

FURTHER DETAILS REGARDING MAIN TOPICS OF

PROGRAMME No. 06/2021 (Item No: 1)

ARCHITECTURAL HEAD DRAFTSMAN

KERALA STATE HOUSING BOARD

Category Number: 140/2019

Module 1

Architectural Design Principles

Elements that influence architectural space

Fundamental Elements of Design: Point, Line, Shape, Plane, Volume, Form

Principles of design – Unity, Balance, Symmetry, Proportion, Scale, Hierarchy, Rhythm, Contrast, Harmony, Focus, Figure and Ground

Anthropometric studies – Average measurements of human body in different postures, its proportion, application in design of simple household and street furniture

Basic human functions and their implications for space requirements. Minimum and optimum areas for various functions

Perception of colour and light, Colour Schemes based on principles of Harmony and Contrast

Design of Buildings

National Building Code

Building Rules in Kerala, RPWD Act

Space standards for buildings - Habitable room, kitchen, toilet, staircases, corridors, parking, access, exits, etc.

Minimum open spaces, setbacks, height of buildings

Vertical Transportation Systems - Design of ramps, stairs, elevators and escalators

Planning of vertical transportation systems – design parameters

Stairs - stairs with straight, circular and curved flights, Construction details of Wooden stair, Concrete stair, Steel stair and Composite stair, Fire escape stairs

Elevators: Planning and grouping of elevators, Elevator design parameters. Quality of service, Different types of elevators, Vertical transportation system in skyscrapers

Planning and details of escalators, travellers

Lighting and Ventilation in buildings

Types of Occupancy

Toilet, water supply and sanitation requirements

Fire fighting requirements

Designing for differently-abled persons

Module 2

Building Materials

Stone: Classification, Characteristic features and uses

Brick - country bricks & factory made bricks - properties, available sizes-uses.

Use of mud in construction

Mortar- types – mud mortar, stabilized mud mortar, lime mortar, cement mortar -preparation techniques. Properties and applications.

Timber: Classification of Timber– properties – available types of timber-suitability for construction

Bamboo: Bamboo as building material-types-properties.

Concrete: Ingredients of plain cement concrete-grades, properties, applications and uses.

Reinforced cement concrete, water-cement ratio, workability, curing, Different types of concrete- Light weight concrete, Rapid setting concrete, etc.

Forms of iron employed in building construction-wrought iron, cast iron and steel-physical properties- uses.

Steel: Types of steel employed in building construction, properties, uses.

Steel as reinforcement in RCC work: Types of reinforcement for concrete – standard forms

Aluminium, plastic and polymers in building construction

Glass and glass products:

Paints, Classification – various types of paints, their characteristics and purpose

Module 3

Construction Techniques

Construction of foundations Soil: Load bearing properties of different soils -Bearing Capacity, Safe bearing capacity and methods for improving it. Site protection: Slope protection- Edge protection- Retaining walls- Materials and Methods.

Shallow foundations: Spread footings – strip footing, stepped footings, isolated footing.

Continuous footing - Strap footing, Combined footing. Mat/ Raft foundation.

Pile foundation: Bearing piles, friction piles – concrete, timber, steel and composite piles.
Cased and uncased, cast in situ concrete piles, Bored piles, pressure piles and precast concrete piles

Structural systems using bricks: Arches, vault, brick piers, brick footing, brick masonry - brick walls in English bond and Flemish bond – half brick wall, one brick wall, T junction and cross junction.

Wall systems- Structural frames, bearing walls, metal and wood stud walls. RCC columns, RCC walls, precast concrete wall panels and columns

Roof systems - Flat roof, Sloping roof and Curved roof

RCC: One-way slab, Two-way slab, Two-way slab and Beam, Pre cast construction,

Steel: One-way beam system, Two-way beam system, Moment connections, Shear connections

Carpentry- Details of joints in wood –Doors – Windows –Furniture. Use of wooden members for various applications like structural systems

Doors - Door types: Metal doors, metal framed doors, plastic doors & glass doors.

Windows - Window types: Aluminum, Steel and plastic Window operation: Fixed, casement, awning & hopper, sliding, and pivoting.

Wall cladding- different types

Module 4

History of Architecture

Introduction to River valley cultures: generic forces shaping settlements and habitats: Indus Valley Civilization, Mesopotamian civilization, Nile Valley Civilization (Egyptian)

Greece - Palaces & Temples and their essential features. Geometry and Greek Architecture, Greek Capitals and Orders, Parthenon

Rome –Typology of buildings - Colosseum, Forums, Palaces Pantheon, Basilica

Salient features Vedic Village, Mauryan Empire –Architectural remains from Pataliputra, Asokan pillar at Vaishali, Buddhist Chaityas, Viharas, Stupa at Sanchi, Chaitya hall at Bhaja

A brief overview of Hindu Architecture - Hindu Temple planning, essential features, philosophy and rituals creating specific architectural vocabulary – Early shrines of the Gupta and Chalukyan periods

Dravidian Architecture : Dravidian culture and its relation to Architecture, Rock cut creations under Pallavas, Shore Temple at Mahabalipuram. Dravidian Order seen in Brihadeeswara Temple, Tanjore, Meenakshi Temple, Madurai. Panchaprakara temple planning.

Salient features of Indo Aryan Temples. Examples - Lingaraja Temple, Bhubaneswar; Sun temple, Konarak; Kandariya Mahadev temple, Khajuraho temple complex

Evolution of Islamic religious architecture in India Influences on Islamic Architecture, Salient features of a mosque. Qutb Minar, Quwwat-ul-islam mosque complex

Architectural Development under the kings of the Khilji - Example - Alai Darwaza. Tughlaq dynasty - Tomb of Ghiyasuddin Tughlaq, Khirki Masjid – Shish gumbad & Purana Qila, Delhi, Tughlaq, Sayyid and Lodi dynasty – Forms of Tombs

Mughal Architecture – Development of the Mughal style under the different rulers - Babur, Humayun, Akbar, Jahangir Shahjahan, Aurangzeb

Important examples –Humayun’s Tomb, Delhi, Fatehpur Sikhri (layout, Bulund darwaza, Diwan i Khas) Akbar’s Tomb at Sikandara, Tomb of Salim Chisti

The Taj Mahal, Agra, Red Fort, Delhi

Development of Architecture through the periods Early Christian, Byzantine, Romanesque, Gothic and Renaissance

Module 5

Architecture of Kerala:

Evolution of architectural style, Climatic, Geographical, Geological, Cultural, socioeconomic and religious factors, materials that influenced Kerala Architecture

Salient features of domestic and religious Architecture of Kerala.

Religious Architecture: Early Cave temples of Kerala, Early Hindu Temples, Churches and Mosques. Evolution of religious architectural forms

Domestic Architecture – Palaces (Padmanabhapuram palace, Krishnapuram palace)

Religious Architecture – Salient features of a Temple- Vadakkunnathan temple, Peruvanam temple, Vaikkom Mahadeva Temple, Kaviyoor rock cut temple

Cultural Architecture-temple theatres, Koothambalams Temple Architecture

Islamic Architecture in Kerala – Juma Masjid Thazhathangadi, Muchundi mosque in Kuttichira, Miskal masjid, Kozhikode

Churches and Synagogues in Kerala:

Traditional building materials and techniques used in Kerala- Timber, Laterite, mud, etc.

Architecture after Industrial Revolution

Architectural developments and impacts on society since Industrial revolution Examples- Crystal palace, Eiffel tower, Arts & Crafts movement; Art nouveau, eclecticism, and the works of Horta, Gaudi

Emergent new building / space types- structural engineering, standardization-Industrial exhibitions- Chicago School and skyscraper development.

Futurism, Expressionism, Cubism, Constructivism, De Stijl and their influence on Architecture

Bauhaus school & Walter Gropius, Modernism and the International style.

Works of national and international architects; international styles, post modernism, Deconstructivism in architecture.

Chandigarh and influence of Le Corbusier, Louis Khan, Koenigsberger

Works and ideas of Nari Gandhi, B.V.Doshi, Achyut Kanvinde, Charles Correa, Laurie Baker, Joseph Allen Stein, Hassan Fathy,

Richard Rogers, Renzo Piano, Norman Foster, Richard Meier, Paulo Soleri Frank Gehry, Santiago Calatrava, Geoffrey Bawa, Kenneth Yeang, Tadao Ando

Module 6

Climate and Built Form

Climate and Architecture: Climate, weather, components of climate, Global climatic factors
Global climate classifications

Site climate, Factors affecting site climate, Macro & microclimate, Urban and rural climate,
Site analysis concepts

Human heat balance and Comfort: Thermal comfort factors, Physiological aspects, Body heat
balance, comfort indices, comfort range and comfort charts

Heat flow through buildings: Basic principles of heat transfer through buildings,

Design considerations for warm-humid, hot-dry, composite and upland climates,

Climate responsive design in the tropics: Principles and its application; Active and passive
systems.

Sun and the design process: Movement of sun and solar geometry, Orientation for sun
Natural ventilation and air movement: Air movement around and through buildings,

Light and Lighting: photometric quantities, climate and light, basic principles of day lighting,
Brief introduction to Energy modeling software and its application.

Module 7

Building Services

Sources of water / hydrological cycle, Quantity of water – factors effecting demand &
consumption – population forecasting – Problems

Quality of water - Drinking water standards, physical and chemical characteristics of water

Processes involved – sedimentation, coagulation, filtration & disinfection, sedimentation
tanks – slow sand filters, rapid sand filters

Distribution systems

Plumbing layout in residential, high rise building

Wastewater characteristics – Types of oxygen demand

Preliminary treatment of wastewater – screens, gritchamber, detritus tank, sedimentation tank

Biological & Anaerobic treatment of waste water, Wastewater disposal

Solid waste management, Refuse collection, disposal, Incinerator, composting, vermi-composting, Sanitary Land filling, Bio gas plants

Refrigeration systems, Refrigeration Cycle, Various components of refrigeration systems and Cycle, Window AC, Split AC, Centralized systems

Understanding Principles of Air-conditioning, Air Conditioning Equipment

Cooling towers, cooling coil, refrigerants, boilers, ducts, concepts of zoning, room air distribution-types of outlets, Direct expansion and chilled water systems.

Types of compressors air-cooled & water cooled condensers, introduction to cooling tower air handling unit,

Computers in Architecture

Introduction to personal computers – hardware / software– operating system – important DOS commands

Introduction to CAD packages- Setting up & controlling– Creating & Editing Commands Organizing a drawing with layers

Introduction to BIM

Module 8

Theory of Structures, Estimation and Construction Management

Theory of Structures

Loads on structure as a whole - Introduction - Dead Load – Live load - Seismic Load - Wind Load - Tributary Load

Beams - support conditions – types

Load types - Point load, uniformly distributed and varying loads

Beam analysis - Shear force diagram - Bending moment diagram of simple cases such as:

- a) Cantilever beams with point loads, UDL & moment
- b) Simply supported beams with point loads, UDL & moment
- c) Simply supported overhanging beams (one side & both sides) with point load, UDL & moment

Precast pre stressed construction. Use and examples of various pre stressed structures. Two-way waffle slab, Two-way flat plate, Two way flat slab, Pre tensioning, Post tensioning, Hollow core slabs, T beam and slab.

Estimation and Construction Management

Measurement units for various building materials, Centreline method, Long and short wall method of estimates, PWD schedule of rate

Specifications – Preparation of detailed and general specifications

Different types of contracts, their relative advantages and disadvantages

Project cycle, Organization, planning, scheduling, monitoring,

Bar charts, work break down structure and preparation of networks. Network Techniques like PERT & CPM in construction management.

Budgeting, Cost planning, Direct Cost, Indirect cost, Total Cost Curve, Cost Slope Time value of money

Module 9

Town Planning and Urban Design

Contribution of Ebenezer Howard, Le Corbusier, Clarence Stein, Patrick Geddes and C.A.

Doxiadis to town planning

Impact of urbanisation on cities, urban environmental problems

Models of urban structure, CBD, nodes, fringe area, peri-urban areas, ribbon development, extended metropolitan regions

New urbanism, Transit oriented development

Master plans, Perspective Plans, Development plans, Town planning schemes, Regional Planning, Integrated rural and urban planning –Process of Plan preparation– Surveys for plan preparation– Development Control tools - land use, density, height, building line, FAR, etc.

Institutional framework for planning and implementation –Acts related to Land Acquisition, 73rd and 74th Amendment of the Constitution –Coastal Regulation Zone Act –SEZ Act – Environmental Acts –Slum related Acts –Schemes and Programmes for development of urban areas.

Urban Design: Definitions of urban design, urban scale, urban spaces, Urban massing, quality of urban enclosure, Image of the city and its elements –Kevin Lynch’s principles. Urban design survey, Urban renewal, urban conservation

Road form and hierarchy-Road pattern, Pedestrian areas

Module 10

Housing

Nature and Magnitude of Housing Problem in India, Housing Shortage, Estimation of Housing Shortage

Role of Housing in the National level, changing priorities in the housing policies and the major housing programmes carried out in the various five year plans.

Initiatives at global Level, Habitat Agenda, Changing role of governments from Providers to Facilitator

Housing typology- apartments, detached housing, row housing

Housing Density- net density and gross density, Rental Housing

Study of Slums, causes, Magnitude of the problem in India.

One Lakh Housing Scheme and other major Housing Schemes in Kerala

Housing the poor: Incremental Housing, Core Housing, Site and Services.

National Urban Housing and Habitat Policy, National Rural Housing and Habitat policy.

Recent Programs in Housing- IAY, IHSDP, RAY, PMAY, LIFE

Agencies involved in Housing: Government Departments, HUDCO, BMTPC, Housing Boards.

Role of NGOs, Cooperative sector and Private Sector in Housing.

Housing Finance: Essential characteristics, Sources of Housing Finance,

Major finance agencies in housing at national and state level; NHB, RBI, HDFC, Scheduled Commercial Banks, Housing Subsidiaries, Cooperatives etc.

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper