

## APWD JE Exam Pattern

<b>Name Of Subject</b>	<b>Number Of Questions</b>	<b>Number Of Marks</b>
Concerned Technical subject for the respective post	80	80
General Intelligence & reasoning	10	10
General Awareness	10	10
Total	100	100
<b>Time Duration: 02 Hours</b>		

## **SYLLABUS FOR RECRUITMENT OF ARCHITECTURAL ASSISTANT**

1. **Architectural Design:** -(Architectural Design- I, II, III, IV, V, VI, VII)- Applying the knowledge gained in other subjects and to design building of medium complexity e.g. Schools, Colleges, Dispensaries, Shops and Houses etc. and present them in graphic form. Fine Arts, Theory & Methodology of Architectural Design, Sociology, Structural Mechanics, I, II, III, IV, Geometrical Drawing, Mathematics, Architectural Graphics- I, II, Surveying & Leveling, Climatology – I, II, Model Workshop, Architectural Acoustics, Computer Application in Architecture – I, II, Interior Design, Landscape Architecture, Town Planning, Design of RCC Structure, Building Services Water Supply & Sanitary Engineer & Electrical,
2. **Building Construction:**-(Building Materials and Construction - I, II, III, IV, V, VI)-Knowledge of various methods of buildings construction of medium complexity with timer, stone, bricks, concrete etc. including foundation, walls roofs, staircase, journey and finishes.
3. **Building Materials and Sciences:** Knowledge of basic building materials and their behavior such as bricks, stones, metals, timber and finishing materials. Effects of climate on built environment to be able to design for comfortable conditions.
4. **Architectural Drawing and Graphics:** Ability to present in graphic form all elements of design-study of shades and shadows, textures, tones, colours, geometrical form., perspective and projections, free hand drawing and rendering.
5. **History of Architecture:**-(History of Architecture – I, II, III, IV, V)- Study of various style of Architecture and methods of construction through the ages in the world with emphasis on Indian Architecture.
6. **Workshop Practice:** Ability to make building models with various materials such as card-board, wood plastics, plaster of paris and metals. Ability to make simple joint in timber, pipes and other materials.
7. **Landscape Design:** Understanding of landscape elements like trees, shrubs, plants, water, rocks and development of landscape planning and application in architectural design.
8. **Structural Mechanics and Theory of Structures:** Understanding the structural concepts and behavior of structural elements, simple calculations for columns, beams, frames, footing slabs walls in concrete, steel and timber.
9. **Surveying and Leveling:** Understanding of various survey and leveling instruments, carrying out surveys of land of medium complexity and preparation of survey plans.
10. **Building Service & Equipments:** Study of land designing for water supply, drainage, sewage disposal, electricity supply, wiring and lighting for building, Air Conditioning, Advances Structural Systems, Estimation & Specification, Building service-I, II& III, Elective – I, II, III, IV, Transportation Planning, Urban Design,
11. **Humanities:** Study of sociology, economics and culture, as applicable for design of human settlements.
12. **Estimating and Costing:** Systems of taking out quantities and estimating for all trades involved in construction of medium complexity.

13. **Principles of Human Settlements:** Man and environment, Biological and behavioral responses to human settlements, design for living, natural and built environment. Ancient texts and treatises on settlements and area planning in India. Human settlements during ancient medieval and modern periods in India, Europe and other parts of the worlds. Characteristics of human settlements built by Muslims and Hindu in India.
14. **Architectural design, planning and thesis:** Design of complicated buildings and campuses involving analytical studies of building and spaces form sociological, economic and cultural points of view such as Universities, Industrial Estates, Housing Schemes etc. Thesis on a subject requiring detailed analytical study to lay down validity and design criteria presented in graphic form, models and report. Thesis may also be research projects presents as a written report.
15. **Building Construction, Materials and specifications:** Study of advanced building construction methods with new materials such as plastics, metals synthetic boards and latest techniques in the use of concrete.
16. **Building Sciences & Services:** Study of Accoustics, Air-Conditioning, Heating, Cooling, Mechanical Installations, Fire-control, Water Supply and Drainages Systems for complicated building.
17. **Town Planning (Theory):** A general understanding of Town Planning Principles as they have evolved through the ages.
18. **Professional Practice:** Professional Practice, Construction Management, Traditional Architecture, Housing, Architectural Criticism, Energy Efficient Architecture and Dissertation-The examination in professional practice is designed to assess the knowledge, skill and maturity of which fit the architect to fulfill his professional duties and his understanding the managements of an office organization for such as a purpose. The syllabus should cover the following area of study:- General principles of Indian Contract Act, Building Contracts generally, Conditions and forms of contract, Administration of contract, Principle of arbitration, India Arbitration Act, 1940 valuations of properties, Architectural Competitions, Easements of properties, Report writing, copy of practice, conditions of engagement, duties and responsibilities of an architect in relation of owner, contractor, relate professional and Indian Standards & Codes of Practice.
19. **Building Bye- Law:** Study of building regulations to enable design and prepare drawing for submission to concerned bodies.
20. **Advance Structure:** Study of new structural technology such as space frames, prestressing, shells and understanding of the limitations and scope of these technique. Calculations for these techniques are not expected.

**E.O TO CHIEF ENGINEER**

**SYLLABUS FOR RECRUITMENT OF ASSISTANT (ARCH DEPT.):**

1. **Architectural Design:** -(Architectural Design- I, II, III, IV, V, VI, VII)- Applying the knowledge gained in other subjects and to design building of medium complexity e.g. Schools, Colleges, Dispensaries, Shops and Houses etc. and present them in graphic form. Fine Arts, Theory & Methodology of Architectural Design, Sociology, Structural Mechanics, I, II, III, IV, Geometrical Drawing, Mathematics, Architectural Graphics- I, II, Surveying & Leveling, Climatology – I, II, Model Workshop, Architectural Acoustics, Computer Application in Architecture – I, II, Interior Design, Landscape Architecture, Town Planning, Design of RCC Structure, Building Services Water Supply & Sanitary Engineer & Electrical,
2. **Building Construction:**-(Building Materials and Construction - I, II, III, IV, V, VI)-Knowledge of various methods of buildings construction of medium complexity with timer, stone, bricks, concrete etc. including foundation, walls roofs, staircase, journey and finishes.
3. **Building Materials and Sciences:** Knowledge of basic building materials and their behavior such as bricks, stones, metals, timber and finishing materials. Effects of climate on built environment to be able to design for comfortable conditions.
4. **Architectural Drawing and Graphics:** Ability to present in graphic form all elements of design-study of shades and shadows, textures, tones, colours, geometrical form., perspective and projections, free hand drawing and rendering.
5. **History of Architecture:**-(History of Architecture – I, II, III, IV, V)- Study of various style of Architecture and methods of construction through the ages in the world with emphasis on Indian Architecture.
6. **Workshop Practice:** Ability to make building models with various materials such as card-board, wood plastics, plaster of paris and metals. Ability to make simple joint in timber, pipes and other materials.
7. **Landscape Design:** Understanding of landscape elements like trees, shrubs, plants, water, rocks and development of landscape planning and application in architectural design.
8. **Structural Mechanics and Theory of Structures:** Understanding the structural concepts and behavior of structural elements, simple calculations for columns, beams, frames, footing slabs walls in concrete, steel and timber.
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19. **Building Bye- Law:** Study of building regulations to enable design and prepare drawing for submission to concerned bodies.
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**E.O to Chief Engineer**

## **SYLLABUS FOR RECRUITMENT OF DRAUGHTSMAN GRADE- III (E & M):-**

**Draughtsman Electrical & Mechanical:** -The test will include questions on Draughtsman Electrical & Mechanical Trade Theory, Workshop Calculation, Mathematics & Science.

1. Nomenclature. Description and use of drawing instruments & various equipment in drawing office. Their care and maintenance, layout of a drawing sheet.
2. Type of lettering proportion and spacing of letter and words.
3. Terms & definitions-polygons and circles. Lines and their meaning, section lines of different materials, conventional signs, symbols & abbreviations, hatching, & shading, Norms of dimensioning different types of drawing sheets.
4. Definition of ellipse, parabola, and hyperbola, different methods of their construction, Definition and method of drawing involutes cycloid curves, helix and spiral.
5. Solution of problems on interpenetration of prism, cones, and pyramids with their axes intersecting at an angle. Intersection of cylinder.
6. Principle of Isometric projection, Difference between isometric drawing and isometric projection. Isometric Scale, Dimensions an isometric drawing.
7. Types of perspective projection fundamental concept & definition, location of station point.
8. Terminology- feature, functional feature, functional dimension, datum dimension, principle.
9. Units of dimensioning, system of dimensioning, method of dimensioning and common features limit, fit, tolerance.
10. Types of fastening materials, types of rivets, their proportion & uses. Types of riveted joints, terms & proportions or riveted joints. Conventional representation.
11. Causes of failure of riveted joints, efficiency of riveted joints
12. Description of welded joints and their representation (Actual and symbolic) Indication of welding symbols on drawings as per BIS.
13. Alternating Current motors, different types and its working along with the use. Direct Current motors, different types and its working along with the use. Generators of various types. Their use, working and symbols used in wiring diagrams.
14. Electrical and Electronic symbols of different components used in circuits diagrams. Calculations for measurement of Current, voltage and the Resistance. Electrical circuits in Series and parallel.
15. Concept of Electrical and Electronic panels. Different components used in Electrical Panels for operating of various machines. Electrical Circuit diagrams of the various panels along with the symbols.
16. Power distribution system LT & HT concept, along with the transformers including symbols.
17. Safety precautions, Hand tools used for moulding. The description, use and care of hand tools. Description of different types of moulding. Description of different types of core, sand, and dressing material, Description of cupola.

18. Method of using precision measuring instrument such as inside & outside micrometers, depth gauges, vernier, calipers dial indicator, slip gauges, sine bars, universal bevel protractor etc.
19. Brief description of milling, shaping, slotting and planing machines, quick return mechanism of these machines.
20. Introduction to Auto CAD, Auto CAD main Menu, screen menu, command line, model space Drawing layouts, Tool bars, File creation, Save, Open existing drawing. Related Exercises using Absolute Coordinate system, Polar Co-ordinate System and Relative Co-ordinate System, Exercise using Line, Break, Erase, Undo commands.
21. Piping materials and specifications of WI & Steel pipes, pipe threads pipe fittings, specifications of fittings. Different types of pipe joints.
22. Brief description of Petrol, Diesel and Gas engines.
23. Numbering of drawings and standard parts > Familiarization with BIS.698 02 Production of interchangeable parts, fits limits, tolerance & familiarization with IS -919 & IS 2709 . Different methods of showing machine surfaces on drawings.
24. Belts-power transmitted by belt. Materials of belts slip and creep Velocity of belt. Arc of contact. Simple exercise in calculation of belt speeds, nos. Of belts needed in V-belt drive, velocity, pulley ratio etc. Standard pulleys width of pulley face, velocity ratio chain drive.
25. Sealed-assembly to details drawing (without the application of tolerance)-swing table or jig table, Belt drive.Assembly to details drawing (with the inclusion of tolerance) and preparation of working drawing-simple tool holder, hand vice.
26. Preparation of an assemble drawing of difference types of pumps and compressors form the given details.
27. Preparation of welding drawing of a bracket showing the correct specification of the welding by symbols as per I.S.I.
28. Drawing of a scale layout of piping with pipe fittings-diagrammatic drawing of piping of the above with the standard symbols of the fittings as per I.S.I.
29. Drawing of a single point cutting tool. Preparation of production tool drawings (assembly and details). Detailing of a simple drilling jig and assembly-plate jig diameter jig. Channel jig-with screw (clamp), bushing leaf jig, tumble jig.Details and assembly of milling fixtures.
30. Preparation of Engineering graphs and charts.Reproduction and duplication of Engineering Drawing. Numbering and preservation of drawing.
31. Project Drawing: Details and assembly of bench grinder, a flanged vice making sketches on the shop floor and taking direct dimensions from there.
32. Concept of SLD, Electrical layout drawings such as cable, earthing, lighting & Lightning protection layouts for substations, control room, process area, off sites and utilities and Sub station Equipment Layouts.
33. Conventional symbols of Electrical installation as per BIS code & IEEE, IES norms Drawings of the typical diagram of plug and socket outlets. Graphical symbols used in electric technology, circuits Elements.

34. Sketching of brush and brush gear of D.C. machines. Lay out D.C. Panel board arrangement. Lettering-Numbers Alphabets. Sketching of D.C. 3-point face Plate starter top scale.
35. Drawing the schematic diagram of automatic voltage regulators of A.C. generators. Drawing the schematic diagram of A.C. 3-ph reversing magnetic starter. Sketching a breather. Free hand sketching of transformer and auxiliary parts and sectional views. Drawing the schematic diagram of plow and pipe earthing I.S.3043. Wiring diagram of the connection of arrangement and push button control of two speed AC motor. IS : 3914 – 1967.
36. Layout diagram of a substation. Sketching different shapes of coils, Sketches indicating possible faults in stator winding. Drawing the development diagram for dupler lap and Wave winding with brush position.
37. Determination of area of sector, segments, ellipse irregular figures, surface area and volumes of pyramids cone, sphere-their frustum including primordial formula.
38. Solution of triangles and problems of height and distance.
39. Calculation on moments center of gravity. Moment of inertia and modulus of section for simple section. Calculation and drawing of B.M. &S.F. diagrams for simple supported beams and cantilevers with concentrated and uniformly distributed loads, selection of steel joints from hand books for given loading.
40. Calculation of material and cost from working drawing.
41. Electricity--laws of electricity brief description working principle and function of a generator, calculation of currents, voltage resistance in series and parallel D.C. circuit-working principle and functions of D.C. and A.C motor and transformers.
42. Pressure of a fluid pressure head of a fluid-total pressure in a surface center of pressure elementary idea of hydraulic press, hydraulic jacks. Flow of fluids-velocity and total heads of fluids-Venturimeter, flow through orifices

**E.O TO CHIEF ENGINEER**



## **SYLLABUS FOR RECRUITMENT OF DRAUGHTSMAN GRADE – III (CIVIL)**

### **1) Preparation of Drawing:-**

Basic drawing skills using drawing instruments. Constructing Plain Scale, Comparative Scale etc, Orthographic projections of different objects with proper lines, lettering & dimensioning, component parts of a single storied residential building, drawing different type of shallow and deep foundation etc, drawing of different types of shoring, arches and lintels with chajja, drawing of different types of roofs, trusses etc as per construction and of various spans. Create objects on CAD work spaces using Toolbars, Commands, Menus, formatting layer and style. Draw a sanction plan of single storied, double storied, public building detailing with roof and Columns by frame structures using CAD. Prepare detailed drawing of RCC structures using CAD and prepare bar bending schedule. Detailing of different types of steel sections, details of Septic Tank etc, flow diagram of Water Treatment Plant(WTP), Sewerage Treatment Plant(STP), Cross section of different type of roads, culverts, bridges, Dam, barrages, cross drainage work using CAD.

### **2) Surveying:-**

Perform site survey using Chain/Tape, Prismatic Compass, PlaneTable, make topography map by contours with Levelling Instrument, Theodolite, prepare a map using Total Station, location of station point using GPS and obtain a set of co-ordinates.

### **3) Estimating and Costing:-**

Prepare detailed estimate and cost analysis of different types of buildings and other structures using application software. Prepare rate analysis of different items of work and approximate cost estimate for building project.

**E.O TO CHIEF ENGINEER**

## RECRUITMENT FOR THE POST OF PLANNING ASSISTANT

### SYLLABUS FOR PLANNING ASSISTANT (CIVIL ENGINEERING STREAM)

1. **APPLIED & ENGINEERING GEOLOGY:** General Geology, Mineralogy, Petrology, Structural Geology and Geophysical Method, Geological Investigations in Civil Engineering.
2. **MECHANICS OF SOLIDS:** Stress Strain and Deformation of Solids, States of Stress, Analysis of Plane Truss, Thin Cylinders / Shells, Transverse Loading on Beams, Deflection of Beams And Shear Stresses, Torsion And Springs.
3. **MECHANICS OF FLUIDS:** Definitions and Fluid Properties, Fluid Statics & Kinematics, Fluid Dynamics, Boundary Layer and Flow through Pipes, Similitude and Model Study.
4. **CONSTRUCTION TECHNIQUES, EQUIPMENT AND PRACTICES:** Concrete Technology, Construction Practices, Sub Structure Construction, Super Structure Construction, Construction Equipment.
5. **SURVEYING I & II :** Introduction And Chain Surveying, Compass Surveying And Plane Table Surveying, Levelling And Applications, Theodolite Surveying, Engineering Surveys. Tacheometric Surveying, Control Surveying, Survey Adjustments, Astronomical Surveying, Hydrographic and Advance Surveying.
6. **SOIL MECHANICS:** Introduction Soil Mechanics, Soil Water and Water Flow, Stress Distribution, Compressibility and Settlement, Shear Strength, Slope Stability.
7. **STRENGTH OF MATERIALS:** Energy Principles, Indeterminate Beams, Columns, State of Stress in Three Dimensions, Advanced Topics in Bending of Beams.
8. **APPLIED HYDRAULIC ENGINEERING:** Open Channel Flow, Uniform Flow, Varied Flow, Pumps, Turbines.
9. **HIGHWAY ENGINEERING:** Highway Planning and Alignment, Geometric Design of Highways, Flexible and Rigid Pavements, Highway Materials and Construction Practice, Highway Maintenance.
10. **IRRIGATION ENGINEERING:** Introduction of Irrigation Engineering, Irrigation Methods, Diversion and Impounding Structures, Canal Irrigation, Irrigation Water Management.
11. **STRUCTURAL ANALYSIS I & II :** Deflection of Determinate Structures, Moving Loads And Influence Lines, Arches, Slope Deflection Method, Moment Distribution Method. Flexibility Method, Stiffness Matrix Method, Finite Element Method, Plastic Analysis of Structures, Space and Cable Structures.
12. **RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING:** Railway Planning and Design, Railway Track Construction, Maintenance and Operation, Airport Planning and Design, Airport Layouts, Visual Aids, and Air Traffic Control, Harbour Engineering.
13. **ENVIRONMENTAL ENGINEERING – I & II :** Planning For Water supply System, Conveyance System, Water Treatment, Advanced Water Treatment, Water Distribution And Supply to Buildings. Planning For Sewerage Systems, Sewer Design, Primary Treatment of Sewage, Secondary Treatment of Sewage, Disposal of Sewage and Sludge.
14. **FOUNDATION ENGINEERING:** Site Investigation and Selection of Foundation, Shallow Foundation, Footings and Rafts, Piles, Retaining Walls.

15. **DESIGN OF RC ELEMENTS:** Methods of Design of Concrete Structures, Limit State Design For Flexure, Limit State Design for Bond, Anchorage Shear & Torsion, Limit State Design of Columns, Limit State Design of Footing And Detailing.
16. **DESIGN OF STEEL STRUCTURES:** Introduction of Design of Steel Structures, Tension Members, Compression Members, Beams, Roof Trusses and Industrial Structures.
17. **CONSTRUCTION PLANNING & SCHEDULING:** Construction Planning, Scheduling Procedures and Techniques, Cost Control Monitoring and Accounting, Quality Control and Safety During Construction, Organization and Use of Project Information.
18. **ENVIRONMENTAL AND IRRIGATION ENGINEERING DRAWING:** Water Supply And Treatment, Sewage Treatment & Disposal, Impounding Structures, Canal Transmission Structures, Canal Regulation Structures.
19. **DESIGN OF REINFORCED CONCRETE & BRICK MASONRY STRUCTURES:** Retaining Walls, Water Tanks, Selected Topics, Yield Line Theory, Brick Masonry.
20. **ESTIMATION AND QUANTITY SURVEYING:** Estimate of Buildings, Estimate of Other Structures, Specification and Tenders, Valuation, Report Preparation.
21. **BASICS OF DYNAMICS AND ASEISMIC DESIGN:** Theory of Vibrations, Multiple Degree of Freedom System, Elements of Seismology, Response of Structures to Earthquake, Design Methodology.
22. **PRESTRESSED CONCRETE STRUCTURE:** Introduction – Theory and Behaviour, Design Concepts, Circular Prestressing, Composite Construction, Pre-Stressed Concrete Bridges.
23. **ENGINEERING ECONOMICS AND COST ANALYSIS:** Basic Economics, Demand And Schedule, Organisation, Financing, Cost And Break Even Analyses.
24. **HYDROLOGY:** Precipitation, Abstraction from Precipitation, Hydrographs, Floods and Flood Routing, Ground Water Hydrology.
25. **CARTOGRAPHY:** Introduction of Cartography, Earth, Sources of Data, Perception and Design, Cartography Abstraction.
26. **ELECTRONIC SURVEYING:** Basic Electronics, Propagation of Electromagnetic Waves, Electromagnetic Distance Measuring System.
27. **REMOTE SENSING TECHNIQUES AND GIS:** EMR and Its Interaction with Atmosphere & Earth Material, Platforms and Sensors, Image Interpretation and Analysis, Geographic Information System, Data Entry, Storage and Analysis.
28. **ARCHITECTURE:** Architectural Design, Site Planning, Building Types, Climate and Environmental Responsive Design, Town Planning.
29. **TOTAL QUALITY MANAGEMENT:** TQM Principles, TQM Tools & Techniques, Quality Systems.
30. **FUNDAMENTALS OF NANOSCIENCE:** Preparation Methods, Patterning and Lithography for Nano scale Devices, Preparation Environments, Characterisation Techniques.

## **SYLLABUS FOR PLANNING ASSISTANT (ARCHITECTURE STREAM)**

### **1. MECHANICS OF STRUCTURES I & II**

Forces and Structural Systems, Analysis Of Plane Trusses, Properties Of Section, Elastic Properties Of Solids, Elastic Constants. Shear Force and Bending Moment, Stresses In Beams, Deflection of Beams, Columns, Statically Indeterminate Beams

### **2. HISTORY OF ARCHITECTURE AND CULTURE II, III, IV, V & VI**

Ancient India, Buddhist Architecture, Evolution of Hindu Temple Architecture, Temple Architecture - Southern India, Temple Architecture - Northern India. Early Christian, Early Medieval Period, Late Medieval Period, Renaissance and Mannerist, Baroque and Rococo. Introduction To Islamic Architecture, Islamic Architecture In India & Architecture Of The Delhi Sultanate, Islamic Architecture In The Provinces, Mughal Architecture, Cross-Cultural Influences. Leading To A New Architecture, Reviewing Industrialisation, Modern Architecture: Development And Institutionalisation, Modern Architecture : Later Directions, Colonial Architecture In India. Critiquing Modernism, After Modernism – I, After Modernism – II, Alternative Practices And Ideas, Post Independent Architecture In India

### **3. BUILDING MATERIALS II, III & IV**

Bricks, Clay Products, Timber and Timber Products, Timber Products, Painting and Varnishing In Timber. Requirements Of Ingredients For Mortar/ Concrete, Cement Concrete And Its Manufacture, Types Of Concrete Aggregates And Concrete, Surface Finishing, Flooring And Damp-Proofing, Glass. Ferrous Metals: Steel And Steel Alloys, Innovations In Steel And Steel Industry, Non-Ferrous Metals, Plastics, Other Materials

### **4. BUILDING CONSTRUCTION I, II, III & IV**

Introduction, Soils, Bamboo, Straw Bales, Stone. Bricks, Clay Products, Timber Joinery, Partitions, Panelling, False Ceiling, Timber Staircases, Timber Walls, Floors And Trusses. Concrete Construction, Water-Proofing And Damp-Proofing Of Concrete Structures, Design And Construction Methods For Concrete Staircases, Advanced Construction Systems Developed By Research Organisations In India, Glass. Steel Construction, Steel Doors, Windows And Rolling Shutters Aluminium Doors And Windows, Aluminium Partitions, Stairs, Curtain Walling, Roofing, Plastics

### **5. THEORY OF ARCHITECTURE**

Introduction to Architecture and Meaning In Architecture, Ordering Elements And Principles Of Architecture, Organisation Of Form And Space, Circulation and in Totality, Experiencing Architecture

### **6. ARCHITECTURAL DRAWING I**

Sociography, Perspective: Scientific Method, Perspective: Short Cut Method, Measured Drawing: Historic Document Study, Measured drawing: Documentation

### **7. BUILDING SERVICES I, II & III**

Water Supply And Water Distribution System, Water Quality Control And Distribution System, Water Management Concepts, Sanitary Waste And Sewerage System, Fundamentals, Sanitary Waste And Sewerage System, Waste Management Concept, Equipment's Used For Management Of Usable Water And Waste Water. Electrical And Electronic Systems: Electrical Wiring Systems, Fundamentals Of Lighting, Illumination And Lighting, Lighting Design: Installation

And Application In Buildings, Lighting Design: Conveying Systems, Air Conditioning: Basic Refrigeration Principles, Air Conditioning: Systems And Applications, Air Conditioning: Design Issues And Horizontal Distribution Of Systems, Fire Safety: Design And General Guidelines Of Egress Design, Fire Safety: Fire Detection And Fire Fighting Installation

#### **8. CLIMATE AND BUILT ENVIRONMENT**

Climate And Human Comfort, Design Of Solar Shading Devices, Heat Flow Through Building Envelope Concepts, Impact Of Air Movement Due To Natural And Built Forms, Climate And Design Of Buildings

#### **9. COMPUTER AIDED DRAFTING**

Introduction To Computer And Image Editing, Introduction To Visual Composition Using Computer Tools, Introduction To Computer Aided 2d Drafting, Introduction To 3d Modelling, 3d Rendering And Setting

#### **10. ARCHITECTURAL DESIGN I & II**

Scale and Complexity: projects involving small span, single space, single usespaces with simple movement, predominantly horizontal, as well as simple function public buildings of small scale; passive energy

Areas of focus/ concern:

architectural form and space

- aesthetic and psychological experience of form and space in terms of scale, colour, light, texture, etc.,
- function and need: user requirements, anthropometrics, space standards, circulation
- image and symbolism

Typology/ project: bedroom, bathroom, kitchen, shop, exhibition pavilion, children's environment, snack bar, residence, petrol bunk, fire station.

Scale and Complexity : Project involving organization of multiples of single unit space with predominantly horizontal movement as well as single use public buildings of small scale; passive energy

Areas of concern/ focus:

- form-space relationships
- spatial organization
- behavioral aspects especially those relating to children
- site planning aspects
- appropriate materials and construction

Suggestive Typologies/ projects : residential buildings, institutional buildings: nursery or primary schools, schools for children with specific disabilities, primary health center, banks, neighborhood market, library

#### **11. DESIGN OF STRUCTURES I, II & III**

Timber Structures, Design of Beams And Columns, Steel Structures, Riveted And Welded Joints, Tension Members, Compression Members, Steel Beams. Methods of Design For Concrete Members, Limit State Design of Beams, Limit State Design of Slabs, Design of Circular Slabs, Design of Staircase By Limit State Method. Limit State Design of Columns, Design of Footings, Design of Retaining Walls, Design of Masonry Walls, Introduction to Prestressed Concrete

#### **12. SITE SURVEYING AND PLANNING**

Introduction, Site Surveying, Site Analysis, Detailed Analysis And Techniques, Site Planning And Site Layout Principles.

### **13. PROFESSIONAL PRACTICE AND ETHICS I & II**

Introduction To The Architectural Profession, Professional Ethics And Code Of Conduct, Architect's Services & Scale Of Fees, Architectural Competitions, Legal Aspects & Legislation. Tender, Contract & Arbitration, New Trends In Project Formulation And Execution, Implications Of Globalisation In Architectural Practice, Emerging Specialisations For An Architect

### **14. ARCHITECTURAL ACOUSTICS**

Fundamentals, Sound Transmission And Absorption, Noise Control And Sound Absorption, Constructional Measures, Acoustics And Building Design

### **15. ARCHITECTURAL DETAILING**

Introduction To Current Developments In Building Industry, Detailing Of Walls, Roofs And Flooring For Institutional Buildings, Detailing Of Walls, Roof, Flooring For Commercial Buildings, Detailing Of Built-In Furniture And Fittings, Detailing Of Exterior And Interior Architectural Elements

### **16. SPECIFICATIONS AND ESTIMATION**

Specification, Specification Writing, Estimation, Detailed Estimate, Cost Estimating & Cost Budgeting

### **17. HUMAN SETTLEMENT PLANNING**

Introduction, Forms of Human Settlements, Planning Concepts, Urban Planning, Urban Renewal And Regional Planning

### **18. URBAN DESIGN**

Introduction To Urban Design, Historic Urban Form, Theorising And Reading Urban Space, Issues Of Urban Space, Best Practice In Urban Design

### **19. VERNACULAR ARCHITECTURE**

Introduction, Approaches And Concepts, Vernacular Architecture Of The Western Northern Region Of India, Vernacular Architecture Of South India, Western Influences On Vernacular Architecture Of India

### **20. INTERIOR DESIGN**

Introduction To Interior Design, History Of Interior And Furniture Design, Components Of Interior Space- Interior Treatment And Finishes, Components Of Interior Space- Lighting And Landscaping, Components Of Interior Space- - Furniture

### **21. STRUCTURE AND ARCHITECTURE**

History Of Structural Design In The Pre Industrial Era, History Of Structural Design In The Post Industrial Period, Contemporary Structural Expression Through Case Study – I, Contemporary Structural Expression Through Case Study – II

### **22. ENERGY EFFICIENT ARCHITECTURE**

Architecture And Energy, Solar Passive Architecture, Passive Heating, Passive Cooling, Day Lighting And Natural Ventilation

### **23. INDUSTRIAL BUILDING SYSTEM**

Introduction, Application Of Industrial Building System, Modular Co-Ordination And Industrialised System, Pre-Fabrication System, Procedures And Organisation

**24. ART APPRECIATION**

Introduction To Art, Vocabulary Of Art, Appreciating Art – Beginnings To Modern Art, Appreciating Art- Modern Art And After, Appreciating Art- Indian Art

**25. URBAN HOUSING**

Introduction To Housing And Housing Issues – Indian Context, Socio-Economic Aspects, Housing Standards, Site Planning And Housing Design, Housing Process

**26. SUSTAINABLE PLANNING AND ARCHITECTURE**

Concept of Sustainability – Carrying capacity, sustainable development – Bruntland report – Ethics and Visions of sustainability, Eco system and food chain, natural cycles – Ecological foot print – Climate change and Sustainability, Selection of materials Eco building materials and construction – Biomimicry, Low impact construction, and recyclable products and embodied energy. Life cycle analysis. Energy sources – Renewable and non-renewable energy, Green building design – Rating system – LEED, GRIHA, BREEAM etc., case Studies, Urban ecology, social and economic dimensions of sustainability, urban heat Island effects, sustainable communities – Case studies.

**27. PRINCIPLES OF TRADITIONAL INDIAN ARCHITECTURE**

Introduction, Measurement And Resonance To Vibration, Site Planning And Cosmogram, Components And Detailing, Materials And Construction

**28. COMPUTER APPLICATIONS IN ARCHITECTURE**

Video Editing, Image Editing & Vector Editing, Pixel And Vector Animation, Web, Non Linear Presentation (Flash & Director)

**29. CONSTRUCTION TECHNOLOGY**

General Building Requirements, Construction Systems, Construction Practice, Construction Equipment, Construction Management

**30. EARTHQUAKE RESISTANT ARCHITECTURE**

Fundamentals of earthquakes, Site planning, performance of ground and buildings, Seismic design codes and building configuration, Various types of construction details, Urban planning and design

**31. ARCHITECTURAL CONSERVATION**

Introduction to Conservation, Conservation In India, Conservation Practice, Urban Conservation, Conservation Planning

**32. SAFETY SYSTEMS AND BUILDING MANAGEMENT**

Safety Requirements, Fire Alarm Systems, Fire Suppression Systems: Security Systems, Integrated Building Management System

**33. LANDSCAPE AND ECOLOGY**

Introduction, Elements In Landscape Design, Garden Design Site Planning, Landscaping Of Functional Areas

## SYLLABUS FOR PLANNING ASSISTANT ( PLANNING STREAM)

1. **BASICS OF STRUCTURAL DESIGN:** Compression and Tension, Columns and Walls, Shear Force and Bending Moment Diagrams, Principles of Design of Structures
2. **MATERIALS AND PRINCIPLES OF CONSTRUCTION:** Introduction to Building Materials and Finishes, Structural Uses of Timber, Principles of Construction of Building Elements, Site Development and Layouts, Principles on of Service Lines and Networks
3. **STATISTICAL METHODS-I& II :** Introduction, Data Presentation, Statistical Methods, Correlation, Probability, Sampling Distribution, Linear Regression Analysis, Time Series, Index Number, Estimation and Testing of Hypothesis, Large Sample Test, Chi-Square Test
4. **SURVEYING, PHOTOGRAMMETRY AND PHOTOGRAPHY:** Basic Principles and Chain Surveying, Traversing and Plain Table Surveying, Computation of Areas and Levelling, Photogrammetry, Photography
5. **HISTORY OF ART AND CULTURE OF SETTLEMENTS:** Art, Culture and Architecture of Old Civilization, Development of Building Technology, Revolutions and their Influences on Culture, Art and Its development, New' Art Forms and Techniques
6. **APPLIED GEOLOGY:** Introductory Earth Science and Meteorology, Geological Structure, Land Forms, Weathering, Landslides and Mass Wasting, Earthquake, Selection of Site and Foundations, Ground Water
7. **THEORY OF DESIGN:** Forms, Design, Perception, Building Elements, Architecture,
8. **ARTS AND GRAPHICS-II:** Basic Design, Standard Presentation Format, Presentation Drawings and Communication Skills, Sculpture and Modelling, Mural Painting
9. **EVOLUTION OF HUMAN SETTLEMENTS:** Introduction, Planning Elements and Dimensions, Planning Through the Ages, The Modern City, Synthesis,
10. **PLANNING THEORY- I&II:** Concept Formation and Perception of Space, What is Planning, Physical Planning, Process of Planning, Plan Preparation and implementation Agencies. Urban Structure and Growth, Land Use Planning, Types of Planning, Principles of Regional Planning, Regional Planning in India.
11. **TECHNIQUES OF PLANNING- I&II :** Techniques of Preparing Base Maps, Data Base for Planning and Socio - Economic Surveys, Physical Surveys, Techniques of Presenting and Analysing Data. Planning Practice in India, Spatial Standards, Regional Survey, Plan Preparation Techniques, Introduction to Advanced Techniques
12. **ECOLOGY AND RESOURCE MANAGEMENT :** Introduction, Ecosystem and its Relevance to Environment, Quantitative Ecology, Environmental Impact Studies,
13. **TRAFFIC AND TRANSPORTATION PLANNING – I& II:** Urbanisation and Transport Problem, Urban and Regional Road Design, Surveys and Studies, Geometric Design of Roads and Intersections, Traffic Management. Evaluation of Urban Structures, Planning and Management of Transport System, Regional Transport Systems, Transport and Environment, Economic Evaluation and Transport Policies
14. **QUANTITY SURVEYING AND SPECIFICATIONS:** Specification, Specifications for Infrastructure Work, Specifications for External Work, Estimation, -Development Costs of Planning Schemes as per Standards, Norms



15. **ENVIRONMENTAL SCIENCE:** Environmental Disruptions, Solid Waste Management, Forest Resources, Environmental Problems,
16. **ELEMENTS OF ECONOMICS:** Definition and Scope of Economics, Theory of Demand and Supply, Theory of Firm and Production, Concept of Income, Employment and Money, Introduction to Urban and Regional Economics
17. **UTILITIES AND SERVICES PLANNING :** Introduction, Basic Concepts and Theories, Storm Water System, Sanitation and Sewer System, Water Supply System, Solid Waste Disposal,
18. **DEMOGRAPHY AND URBANISATION:** Study of Population, Study of Demography, World Urbanisation and Urbanisation in India, Settlement System and Role of Urban Area, Policies and Strategies for Directing Urbanisation Trends in India
19. **HOUSING AND COMMUNITY PLANNING:** Housing as a Basic Human Necessity, Role of Community Development in Housing, Housing Standards, Planning and Design of Housing Areas, Housing and Finance Policies
20. **SETTLEMENT GEOGRAPHY:** Introduction of Settlement Geography, Classification of Settlements, Rural Settlements, Urban Settlements, Settlements as a System
21. **DEVELOPMENT PLANNING:** Developed, Developing and Under-Developed Economics", Classical Theories of Development: ·, Modern Theories of Development ,, Models of Development, Issues in Growth and Development
22. **URBAN DESIGN AND CONSERVATION:** Introduction to Urban Design Theory, Elements of Urban Design, Physical and Non-Physical Determinants of Urban Forms, Basic Principles of Conservation, Aspects of Urban Conservation,
23. **OPERATIONS RESEARCH AND SYSTEMS ANALYSIS/ COMPUTER APPLICATION:** Linear Programming Problems, Transportation Problems, Queuing systems, PERT and CPM Networks, System Simulation
24. **PLANNING AND MANAGEMENT OF INFORMAL SECTOR AND BASIC NEEDS.:** Urban Poverty, Basic Needs, Alternative Approaches ~or Delivery of Basic Services to the Urban Poor, Migratory Impulses and Impact on Informal Sector, Consequences of Spontaneous Growth,
25. **LANDSCAPE PLANNING AND DESIGN:** landscape Elements, Urban Landscape, Landscape Aspects of Site Planning- I, Landscape Aspects of Site Planning- II, Elements of Landscape Planning,,
26. **LAND ECONOMICS AND LOCATIONAL THEORY:** Introduction to land Economics, Development of Land and Real Property, Real Property Markets, Factors Influencing Locational Decisions, Technique of Cost Benefit Analysis
27. **ELEMENTS OF SETTLEMENT SOCIOLOGY:** Introduction, Basic Concepts of Society, Sociology of India, Urban and Industrial Sociology, Neighbourhood Concept
28. **RURAL AND RESOURCE PLANNING:** Introduction, Village Planning : Concepts and Institutional Framework, Rural Planning in Relation to National and Regional Policies, Resource Planning Development and Management, Community Development and Participation
29. **PLANNING INFORMATION SYSTEMS AND COMPUTER USE:** Introduction, Information Systems, Geographic Information System, Use Map, Other Packages

30. **URBAN MANAGEMENT:**Introduction to Management, Legal Framework, Urban Management, Organisations Involved in Urban Management, Coordination of Participation
31. **PROJECT PLANNING AND CONTROL:**Introduction to Project Management, Project Planning Management, Pre-Implementation Planning Phase, Project Implementation and Evaluation Phase,
32. **PUBLIC FINANCE:**Taxation, Fees and Charges, Borrowing, Inter-Governmental Fiscal Relations, Public Expenditure
33. **PROFESSIONAL PRACTICE:** Organisation, Scope and Scale of Charges, Role of Planner, Valuation, Methods of Real Property Valuation, Contract Documents and Project Formulation,
34. **PLANNING LEGISLATION:**Concept of Law, Indian Constitution, Land Acquisition Act, Case Studies Related to Land Acquisition Act., Organisations for Plan Implementation,
35. **POLITICAL SYSTEMS AND PLANNING:**Decision Making, Leadership, Communication, Political Systems, Social Systems and Planning, Conflicts.

**EO TO CHIEF ENGINEER**

**SYLLABUS FOR GENERAL INTELLIGENCE & REASONING AND GENERAL  
AWARENESS FOR ALL THE RESPECTIVE 08 POSTS OF GROUP “B” (NG) AND  
GROUP “C” POSTS APWD:-**

**General Intelligence & Reasoning:** The syllabus for General Intelligence would include questions of both verbal and Non-verbal type. The test will include questions on analogies, similarities and difference, space visualization, problem solving analysis, judgment, decision making, visual memory, discrimination observation, relationship concepts, arithmetical reasoning, verbal and figure classification, arithmetical number series, non- verbal series etc. The test will also include questions designed to test the candidate’s abilities to deal with abstract ideas and symbols and their relationship, and other analytical functions.

**General Awareness:** - Questions will be aimed at testing the ability of the candidate’s general awareness of the environment around him/her and its application to society. Questions will also be designed to test the knowledge of current events and of such matters of everyday observations and experience in their scientific aspect as may be expected of any educated person and elementary knowledge of computers. The test will also include questions related to India and its neighboring Countries especially pertaining to History, Culture, Geography, Economic, Science, General Politic and Scientific research etc. These questions will be such that they do not require a special study of any discipline.

**E.O TO CHIEF ENGINEER**

## **SYLLABUS FOR RECRUITMENT OF JUNIOR ENGINEER (E&M)**

- 1. Basic Electrical Engineering:** Concept of currents, voltage, resistance, power & energy, their units, Ohm's law, electrical symbols.
- 2. Circuit Laws:** Kirchhoff's law, Superposition, Thevenin, Norton, Star- delta network theorems with simple numerical.
- 3. Magnetic Circuit:** Concept of flux, EMF, inductance, different kind of magnetic materials, Electro-magnetic induction-Self & Mutual inductance.
- 4. A.C fundamental:** Instantaneous, peak, R.M.S and average value of alternating wave, simple Series and Parallel A.C circuits consisting of Resistance, inductance & Capacitance, Analog & Digital ammeters and voltmeters, Wattmeter, Multi-meters, Megger, Low Voltage transformers CT & PT.
- 5. Electrical Machines:** Basic principles of AC & D.C. machines (Motors & Generators), construction, principles of operation, speed control & Starting, losses & efficiency of AC & D.C. Machines, equivalent circuit, voltage regulation. Transformer O.C and SC tests, efficiency, auto transformers. Principle of operation, equivalent circuit, torque speed characteristics, starting and speed control of 3 phase induction motor, Generation of three phase EMF, 3-Phase induction motor, rotating magnetic field. Fractional KW motors, 1- Phase induction motor, types of AC Motors, DG Sets, operation.
- 6. Estimation and costing:** Estimation of lighting scheme, electric installation of machine and relevant IE rules. Details of illumination system, details of load distribution, Design of electrical installation & its symbols (internal & external), Energy efficient equipment, energy audit, protection systems of Electrical circuit, Earthing Systems, Testing of Electrical Installations, types of cables –Overhead & underground.
- 7. General Distribution:** Types of faults – symmetrical and unsymmetrical faults, short circuit current for symmetrical faults, Protection & Switchgear-rating of circuit breakers, principles of arc extinction by oil and air, H.R.C fuses, Protection earth leakage. Lightning Arrestors
- 8. Utilization of electrical energy:** Illumination-types of lamps, utilization and applications, electric welding, electric drivers etc.
- 9. Renewable Energy:** Solar Energy – Direct Uses, concept, working principle and application of solar thermal systems, Power Generation (On grid & Off Grid System) with simple numerical, Solar Photovoltaic System (SPV) Applications- Solar Lantern, Solar Home System, SPV Street Light, SPV Pumping systems.
- 10. Introduction to Refrigeration:** Terms, component & working of refrigeration system and properties, C.O.P., E.E.R, unit of refrigeration, Concept of heat engine, heat pump and refrigerator, various refrigeration cycles: refrigeration using simple air cooling system, Reversed Carnot Cycle, Air Refrigeration Cycles - Bell Coleman air refrigerator & their respective plot on P-V and T-S., Refrigerants, types, nomenclature, selection & harmful environmental effects like greenhouse effect, ozone depletion etc... of refrigerants. Eco-friendly refrigerants like R-134a, HCFC etc... Non-conventional methods of refrigeration: Vortex tube, Pulse tube refrigeration.
- 11. Air Conditioning & Air Distribution Systems:** Classification of various air conditioning systems, Industrial & commercial Air Conditioning Systems: split type, central type AC, VRF/VRV- maintenance & application. Air distribution systems: duct systems, closed perimeter system, extended plenum system, radial duct system and properties and losses in duct materials. Types & working of fans and blowers-types of diffusers. Thermal & sound Insulation.
- 12. Battery:** Automotive battery- construction and operation, battery capacity & ratings. Battery tests Charging System- Uses, Construction & operation of charging system.

Schematic & working of alternator, starting system, lighting system, ignition system and their components in automobile.

- 13. Types of measurement, classification of instruments Static terms and characteristics:** Range and Span, Accuracy and Precision, Reliability, Calibration, Hysteresis and Dead zone, Drift, Sensitivity, Threshold and Resolution, Repeatability and Reproducibility, Linearity.
- 14. Basic Electronics:** Electronics- Atomic structure of elements. The electron Energy of an electron valence electrons – Free electrons -Voltage source - Constant voltage source - Constant current source.
- 15. Electron Emission:** Electron emission, types of electron emission-Thermion emission – Thermionic emitter.
- 16. Regulated D.C. Power Supply:** Ordinary D.C. Power supply, Regulated power supply. Types of voltage regulators - Zener diode voltage regulator.
- 17. Semi-Conductor Physics:** Semi-conductor Bonds in semiconductor-commonly use semiconductors, energy band description of semiconductors-effect of temperature on semiconductor-intrinsic semiconductor-extrinsic semiconductor-properties of p-n junction.
- 18. Semi-Conductor Diode:** Semi-conductor diode, logic gates, half wave rectifier-full wave rectifier, zener diode, special diodes, optical diodes, Filters-LC filter,  $\pi$  filter. Principle & application of Solid State Switching Circuits.
- 19. Transistors:** Field effect transistors, Uni-junction Transistor (UJT): Construction, working principle, advantage & application
- 20. Rectifiers:** Silicon Controlled Rectifier (SCR), Triac: Construction, working principle, advantage & application.
- 21. Flow of Fluids:** Flow through pipes & discharge measurement- Venturi meter, Orifice meter, Nozzle Meter major.Minor friction losses. Forces of jet impinging on vanes-stationary & moving blades, work done and efficiency. Classification of pumps & turbines on constructional.
- 22. Production Engineering:** *Casting*-Concept and types of Moulds and pattern, different types of sand used for casting, different casting processes. Defects in casting: pouring defect in castings, causes & remedies.  
*Welding*-Concept and types of welding, defects in welds, difference in welding, brazing and soldering.  
*Lathes*-Working of lathes, various tools and its operation on lathes, types of lathes, drilling operations performed on drilling machines. Description, Principles of working and various operations on machines tools milling machine, *Shaper, grinder, boring & slotting machines, Plating.*
- 23. Automobiles:** Classification and types of automobile vehicles, two and four wheeler chassis layout and body types. Layout of vehicle such as front engine rear wheel drive, front engine front wheel drive, rear engine rear wheel drive, four wheels drive etc. their advantages, comparisons on Aerodynamic basis.
- 24. Transmission Systems:** Need and Requirements of transmission system. Components and functions of Clutch, Gear box, Propeller shaft, Differential, Axle.
- 25. Control Systems:** *Steering System*-Purpose, construction and working of - recirculating ball type and rack and pinion steering system. Power steering, *Wheel Geometry*- caster, camber, king pin inclination, Toe In and Toe Out. *Braking System*: Need & types of automotive braking systems for two and four wheeler vehicles: mechanical, hydraulic and air operated. Layout, components, construction and working of hydraulic braking systems, master cylinder and wheel cylinder, Drum braking system, Disc Braking Systems Air braking system.

- 26. Suspension Systems, Wheels and Tires:** Types of *wheel*-spoked, disc, light alloy cast. Types of *rims*. Tires specifications. Types - radial ply, cross ply, tubeless. Tires specifications. Factors affecting tyre life. Tires-Desirable properties & Wheel alignment and balancing.
- 27. I.C. Engine:** Ignition method of I. C. Engine (C.I & S.I). *Two & Four stroke Engines:* construction and working. Various terms related to I.C Engine: scavenging, pre-ignition, detonation, supercharging, turbo charging, air fuel ratio requirements, M.P.F.I., fuel injection pump.
- 28. I.C. Engine Testing and Pollution Control:** *ICEngine Testing* - I.P., B.P. Morse Test. List of fuel, lubricant additives and their advantages. Pollution Control, their effects on environment, Catalytic Converter, Bharat stage III, IV, VI norms.
- 29. Air Compressor:** Concept of single and multistage, single and double acting compressor & methods of energy saving. Types- Reciprocating Air Compressor, Rotary Compressor. Pressure ratio, Compressor capacity, Free Air Delivered, Swept volume of air compressor. Uses of compressed air.
- 30. Fuels:** Properties, calorific value & ignition temperature of fuels. Characteristics of a good/ ideal fuel. Liquid fuels: fractional distillation, composition, properties, uses. Applications of-Biodiesel. Gaseous fuels- properties, applications of Biogas, LPG, CNG, hydrogen fuel cell, Li-ion battery.
- 31. Lubricant:** Definition, functions, classification & application of lubricant. Selection of Lubricants for road rollers, sewing machine, concrete mixer, I.C engine, cutting tools, gears. Different method of lubricating system in I.C engine.
- 32. Simple Machines:** Find Efficiency of given machine, *Definitions:* Simple & compound machine, load, effort, mechanical advantage, velocity ratio, input of a machine, output of a machine, efficiency of a machine, ideal machine, ideal effort and ideal load, load lost in friction, effort lost in friction.
- 33. Industrial Safety:** Safety Management, Causes, types, Preventive measures & Safety procedures of Industrial Accidents. Inventory Concept, ABC Analysis - Necessity & Steps, Economic Order Quantity Concept, graphical representation, determination of EOQ, Standard steps in Purchasing, Modern Techniques of Material Management.
- 34. Materials Management:** Inventory Concept, its classification, functions of inventory, Standard steps in Purchasing, Modern Techniques of Material Management- Material Resource Planning (MRP) - Functions of MRP, Input to MRP, Benefits of MRP, Enterprise Resource Planning (ERP) - Concept, list of modules, advantages & disadvantages of ERP
- 35. Quality Management:** Meaning of Quality, Quality Control – Concept, Objectives, Functions, Advantages. Meaning of Total Quality and TQM, Components of TQM – Concept, Elements of TQM, & Systems of Quality Management like Kaizen, 5'S, 6 Sigma, ISO 9001:2000 – Benefits.
- 36. Basics of Oil Hydraulic System:** Various components in simple oil hydraulic circuits, components, Construction & working principle. Overview of essential properties of hydraulic fluids.
- 37. Basic Design Considerations:** General Considerations in Design, Types of loads, concepts & type of stress (Tension, Compression, Shear, Bearing pressure, Intensity, crushing, bending and torsion, Principle Stresses (Simple Numerical)), & strain, Stress – Strain Diagram for Ductile and Brittle Materials, Concept of Creep, Fatigue, S-N curve, Endurance Limit.
- 38. Modern Design considerations:** Design for safety, Ecology, societal consideration & Concept of Product Design, System Design & Creativity in Design, Ergonomics and aesthetic considerations in design.

**E.O to Chief Engineer**



## **SYLLABUS FOR RECRUITMENT OF JUNIOR ENGINEER (CIVIL):-**

1. **Building Materials:** Physical and chemical properties, classification, standard tests, uses and manufacture/quarrying of materials e.g. building stones, silicate based materials, cement (Portland), Asbestos products. Timber and Wood based Products, laminates, bituminous materials, paints, varnishes.
2. **Concrete Technology:** Properties, Advantages and uses of concrete, cement aggregates, importance of water quality, water cement ratio, workability, mix design, storage, batching, mixing, placements, compaction, finishing and curing of concrete, quality control, hot weather and cold weather concreting, repair and maintenance of concrete structure, Admixture and additives.
3. **Surveying:** Principles of surveying, working of prismatic, compass and bearings, planetable surveying, theodolite traverse, adjustment of theodolite, leveling and contouring, curvature, refraction correction, permanent adjustment of dumpy level, methods of contouring and uses of a contourmap, tacheometric survey, Curves, Horizontal and Vertical Curves.
4. **Soil Mechanics:** Origin of soil phase diagram, definitions of void ratio porosity, degree of saturation, water content specific gravity of soil grains and unit weights, grain size distribution curves for different soil and their uses, Atterberg's limits, ISI soil classification, plasticity chart, coefficient of permeability, effective stress, consolidation of soils. Classification, shear strength of soils, direct shear test, vane shear test, triaxial test, soil compaction, Lab compaction, Lab compaction test, moisture content and bearing capacity of soil, plate load test standard penetration test.
5. **Theory of Structures:** Elasticity constants, Types of beams, determinate and indeterminate, Bending moment and shear force diagrams of simply supported, cantilever and over hanging beams, Moment of area and moments of inertia for rect. & circular section, bending moments of shear stress for tee, channel and compound sections, chimneys, dams and retaining walls, eccentric loads slope deflection of simply supported and cantilever beams, critical load columns, torsion of circular section.
6. **RCC & Steel Design:** RCC beams, flexural strength, shear strength, bond strength, design of single reinforce beams, lintels, cantilever beams, double reinforced beams, one way slabs two way slabs, reinforced brick work, T-beams, columns, staircases, retaining walls, water tanks steel design, welded connections, riveted joints, design and construction of steel columns, beams roof trusses plate girders.
7. **Hydraulics:** Fluid properties, hydrostatics, measurements of flow, Bernoulli's theorem and its application, flow through pipes, flow in open channels, weirs, flumes spillways, pump and turbines.
8. **Public Health Engineering:** Quality of water, source of water supply, purification of water, distribution of water, need of sanitation, sewerage systems, circular sewers oval sewers, sewer appurtenances surface water drainage, sewage treatments.
9. **Transport and Highway Engineering:** Classification of Highway, Structural and geometrical components, Design of various elements of highway, Junction and intersection, Type of curves, Elements of curves, Setting out of curves, Materials for highway their testing and types, Physical, Chemical and Mechanical properties, Classification of traffic, Traffic survey, Important characteristics and Highway Construction.
10. **Port- Harbour and Airport:** Definitions and Classifications, Important Components and their Characteristics, Site Investigation and Requirement, Navigation and Control, Essential Amenities and Requirement.
11. **Estimating Costing & Valuation:** Estimate, glossary of technical terms, analysis of rates, methods and unit of measurement, Item of Works – earthwork, Brickwork (Modular & Traditional bricks), RCC work, Shuttering, Timber work, Painting, Flooring, Plastering, Boundary wall, Brick building, water tank, septic tank, bar bending schedule, Centre line method, Mid-section formula, trapezoidal formula, Simpson's rule, Cost estimate of Septic tank, flexible pavements, Tube well, isolates and combined footings, steel truss, piles and pile caps. Valuation –value and cost, scrap value, salvage value assessed value, sinking fund, depreciation and obsolescence, methods of valuation.

**E.O TO CHIEF ENGINEER**



## **SYLLABUS FOR RECRUITMENT OF SURVEYOR**

### **Trade Theory and Practical**

#### **Surveying:-**

Preparation of site plan using chain/tape, Prismatic compass, Perform Auto CAD drawing. Different site survey using Plane Table (radiation, intersection, traversing, determination of height), Theodolite (measurement of angle, traversing, computation of area), Levelling instrument (different levelling- differential, reciprocal etc), tacheometer (determination of horizontal and vertical distance, constants etc.) field book entry, plotting, mapping, calculation of area, simple building drawing using CAD.

Making topographical map using level instruments with contours, performing survey using Total Station and preparation of map (measurement of angle, co-ordinates and heights, downloading survey data and plotting), making of site plan by Cadastral survey (preparation of site plan, calculation of plot area etc.) performing road project survey (location survey and preparation of route map, profile/longitudinal/cross sectional levelling and plotting) and survey drawing using CAD. Drawing of cartographic projection, setting and application of GIS and GPS techniques in fields, collection and processing of data, performing hydrographic survey (determining hydrographic depth, measuring velocity of flow, determining cross sectional area of river, calculating the discharge of river etc). Setting out Works – setting out buildings, culvert, Centre line of dams, bridges and slope of earthwork. Drawing of building by CAD and preparation of estimation.

**E.O TO CHIEF ENGINEER**