

### **Plan of Written Examination**

All the aspirants are informed as under with respect to the written test to be conducted for the recruitment of Junior Draftsman **(Advt. No.11 of 2023)** :-

1. The Exam will be conducted in MCQ (Multiple Choice Questions) format. OMR sheets will be used for answering the questions.
2. The Exam would be of 2 hours 30 minutes duration.
3. The Exam will consist of two parts (Part A and Part B) as follows:-

(a) **Part A:-** Qualifying test of Punjabi Language equivalent to Matriculation standard as per Notification No. G.S.R.72 / Const. / Art.309/Amd.(22)/2022, dated:28.10.2022.

Part	Topic	No. of Questions	Marks (Each Question carries 1 mark)	Type of Questions
<b>A</b>	Punjabi (Qualifying Nature) (Annexure-1)	50	50	MCQs (Multiple Choice Questions)

**Note:- (i) There will be no negative marking in Part-A.**

**(ii) Part 'B' will be evaluated only if a candidate scores minimum 50% marks (i.e 25 marks) in Part 'A'.**

(b) **Part-B:-** Part-B will consist of two sub-sections i.e Section (I) and Section (II) as following:-

Part	Section	Topic	No. of Questions	Marks (Each Question carries 1 mark)	Type of Questions
<b>B</b>	(I)	Questions from General Knowledge and Current Affairs, Punjab History and Culture, Logical Reasoning and Mental ability, Punjabi, English, Information Technology/Computer (Annexure-2)	40	40	MCQs (Multiple Choice Questions)
	(II)	Questions from the Subject (Annexure-3)	60	60	
	<b>Total</b>		<b>100</b>	<b>100</b>	

**Note:- (i) There will be negative marking in Part-B. Each question carries 1 mark. For every wrong answer, 1/4<sup>th</sup> mark i.e, 0.25 marks would be deducted. The question(s) not attempted will receive no credit or discredit.**

**(ii) The merit list of only such candidates, who qualify Part-'A', will be prepared on the basis of marks secured by candidate in Part-B.**

**(iii) Section (II) of Part B contains questions from the Trade/Subject related to the respective post.**

4. Tentative syllabus for the written examination for the recruitment of Junior Draftsman **(Advt. No. 11 of 2023)** is annexed at Annexure-1, 2 and 3.

**Annexure-1**

**(Punjabi Syllabus)**

**Part-A (Punjabi Qualifying Exam)**

1. ਜੀਵਨੀ ਅਤੇ ਰਚਨਾਵਾਂ ਨਾਲ ਸਬੰਧਤ ਪ੍ਰਸ਼ਨ:-  
ਸ੍ਰੀ ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਜੀ, ਸ੍ਰੀ ਗੁਰੂ ਅੰਗਦ ਦੇਵ ਜੀ, ਸ੍ਰੀ ਗੁਰੂ ਰਾਮਦਾਸ ਜੀ,  
ਸ੍ਰੀ ਗੁਰੂ ਅਰਜਨ ਦੇਵ ਜੀ, ਸ੍ਰੀ ਗੁਰੂ ਤੇਗ ਬਹਾਦਰ ਜੀ, ਸ੍ਰੀ ਗੁਰੂ ਗੋਬਿੰਦ ਸਿੰਘ ਜੀ।
2. ਵਿਰੋਧਾਰਥਕ ਸ਼ਬਦ, ਸਮਾਨਾਰਥਕ ਸ਼ਬਦ।
3. ਮੁਹਾਵਰੇ।
4. ਅਖਾਣ।
5. ਸਬਦ ਦੇ ਭੇਦ।
6. ਅਗੇਤਰ/ਪਿਛੇਤਰ।
7. ਵਚਨ ਬਦਲੇ ਤੇ ਲਿੰਗ ਬਦਲੇ।
8. ਵਿਸਰਾਮ ਚਿੰਨ੍ਹ।
9. ਸ਼ਬਦਾਂ / ਵਾਕਾਂ ਨੂੰ ਸੁੱਧ ਕਰਕੇ ਲਿਖੋ।
10. ਅੰਗਰੇਜ਼ੀ ਸ਼ਬਦਾਂ ਦਾ ਪੰਜਾਬੀ ਵਿੱਚ ਸੁੱਧ ਰੂਪ।
11. ਅੰਕਾਂ, ਮਹੀਨੇ, ਦਿਨਾਂ ਦਾ ਸੁੱਧ ਪੰਜਾਬੀ ਰੂਪ।
12. ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨਾਲ ਸਬੰਧਤ ਪ੍ਰਸ਼ਨ।
13. ਪੰਜਾਬ ਦੇ ਇਤਿਹਾਸ ਨਾਲ ਸਬੰਧਤ ਪ੍ਰਸ਼ਨ।
14. ਪੰਜਾਬ ਦੇ ਸਭਿਆਚਾਰ ਨਾਲ ਸਬੰਧਤ ਪ੍ਰਸ਼ਨ।

**Annexure-2**

**Part B- Section (I)**

<b>Sr. No.</b>	<b>Indicative Contents of Syllabus</b>	<b>Weightage (Approx.)</b>
1	<b>General Knowledge and Current affairs of National and International importance including:</b>  (i) Political issues, (ii) Environment issues, (iii) Current Affairs, (iv) Science and Technology, (v) Economic issues, (vi) Geography (vii) History of India with special reference to Indian Freedom Struggle Movement, (viii) Sports, (ix) Cinema and Literature.	10
2	<b>Punjab History and Culture:-</b>  <i>Physical features of Punjab and its ancient history. Social, religious and economic life in Punjab. Development of Language &amp; literature and Arts in Punjab, Social and culture of Punjab during Afgan/Mughal Rule, Bhakti Movement, Sufism, Teachings/History of Sikh Gurus and Saints in Punjab. Adi Granth, Sikh Rulers, Freedom movements of Punjab.</i>	5
3	<b>Logical Reasoning &amp; Mental Ability:</b>  (i) Logical reasoning, analytical and mental ability. (ii) Basic numerical skills, numbers, magnitudes, percentage, numerical relation appreciation. (iii) Data analysis, Graphic presentation charts, tables, spreadsheets.	10
4	<b>English:-</b>  <i>Basic Grammar, Subject and Verb, Adjectives and Adverbs, Synonyms, Antonyms, One Word Substitution, Fill in the Blanks, Correction in Sentences, Idioms and their meanings, Spell Checks, Adjectives, Articles, Prepositions, Direct and Indirect Speech, Active and Passive Voice, Correction in Sentences, etc.</i>	5
5.	<b>ਪੰਜਾਬੀ:-</b>  ਸੁੱਧ-ਅਸੁੱਧ, ਸ਼ਬਦਜੋੜ, ਅਗੇਤਰ ਅਤੇ ਪਿਛੇਤਰ, ਸਮਾਨਾਰਥਕ/ਵਿਰੋਧੀਸ਼ਬਦ, ਨਾਂਵ, ਪੜਨਾਂਵ ਅਤੇ ਕਿਰਿਆ ਦੀਆਂ ਕਿਸਮਾਂ ਤੇ ਸਹੀ ਵਰਤੋਂ, ਲਿੰਗ ਅਤੇ ਵਚਨ, ਪੰਜਾਬੀ ਅਖਾਣ ਤੇ ਮੁਹਾਵਰੇ, ਅੰਗਰੇਜੀ ਤੋਂ ਪੰਜਾਬੀ ਅਨੁਵਾਦ ਅਤੇ ਬਹੁਤੇ ਸ਼ਬਦਾਂ ਦੀ ਥਾਂ ਇੱਕ ਸ਼ਬਦ ਆਦਿ।	5
6	<b>Information Technology/Computer:-</b>  <i>Basics of computers, Network &amp; Internet, Use of office productivity tools Word, Excel, Spreadsheet &amp; PowerPoint.</i>	5
	<b>Maximum Marks</b>	40

## Annexure-3

### Part B Section (II) – Trade/Subject Syllabus

#### **I. For the Post of Junior Draftsman (Architect) :**

##### **Architectural Drawing**

1. Orthographic projections
2. Section of Solids : Simple geometrical shapes
3. Development of surface
4. Isometric Views : Conversion of 2D geometrical shapes into 3D isometric views
5. Axonometric Views
6. Simple Perceptive of solids incorporating all views.
7. Introduction to Sciography and Rendering

##### **History of Architecture**

1. Pre Historical Architecture
2. River Valley Civilizations
3. Greek Civilization
4. Roman Civilization
5. Buddhist Architecture in India
6. Temple Architecture in India
7. Early Christian Architecture
8. Byzantine Architecture
9. Romanesque Architecture
10. Gothic Architecture
11. Renaissance Architecture
12. Islamic Architecture in India
13. Industrial revolution
14. Modern Architecture in Europe and America
15. Contemporary/post Independence Architecture in India

##### **Architectural Design**

1. Elements of Design : Line, shape, form, pattern, Textures.
2. Principles of Design : Balance, Unity, Symmetry, Rhythm, Harmony etc.
3. Role of Colour : Warm and Soft Colours, Colour schemes for various interior / exterior spaces, colour theory.
4. Anthropometric Studies and graphical representation of :  
(a) Vehicles (b) Street furniture (c) Graphic Representation of plant material, and human figures.
5. Study of spaces and layout of furniture for various activities in small structures comprising public utilities.
6. Design of a single storey structure such as weekend cottage, milk bar etc.

##### **Building Construction - I**

1. Brick work and stonework : sizes, types, jalties, reinforcement, stone facings and claddings
2. Openings in walls : Classification of arches and lintels
3. Damp Proof Course(DPC): Sources, classification and treatment
4. Foundations : types
5. Doors and windows : functions, sizes, location and classification, joints used.
6. Flooring : types and finishes
7. Roof and roof coverings : types, king post and queen post trusses
8. Staircases and ramps : purpose, types, materials, relation between different component, slopes
9. Interiors of Buildings : False ceiling and partitions
10. Expansion joints
11. Form work and steelwork for different structural members, bending of bars, formation of

- hooks and cranks
- 12. Steel Sections using standard rolled sections, rolling and collapsible shutter
- 13. Steel Roofs : construction details, roof covering – AC, GI sheets
- 14. Finishes : Plastering and pointing, Stone cladding and tile lining, Gravel and wash marble finish, Panellings and fibrous board finishes
- 15. Doors and Windows using different sections, anodizing, beading in aluminum sections
- 16. Earthquake resistant building configuration.

### **Building Services**

1. Water Supply
  - 1.1 System of water supply
  - 1.2 Storage and Distribution of Water
  - 1.3 Hot water supply for buildings including solar water heating.
  - 1.4 Service connections, types and sizes of pipes, water supply fixture and installations
  - 1.5 Concept of Rain water harvesting
2. Drainage
  - 2.1 Principles of drainage, surface drainage
  - 2.2 House drainage
  - 2.3 Inspection chambers
  - 2.4 Ventilation of house drainage
  - 2.5 Functions and working of sinks, wash basins, water closets, flushing cisterns, urinals,
  - 2.6 Septic tanks, seepage and soak pits
3. Sound Insulation
  - 3.1 Behaviour of sound propagation
  - 3.2 Acoustics in building, acoustical defects such as echo, reverberation, sound foci, methods of correction, special requirements in Buildings like auditorium, conference halls, studios, etc
  - 3.3 Acoustical materials and their uses in various buildings
4. Lighting and Electrical Fittings
5. Heat, Ventilation and Air Conditioning
6. Vertical Transportation Systems
7. Fire Fighting Services
8. Integration of lighting, air-conditioning, acoustics and other services/systems in buildings

**Structure Mechanics :** Force system and Equilibrium, Centroid and Moment of Inertia, Stress and Strain, Shear Force and Bending Moment, Bending stresses in Beams, Plain frame(Truss)

**Climatology :** Relation of Climate and comfort, Sun Control and shading devices, Wind control, Use of building materials with respect to climate : Concrete, Brick, Glass, Plastics, Stone, and Insulating material, Criteria for site selection, Environment and Ecology

### **Computer Applications in Architecture (AutoCAD)**

1. Creating and Saving a new Drawing
2. Drawing Commands : Line, Poly line/Double line, Arc, Ellipse, Polygon, Rectangle, Spline, Circle, Sketch, Hatch, Donuts.
3. Viewing an Existing Drawing : Zoom, Pan, Redraw and Regen all, Regen Auto, View
4. Modifying an Existing Drawing : Undo / Redo / Oops, Trim, Move, Offset, Rotate, Array, Stretch, Divide, Chamfer, Erase, Break, Copy, multiple copy, Mirror, Change (change properties), Extend, Explode, Blip mode, Scale, Fillet.
5. Making and Inserting Blocks : Blocks, Insert block, Base, Using library for blocks, W-block, X-ref, Explode.
6. Dimensioning and Text : type, style, units, utilities, variables, Dimensioning of different elements like Arc, Circle Radius, diameter, continuous dimensioning etc. Editing dimension test and updating. Text style – font types, height, width factor etc.

### **Structure Systems**

1. Bulk Active Structures : Post and beam, Fixed and continuous beams, Portal Frame.
2. Vector Active Structure : Roof Truss, Space Truss.

3. Surface Active Structure : Slabs and Folded plates, Spherical shells, domes and vaults.
4. Pneumatic Structure : Membrane Action, Air supported and air inflated structures.
5. High Rise Structures

### **RCC Structures**

1. Concept of reinforced concrete, suitability of different types of reinforcing materials. Introduction to IS:456-2000.
2. Theory and design of singly reinforced rectangular sections, concept of neutral axis, balanced, under reinforced and over reinforced sections.
3. Calculation of Moment of Resistance of Simply Supported Singly reinforced Rectangular beams.
4. Shear and Bond stresses in beams.
5. Theory of doubly reinforced beams.
6. Theory of one way and two way slabs as per IS: 456-2000 and drawings showing reinforcement details.
7. Theory of long and short square, rectangular and Circular Columns subjected to axial loading (with Circular ties) as per IS: 456-2000 and drawings showing reinforcement details. Design of Square / Rectangular / Circular Column.
8. Detailing of reinforcements: Slabs, Beams, Columns and Column footings

### **Steel Structures**

1. Introduction to IS:800, Types of structural steel, Types of Indian Standard Steel Sections.
2. Stress Strain Curve of mild steel.
3. Riveted Connections and Welded Connections
4. Theory and design of laterally restrained single I-section, steel beams as per BIS: 800.
5. Theory of Tension and compression members of a roof truss as per IS:800.
6. Theory of axially loaded single I-Section steel column as per IS:800 .
7. Types of column basis, column beam junctions (framed, seated )

### **Surveying**

1. Chain surveying : purpose, error and corrections.
2. Compass surveying
3. Levelling
  - 3.1 Concept of levelling, reduced level and benchmarks
  - 3.2 Construction of Dumpy level
  - 3.3 Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis
  - 3.4 Temporary adjustment: setting up and leveling
  - 3.5 Concept of back sight, foresight, intermediate sight, station change point, to determine reduced levels
  - 3.6 Level book and reduction of levels by
  - 3.7 Computations of Areas of regular figure and irregular figure. Simpson rule
4. Plane Table Surveying:
  - 4.1 Purpose of plane table surveying, equipment used in plane table survey
  - 4.2 Setting of a plane table: Centering, Leveling, Orientation.
  - 4.3 Methods of plane table surveying : (a) Radiation, (b) Intersection (c) Traversing
  - 4.4 Two Point Problem
5. Contouring : Concept of contours, contour interval and horizontal equivalent.
6. Instruments : uses of (a) Theodolite (b) Planimeter
7. Use of Modern Surveying equipment (Auto Level, Micro-optic Total station, EDM instruments)

### **Town Planning**

Growth of the Industrial Town, Planning Process, Introduction to Urban land uses & their management, Legislation and Urban Controls.

## **Building Bye-Laws**

1. Basic Terminology
2. Factors affecting planning of byelaws: Light and ventilation, Mass, Volume, Open space Skyline, Aesthetics, Setbacks, Parking and Fire Safety.
3. Byelaws
4. Zoning : objectives and types.
5. BIS and CPWD By-laws/standards for removing Architectural barriers for persons with disabilities (PWDs)
6. Earthquake resistant regulations, Code provisions (IS-1893), seismic zoning.

## **Quantity Surveying and Valuation**

1. Types of estimates : preliminary and detailed.
2. Preparation of Detailed and Abstract Estimates from Drawings
3. Calculation of quantities of materials
4. Analysis of Rates
5. Measurement Book and Billing
6. Valuation
7. Contractorship
8. Preparation of Tender Document based on Common Schedule Rates(CSR)

## **II) For the Post of Junior Draftsman (Civil/Civil & Public Health)**

1. **Introduction:** Importance of safety and general precautions observed in the in the industry/shop floor. Familiarization& information about rules and regulations of the Trade.
  - List of the Instruments, equipment's and materials
2. **Importance of B.I.S.**
  - Introduction of Code for practice of Architectural and Building Drawings (IS: 962-1989, SP-46:2003).
  - Layout of drawing. Lines, Lettering, Dimensioning.
  - Knowledge of different types of scale. Principle of R.F.
  - Different types of projection views: Orthographic, Isometric, Oblique and Perspective.
3. **Characteristic, types and uses of Materials:-**
  - Stones, Bricks, Lime, Pozzolanic, Cement, *Sand*, Clay Products (types, earthenware, stoneware, porcelain, terracotta, glazing), Mortar & Concrete (Types, uses, preparation, proportion, admixtures and applications),
  - Timber (Types, Structure, disease & defects, characteristic, seasoning, preservation and utility) Alternative material to Timber (Plywood, Block board, Particle board, Fireproof reinforced plastic(FRP), Medium density fireboard (MDF)etc.), Tar, bitumen, asphalt
  - Protective materials:-*Paints*, Varnishes, Metal and Plastics
4. **Building Construction:-**
  - Sequence of construction of a building, different parts of building, Stonemasonry (Terms, use and classification), Principle of construction, composite masonry, Strength of walls, Strength of masonry, Brick masonry – principles of construction of bonds, Tools and equipments used.
  - Foundation:-Purpose of foundation, Causes of failure of foundation, Bearing capacity of soils, Dead and live loads, Examination of ground, Types of foundation, Drawing of footing foundation setting out of building on ground excavation, Simple machine foundation
  - Types of shoring, scaffolding, Underpinning and Timbering
  - Carpentry joints, Doors, *Windows, Ventilators*
  - Floors, Flooring, Stairs, lift and Escalator

- Roofs & Roof coverings, *Truss, Shell, Dome, Roof & coverings*
- House drainage of building:-Introduction, Terms used in PHE, Systems of sanitation, System of house drainage, plumbing, sanitary fittings, etc, Types of sewer appurtenance, Systems of plumbing, Manholes & Septic tank, Water treatment plant, Sewerage treatment plant

#### **5. Treatments of building structures:-**

- DPC Sources and effects of dampness, Method of prevention of dampness in building, Damp proofing materials, Anti-termite treatment, Weathering course, Fire proofing, Arches, *Lintel* ( types, wooden, brick, stone, steel &RCC ), Chajjahs, Centering& Shuttering

#### **6. Surveying:-**

- Introduction, History and principles of chain survey, Instruments Classification, accuracy, types, Main divisions (plane & geodetic), Chaining, Mouza Map, Compass survey, Plane table survey.
- *Levelling*:-Auto level, dumpy Level, Tilting Level, Principle of levelling Types, component / part and function, Datum Focussing & parallax, Deduction of levels / Reduced Level, Types of leveling, Application to chain and Levelling Instrument to Building construction.
- *Contouring*:- Definition, Characteristics, Methods, Interpolation of Contour, Contour gradient, Uses of Contour plan and Map.
- Introduction to Theodolite survey

#### **7. Electrical Wiring: -**

- Safety precaution and elementary first aid, Artificial respiration and treatment of electrical shock, Elementary electricity, General ideas of supply system, Wireman's tools kit, Wiring materials, Electrical fittings, System of wirings. Wiring installation for domestic lightings,

#### **8. Building:-**

- Principle of planning, Objectives & importance Function & responsibility, Orientation, Local building Bye-Laws as per ISI code, Lay out plan & key plan, composition of drawing, Provisions for safety, Requirement of green belt and land, Economy & orientation, Provision for lighting, ventilation, drainage and sanitation.
- Types of building, planning & designing of residential, public and commercial building
- *Parks* & play ground-Types of recreation, landscaping etc.
- Prefabricated Structure: Method of construction and assembling
- Concepts of design of earthquake resisting buildings- requirements resistance, safety, flexible building elements, special requirements, base isolation techniques.

#### **9. Computer aided drafting:-**Operating system, Hardware & software, CAD, 3D modeling concept in CAD, 3D coordinate systems to aid in the construction of 3D objects

#### **10. Reinforced cement concrete structure:-**Introduction to RCC uses, Materials, Formwork, Bar bending details as per IS Code, Reinforced brickwork, Materials used for RCC Construction, Selection of materials – coarse aggregate, fine aggregate, cement water and reinforcement, Characteristics, Method of mixing concrete, Slump test, Structure – columns, beams, slabs - one-way slab & two-way slab, Innovative construction, Safety against earthquake, Grade of cement, steel- behaviour and test, Bar-bending schedule, Retaining wall, R.C.C. Framed structure.

- Steel structures:-Structural fasteners, Joints, Tension & compression member, Classification, fabrication, Construction details.

#### **11. Roads:-**Introduction, General principles of alignment, Classification and construction of different types of roads, Component parts, Road curves, gradient, Curves-types,



designation of curves, Setting out simple curve by successive bisection from long chords, simple curve by offsets from long chords, Road drainage system,

- Basics of Bridges & Culvert.

## 12. Irrigation Engineering:-

- Basic terms used in irrigation, Hydrology like duty, delta, base period, intensity of irrigation, Hydrograph, peak flow, run off, catchment area, CCA, corps like, rabi, kharif etc.,
- Storage, diversion head, work -characteristics and types.
- Reservoir –types of reservoirs, i.e., single purpose and multi- purpose, area, capacity and curves of reservoir.
- Dams, weir & barrages- types purposes.
- Hydro electric project like Fore bay, Penstock, Turbines, Power house, etc.
- Canals- classification and distribution system, canal structures.
- Types of cross drainage works like Aqueduct, Super passage, Syphon, Level crossing, inlet and outlet, etc.

## 13. Estimating and Costing:-

- Introduction, Purpose and common techniques, Drawing of construction, Measurement techniques.
- Estimate-necessity, importance, types- approximate and detailed estimate-main and sub estimates, revised, supplementary, maintenance/repair estimate-taking off quantities-method Rate analysis of typical items and their specifications, Labor and materials, Govt. Schedule of rate, Estimating of irregular boundaries by trapezoidal and Simpsons formula.

### (III) For the Post of Junior Draftsman (Town Planning)

**Note: For the Post of Junior Draftsman (Town Planning), Candidate can choose/attempt any one of the following two subjects i.e, Civil and Architecture.**

#### (i) Civil :

1. **Introduction:** Importance of safety and general precautions observed in the in the industry/shop floor. Familiarization& information about rules and regulations of the Trade.
  - List of the Instruments, equipment's and materials
2. **Importance of B.I.S.**
  - Introduction of Code for practice of Architectural and Building Drawings (IS: 962-1989, SP-46:2003).
  - Layout of drawing. Lines, Lettering, Dimensioning.
  - Knowledge of different types of scale. Principle of R.F.
  - Different types of projection views: Orthographic, Isometric, Oblique and Perspective.
3. **Characteristic, types and uses of Materials:-**
  - Stones, Bricks, Lime, Pozzolanic, Cement, *Sand*, Clay Products (types, earthenware, stoneware, porcelain, terracotta, glazing), Mortar & Concrete (Types, uses, preparation, proportion, admixtures and applications),
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  - Sequence of construction of a building, different parts of building, Stonemasonry (Terms, use and classification), Principle of construction, composite masonry, Strength ofwalls, Strength of masonry, Brick masonry – principles of construction of bonds, Tools

and equipments used.

- Foundation:-Purpose of foundation, Causes of failure of foundation, Bearing capacity of soils, Dead and live loads, Examination of ground, Types of foundation, Drawing of footing foundation setting out of building on ground excavation, Simple machine foundation
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- Roofs & Roof coverings, *Truss, Shell, Dome, Roof & coverings*
- House drainage of building:-Introduction, Terms used in PHE, Systems of sanitation, System of house drainage, plumbing, sanitary fittings, etc, Types of sewer appurtenance, Systems of plumbing, Manholes & Septic tank, Water treatment plant, Sewerage treatment plant

#### **5. Treatments of building structures:-**

- DPC Sources and effects of dampness, Method of prevention of dampness in building, Damp proofing materials, Anti-termite treatment, Weathering course, Fire proofing, Arches, *Lintel* ( types, wooden, brick, stone, steel &RCC ), Chajjahs, Centering& Shuttering

#### **6. Surveying:-**

- Introduction, History and principles of chain survey, Instruments Classification, accuracy, types, Main divisions (plane & geodetic), Chaining, Mouza Map, Compass survey, Plane table survey.
- *Levelling*:-Auto level, dumpy Level, Tilting Level, Principle of levelling Types, component / part and function, Datum Focussing & parallax, Deduction of levels / Reduced Level, Types of leveling, Application to chain and Levelling Instrument to Building construction.
- Contouring:- Definition, Characteristics, Methods, Interpolation of Contour, Contour gradient, Uses of Contour plan and Map.
- Introduction to Theodolite survey

#### **7. Electrical Wiring: -**

- Safety precaution and elementary first aid, Artificial respiration and treatment of electricalshock, Elementary electricity, General ideas of supply system, Wireman's tools kit, Wiring materials, Electrical fittings, System of wirings. Wiring installation for domestic lightings,

#### **8. Building:-**

- Principle of planning, Objectives & importance Function & responsibility, Orientation, Local building Bye-Laws as per ISI code, Lay out plan & key plan, composition of drawing, Provisions for safety, Requirement of green belt and land, Economy &orientation, Provision for lighting, ventilation, drainage and sanitation.
- Types of building, planning & designing of residential, public and commercial building
- *Parks &play ground*-Types of recreation, landscaping etc.
- Prefabricated Structure: Method of construction and assembling
- Concepts of design of earthquake resisting buildings- requirements resistance, safety, flexible building elements, special requirements, base isolation techniques.

#### **9. Computer aided drafting:-**Operating system, Hardware & software, CAD, 3D modeling concept in CAD, 3D coordinate systems to aid in the construction of 3D objects

#### **10. Reinforced cement concrete structure:-**Introduction to RCC uses, Materials, Formwork, Bar bending details as per IS Code, Reinforced brickwork, Materials used for RCC Construction, Selection of materials – coarse aggregate, fine aggregate, cement water and reinforcement, Characteristics, Method of mixing concrete, Slump test, Structure –

columns, beams, slabs - one-way slab & two-way slab, Innovative construction, Safety against earthquake, Grade of cement, steel- behaviour and test, Bar-bending schedule, Retaining wall, R.C.C. Framed structure.

- Steel structures:-Structural fasteners , Joints, Tension & compression member, Classification, fabrication, Construction details.

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- Basics of Bridges & Culvert.

### **12. Irrigation Engineering:-**

- Basic terms used in irrigation, Hydrology like duty, delta, base period, intensity of irrigation, Hydrograph, peak flow, run off, catchment area, CCA, corps like, rabi, kharif etc.,
- Storage, diversion head, work -characteristics and types.
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- Dams, weir & barrages- types purposes.
- Hydro electric project like Fore bay, Penstock, Turbines, Power house, etc.
- Canals- classification and distribution system, canal structures.
- Types of cross drainage works like Aqueduct, Super passage, Syphon, Level crossing, inlet and outlet, etc.

### **13. Estimating and Costing:-**

- Introduction, Purpose and common techniques, Drawing of construction, Measurement techniques.

Estimate-necessity, importance, types- approximate and detailed estimate-main and sub estimates, revised, supplementary, maintenance/repair estimate-taking off quantities-method Rate analysis of typical items and their specifications, Labor and materials, Govt. Schedule of rate, Estimating of irregular boundaries by trapezoidal and Simpsons formula.

## **(ii) Architecture :**

### **Architectural Drawing**

1. Orthographic projections
2. Section of Solids : Simple geometrical shapes
3. Development of surface
4. Isometric Views : Conversion of 2D geometrical shapes into 3D isometric views
5. Axonometric Views
6. Simple Perceptive of solids incorporating all views.
7. Introduction to Sciography and Rendering

### **History of Architecture**

1. Pre Historical Architecture
2. River Valley Civilizations
3. Greek Civilization
4. Roman Civilization
5. Buddhist Architecture in India
6. Temple Architecture in India
7. Early Christian Architecture
8. Byzantine Architecture
9. Romanesque Architecture
10. Gothic Architecture
11. Renaissance Architecture
12. Islamic Architecture in India

13. Industrial revolution
14. Modern Architecture in Europe and America
15. Contemporary/post Independence Architecture in India

### **Architectural Design**

1. Elements of Design : Line, shape, form, pattern, Textures.
2. Principles of Design : Balance, Unity, Symmetry, Rhythm, Harmony etc.
3. Role of Colour : Warm and Soft Colours, Colour schemes for various interior / exterior spaces, colour theory.
4. Anthropometric Studies and graphical representation of :  
(a) Vehicles (b) Street furniture (c) Graphic Representation of plant material, and human figures.
5. Study of spaces and layout of furniture for various activities in small structures comprising public utilities.
6. Design of a single storey structure such as weekend cottage, milk bar etc.

### **Building Construction - I**

1. Brick work and stonework : sizes, types, jalties, reinforcement, stone facings and claddings
2. Openings in walls : Classification of arches and lintels
3. Damp Proof Course(DPC): Sources, classification and treatment
4. Foundations : types
5. Doors and windows : functions, sizes, location and classification, joints used.
6. Flooring : types and finishes
7. Roof and roof coverings : types, king post and queen post trusses
8. Staircases and ramps : purpose, types, materials, relation between different component, slopes
9. Interiors of Buildings : False ceiling and partitions
10. Expansion joints
11. Form work and steelwork for different structural members, bending of bars, formation of hooks and cranks
12. Steel Sections using standard rolled sections, rolling and collapsible shutter
13. Steel Roofs : construction details, roof covering – AC, GI sheets
14. Finishes : Plastering and pointing, Stone cladding and tile lining, Gravel and wash marble finish, Panellings and fibrous board finishes
15. Doors and Windows using different sections, anodizing, beading in aluminum sections
16. Earthquake resistant building configuration.

### **Building Services**

1. Water Supply
  - 1.1 System of water supply
  - 1.2 Storage and Distribution of Water
  - 1.3 Hot water supply for buildings including solar water heating.
  - 1.4 Service connections, types and sizes of pipes, water supply fixture and installations
  - 1.5 Concept of Rain water harvesting
2. Drainage
  - 2.1 Principles of drainage, surface drainage
  - 2.2 House drainage
  - 2.3 Inspection chambers
  - 2.4 Ventilation of house drainage
  - 2.5 Functions and working of sinks, wash basins, water closets, flushing cisterns, urinals,
  - 2.6 Septic tanks, seepage and soak pits
3. Sound Insulation
  - 3.1 Behaviour of sound propagation
  - 3.2 Acoustics in building, acoustical defects such as echo, reverberation, sound foci, methods of correction, special requirements in Buildings like auditorium, conference halls, studios, etc
  - 3.3 Acoustical materials and their uses in various buildings
4. Lighting and Electrical Fittings

5. Heat, Ventilation and Air Conditioning
6. Vertical Transportation Systems
7. Fire Fighting Services
8. Integration of lighting, air-conditioning, acoustics and other services/systems in buildings

**Structure Mechanics :** Force system and Equilibrium, Centroid and Moment of Inertia, Stress and Strain, Shear Force and Bending Moment, Bending stresses in Beams, Plain frame(Truss)

**Climatology :** Relation of Climate and comfort, Sun Control and shading devices, Wind control, Use of building materials with respect to climate : Concrete, Brick, Glass, Plastics, Stone, and Insulating material, Criteria for site selection, Environment and Ecology

### **Computer Applications in Architecture (AutoCAD)**

1. Creating and Saving a new Drawing
2. Drawing Commands : Line, Poly line/Double line, Arc, Ellipse, Polygon, Rectangle, Spline, Circle, Sketch, Hatch, Donuts.
3. Viewing an Existing Drawing : Zoom, Pan, Redraw and Regen all, Regen Auto, View
4. Modifying an Existing Drawing : Undo / Redo / Oops, Trim, Move, Offset, Rotate, Array, Stretch, Divide, Chamfer, Erase, Break, Copy, multiple copy, Mirror, Change (change properties), Extend, Explode, Blip mode, Scale, Fillet.
5. Making and Inserting Blocks : Blocks, Insert block, Base, Using library for blocks, W-block, X-ref, Explode.
6. Dimensioning and Text : type, style, units, utilities, variables, Dimensioning of different elements like Arc, Circle Radius, diameter, continuous dimensioning etc. Editing dimension test and updating. Text style – font types, height, width factor etc.

### **Structure Systems**

1. Bulk Active Structures : Post and beam, Fixed and continuous beams, Portal Frame.
2. Vector Active Structure : Roof Truss, Space Truss.
3. Surface Active Structure : Slabs and Folded plates, Spherical shells, domes and vaults.
4. Pneumatic Structure : Membrane Action, Air supported and air inflated structures.
5. High Rise Structures

### **RCC Structures**

1. Concept of reinforced concrete, suitability of different types of reinforcing materials. Introduction to IS:456-2000.
2. Theory and design of singly reinforced rectangular sections, concept of neutral axis, balanced, under reinforced and over reinforced sections.
3. Calculation of Moment of Resistance of Simply Supported Singly reinforced Rectangular beams.
4. Shear and Bond stresses in beams.
5. Theory of doubly reinforced beams.
6. Theory of one way and two way slabs as per IS: 456-2000 and drawings showing reinforcement details.
7. Theory of long and short square, rectangular and Circular Columns subjected to axial loading (with Circular ties) as per IS: 456-2000 and drawings showing reinforcement details. Design of Square / Rectangular / Circular Column.
8. Detailing of reinforcements: Slabs, Beams, Columns and Column footings

### **Steel Structures**

1. Introduction to IS:800, Types of structural steel, Types of Indian Standard Steel Sections.
2. Stress Strain Curve of mild steel.
3. Riveted Connections and Welded Connections
4. Theory and design of laterally restrained single I-section, steel beams as per BIS: 800.
5. Theory of Tension and compression members of a roof truss as per IS:800.
6. Theory of axially loaded single I-Section steel column as per IS:800 .
7. Types of column basis, column beam junctions (framed, seated )

## **Surveying**

1. Chain surveying : purpose, error and corrections.
2. Compass surveying
3. Levelling
  - 3.1 Concept of levelling, reduced level and benchmarks
  - 3.2 Construction of Dumpy level
  - 3.3 Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis
  - 3.4 Temporary adjustment: setting up and leveling
  - 3.5 Concept of back sight, foresight, intermediate sight, station change point, to determine reduced levels
  - 3.6 Level book and reduction of levels by
  - 3.7 Computations of Areas of regular figure and irregular figure. Simpson rule
4. Plane Table Surveying:
  - 4.1 Purpose of plane table surveying, equipment used in plane table survey
  - 4.2 Setting of a plane table: Centering, Leveling, Orientation.
  - 4.3 Methods of plane table surveying : (a) Radiation, (b) Intersection (c) Traversing
  - 4.4 Two Point Problem
5. Contouring : Concept of contours, contour interval and horizontal equivalent.
6. Instruments : uses of (a) Theodolite (b) Planimeter
7. Use of Modern Surveying equipment (Auto Level, Micro-optic Total station, EDM instruments)

## **Town Planning**

Growth of the Industrial Town, Planning Process, Introduction to Urban land uses & their management, Legislation and Urban Controls.

## **Building Bye-Laws**

1. Basic Terminology
2. Factors affecting planning of byelaws: Light and ventilation, Mass, Volume, Open space Skyline, Aesthetics, Setbacks, Parking and Fire Safety.
3. Byelaws
4. Zoning : objectives and types.
5. BIS and CPWD By-laws/standards for removing Architectural barriers for persons with disabilities (PWDs)
6. Earthquake resistant regulations, Code provisions (IS-1893), seismic zoning.

## **Quantity Surveying and Valuation**

1. Types of estimates : preliminary and detailed.
2. Preparation of Detailed and Abstract Estimates from Drawings
3. Calculation of quantities of materials
4. Analysis of Rates
5. Measurement Book and Billing
6. Valuation
7. Contractorship
8. Preparation of Tender Document based on Common Schedule Rates(CSR)

## **(IV) For the Post of Junior Draftsman (Electrical)**

Note: For this post, the syllabus is pending for now, which will be uploaded later on.

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