mausoleum, Palace. Sarai, Water-ware, Ba0li,*
Architectural characteristics of typical civic spaces such as Agora, Acropolis, theaters,
Evaluation of *Corbelling, Trabeated* and *Arcuated* structure with examples.

2. Sustainable Vernacular Practices in Himachal Pradesh

Hill architecture and its unique attributes and concerns, Major hill settlements in various districts of Himachal Pradesh, A broad view of sustainable Vernacular Hill Architecture, Building types, techniques and materials of

Vernacular Architecture of Himachal Pradesh, Study of Vernacular construction techniques of Himachal Pradesh, *Koti* Banal Architecture *(Kath-Kuni)*, *Thathara* houses, *Dhajji* construction etc., Resilience of Vernacular construction techniques, Vernacular & Contemporary Construction techniques as adopted in the Zone-4 & 5 of Earthquake region of the Himachal State, Study of Vernacular/village settlement of hilly region preferably Himachal Pradesh.

3. Building Construction and Materials

Behavioral characteristics and applications of basic building materials- brick, stone, lime, cement, sand. Application, Properties and defect, in building components- wall, floor, roof and foundation.

Process of rock formation, types, properties, applications. Igneous, Sedimentary, Metamorphic, rocks/stones . Common stones used in buildings. Granite, Marble, Sand Stone etc.

Bricks- Constituents and properties of soil, manufacturing, types, sizes, properties and uses, Building construction techniques in brick and stone masonry, Various types of bonding in walls such as Stretcher bond- English bond- Single & Double Flemish bond etc.,., stone masonry of various types such as Rubble walling.

Applications of Timber: variety of Indian timbers, Characteristics and suitability for different uses. Building construction techniques in timber doors and windows, Battened-Braced-Framed doors, Flush doors etc., Introduction to various types of windows in Timber, Building construction techniques in timber floors,, Introduction to the nature and characteristics of wood construction-roofs, its advantages and Limitations,

Introduction to various materials, products and hardware for false ceiling, paneling and partitions,

Type of RCC foundations in framed structure-stepped, isolated, combined footing, raft and pile foundation; selection of foundation type as per soil bearing capacity and its improvements; depth and width of foundations; causes and failure and remedies of foundation.

Shell structures, Pneumatic Structure, Geodesic Domes, Space frames, filler slab, waffle slab, coffer slab, flat slabs and folded plates, Detailing of structural glazing, curtain walls, triple glazing windows, aluminum composite panels, etc.,

Details of aluminum doors and windows, and roof gardens, Prestressed Concrete Structures: introduction, method of prestressing, losses of prestress, designing of rectangular beams.

3. Analysis of Structures

Bending moment in Beams, theory of simple bending, section modulus, design criterion, bending Moment in symmetrical and unsymmetrical sections, strength of sections, Shear stress in Beams and Torsion, Shear Stress in beams and Torsion in Symmetrical and Asymmetrical sections, Fixed and Continuous Beams, Review of Shear Force and Bending Moment diagram for simply supported beam, Effect of continuity, its advantages and disadvantages, Analysis of Continuous Beams for two to four spans, conceptual idea about full and partial loading and fixed end moment using moment distribution method and Theorem of three moments.

Trusses, Definition of Truss, Perfect Truss, Imperfect Truss, types of Trusses and suitability, analysis of Simple trusses by analytical method.

Arches, types and behavior of arches with history, introduction to three hinged arches, Frames, indeterminacy of frames with different end conditions, analysis of frame by portal & cantilever method, Introduction of basic structural systems in architecture, Tensile structures, Comprehensive structures, Trusses, Shear structures, Bending Structures.

Basic of structural System & Soil Mechanics, bearing capacity of soil. Application of Structural concept and understanding of behavior of RCC (Reinforced Cement Concrete). Mix and working with RCC. Type of steel in use for Reinforcement, Types of Cement Used in Construction.

4. Geomatics and Survey

Application of Survey in Architecture, basic principles, types of maps, their scales, and uses, surveying, equipment namely Levels, Plane Table, Compass, Theodolite, Total Station and Laser based equipments, Measurements of distance, angles, directions and heights: principles and components of Theodolite, Magnetic Compass, IOP Levels, Auto Levels, Total Station, Contouring: Technical terms used in contouring, characteristics of contours, methods of contouring, tracing the contour, gradient for alignment of a roads and paths, uses of contours.

5. Computer Applications in Architecture

Auto Cad, Archicad, Revit,, Photoshop, 3D Max, and other soft wares in use of architecture design and drawings. Computation of data & Presentation through relevant Software, Introduction to 2D tools of CAD, Creating Drawings & using Text, Use of Drawing and modify toolbar, Grouping of Objects, Introduction to building Information Modelling (BIM), Introduction to Image Processing software, 3D Rendering- Introduction to 3D Rendering, Simulating the Sunlight angle, Adding Shadows, Adding Materials and adjusting its appearance, Adding a background scene, Effects with light, Adding Reflections and details with Ray Tracing, Creating and adjusting Texture maps, Adding Landscape and people and improving your image and editing.
Geo-positioning of land, finding of Longitude, Latitude of a piece of land.

6. Building Estimation, Costing & Specification

Introduction to different types of specification and their uses, writing specification for civil works of a project. Calculate Earth Excavation for Foundations, damp proof course, brick masonry work, concreting, flooring, plastering, painting, doors and windows, painting, varnishes, sanitary fixtures, electric fixtures etc.

Introduction to bill of Quantities of materials for RCC work in slab, beam, column, stair cases etc, Specification in bill of quantities. Methods of details of measurement and their application, item of work, measurement of typical elements, viz., arches, steps, and polygonal rooms.

7. Disaster Management

Natural disasters: Earthquakes, Floods, River Erosion, Cyclones, Tsunami, Landslides & Avalanches Forest Fires, Man Induced Disasters: Introduction, Nuclear Disaster Chemical, Mine Disaster, Biological Disaster, Cyber Terrorism, and Environmental Disaster, Planning for Disaster: Guidelines for disaster management of Floods, River Erosion, Cyclones, Tsunami, Landslides & Avalanches Forest Fires, Fire Service, Forecasting & Early warning Communications & IT with Scientific organizations. Spatial Data Management, Risk Transfer, Micro-finance, Role of Corporate and NGOs, Community Preparedness and Education Gender Issue Vulnerable Groups, Urban Development Civil Defence Home Guards NCC, NSS, NYK, Medical Preparedness, Public Awareness.

Role of Architects in Disaster Management., Make Shift/ quick construction techniques for rehabilitation.

8. Urban Design

Introduction to Urban Design, Its principles and Techniques, scope of Urban Design, Emergent concept in Urban Design, Urban Design Vocabulary, Elements of Urban Design, Concept of Urban Redevelopment, Urban Renewal and Urban Regeneration, Importance of context in Urban design (Context analysis, regional study and project understanding), Impact of Factors such as economy, politics, religion and regional on urban design, Gentrification and social imbalance, approach to gender issue, elderly people and child. Study of Futuristic city and new urbanism, Concept of Neighbourhood planning, study of existing urban developments, Urban design exercises.

9. Environmental Planning & Eristics

Meaning and Scope in Relation to town Planning and Architecture, settlement patterns in later periods of history; Changing form and pattern of human settlements in ancient, Medieval, colonial and modern India. Approach towards end user, issues of Slums, Ghetto, Vendors, Roadside Safety. Environmental sustenance.

Globalization and its impact on cities- Urbanisation, emergence of new forms of developments- self sustained communities- SEZ- transit development- integrated townships- case studies, Scope and Content of Master Plan- Planning area, land use plan and Zoning regulations- zonal plan- need, linkage to master plan and land use plan- planned unit development (PUD)- need, applicability and development regulations- Urban Renewal Plan- Meaning,. Redevelopment, Rehabilitation and Conservation-JNNURM- case studies, Definition and explanation of the concepts of density, FAR, land use and zoning, Emergence of the metropolitan phenomenon; Planning problems of cities and Solutions Rural and regional Systems: The rural-urban relationships; Problems of rural systems.

10. Energy Efficient Architecture

Types of availability and resources of conventional and non-conventional energy sources, Energy Conservation, Indian Energy Conservation Act 2001 features, Energy Star Rating of buildings and equipments, Bureau of Energy Efficiency, Energy Conservation Building Code (ECBC), Energy Building Code, Guidelines, Thermal Insulation, Heating, Ventilation and Air-Conditioning System, Building Lighting Design: lighting levels, efficient light options, CFL, LED's, Fixtures, Day lighting timers, Building Energy Management, Introduction to Building rating systems in India, Detailed study on LEED and GRIHA (Green Rating for Integrated Habitat Assessment), Case study: National and International examples.

11. Climate Resilience

Climatically Resilient planning for hill settlements, Introduction, Components of natural and built environment, Eco-systems and their relevance to environment human settlements, Modifications in natural environment, causes and consequences, evolution and significance, Existing Scenario: Impact of urbanization on settlements, Urban ecosystem approach, for villages in Himachal.

12. Research Methodology

Research in architecture-its nature, purpose and scope, Basic and applied research, Technical and behavioral-oriented research, Science and scientific method- various steps in scientific method, hypothesis, research design, data collection & analysis, conclusion and implications with special reference to architectural research.

13. Project Management

Construction Management, Construction stages, Construction team, Role of an architect in construction management, Management techniques and tools, Bar Charts, Program Evaluation and Review Techniques (PERT), Critical Path Method (CPM) for project management, Development and analysis of CPM net work,

Cost time analysis in network planning, Scientific methods of construction management, Project management for repetitive types of buildings. Inventory management, Resource scheduling methods through Bar charts, CPM and Line of Balance method, Inspection and quality control, Safety in Construction.

14. Earthquake Resistance Architecture

Seismic Zoning In India, Their relation with Architecture Deign, Number of Seismic Zone, and their consideration in design.

Structural Engineering Consideration for Earthquake

Architectural Measures for Earthquake.

Vernacular Practices for Resisting Earthquake.

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