

ಅನುಬಂಧ-2

ಸಹಾಯಕ ಇಂಜಿನಿಯರ್ ಗ್ರೇಡ್-1 ಹುದ್ದೆಗಳ ಪಠ್ಯಕ್ರಮ

SYLLABUS FOR GENERAL KNOWLEDGE

1. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ -1-: ಸಾಮಾನ್ಯ ಜ್ಞಾನ

Covering General Knowledge topics relating to Current Events, General Science, Indian History, Indian Geography, Social Science, General Mental Ability, matters of every day observation and practical knowledge as may be expected of a person who has passed the prescribed qualifying examination.

2. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ -2 ನಿರ್ದಿಷ್ಟ ಪತ್ರಿಕೆ

i) **Roads and Bridges :**

Roads:

1. General- Importance of highway development, Highway economics and Highway financing and Highway system.
2. Surveys – Highway planning surveys, location surveys and soil surveys, Presentation of data in terms of charts and tables (urban and rural areas), Highway plans and specifications.
3. Highway Design – Geometric design – Rights of way, Highway capacity, design speeds, cross section, sight distances, grade line, alignments, channelisation, inter sections and inter changes, grade separators, rotary inter sections etc.,
4. Highway Construction - Urban and Rural areas, economic principles: drainage of road way and road side and subsoil drainage and hydrology, hydraulical design principles, drainage structures.
5. Highway Construction – Site Clearance, different types of road rollers, earth moving equipment and construction equipment, Modern highway practices of construction, Specifications for highway materials and construction.
6. Highway Construction – Surface maintenance, shoulder and approach maintenance, snow and ice control, bridge and culvert maintenance etc., Traffic service and maintenance cost.

Bridges:

1. ATE for design, Hydrologic investigations of the watershed area, Flood estimation for bridge water ways by Empirical formulas, Rational method, Probability method and Unit graph method.

2. Practical rules of design and economic Span Types of Bridges such as Deck and through bridges, Bowstring, suspension and Moveable-span bridges.
3. Design of floor system and different types of bearing specifications for Railway and Highway bridges.

ii) Construction Technology and Management:

1. Quantitative methods in construction.
2. Construction, planning and control.
3. Advances in construction materials.
4. Construction in disaster prone areas.
5. Rehabilitation of structures.
6. Construction economics and finance.
7. Construction management and computer application.
8. Mechanisation in construction.
9. State laws governing construction.

iii) Highway Engineering:

1. General – Importance of highway development, Highway financing and Highway system.
2. Surveys- Highway planning surveys, location surveys and soil surveys, Presentation of data in terms of charts and tables (urban and rural areas) Highway plans and specifications.
3. Highway design- Geometric design – Rights of way, Highway capacity, design speeds, cross section, sight distances, grade line, alignment, channelisation, inter-section, etc.,
4. Highway Drainage – Urban and Rural areas, economic principles drainage of roadway and road side and sub soil drainage and hydrology, hydraulical design principles, drainage structure.
5. Highway Construction – Site clearance, different types of road rollers, earth moving equipment and construction equipment, Modern highway practices of construction, Specifications for highway materials and construction.
6. Highways Maintenance- Surface maintenance, shoulder and approach maintenance, snow and ice control, bridge and culvert maintenance, etc., Traffic service and maintenance cost.

iv) Advance Structure:

1. Compound stresses and strains – Mohr's Circle and its application. Compound strains, Principal strains, graphical solutions.

2. Effects of temperature on Mechanical properties of materials.
3. Theories of elastic failure.
4. Strain Energy Methods – Deflection of simple trusses, strain energy methods applied to simple beams and trusses.
5. Castigliano's Theorem I and its application to simple cases.
6. Analysis of continuous beams, propped cantilevers, fixed beams, Slope-deflection equations and moment distribution.
7. Three hinged arches, Lines of resistance through hinged arches under dead and live loads, Influence lines for horizontal thrust and bending moment. Reaction locus.
8. Rolling loads-curves of maximum bending moments and maximum shear forces, the enveloping parabola and determination of equivalent uniformly distributed load under different system of loading.
9. Influence lines of reaction, shear force, bending moment and deflection, Reversal of stress under live load, Williot-Mohr's diagram.
10. Determination of stresses in the members of the frames due to rolling loads – Influence lines.

v) Public Health Engineering :

(a) Sanitary Engineering:

1. Drainage and Sewerage – Objects of Scheme – surface drainage, underground sewerage systems and the general arrangement of the several works, principles of design, Data to be collected, allowances for inclusions of the foul part of the rainfall, size velocity and gradients of sewers, Selection of suitable system and evolution of a scheme, design of the several necessary works of a sewer lines.
2. House Drainage – Water closets, taps, soil and other pipes, sinks, inventories, urinals and baths.
3. The sewer line – Laying, joining and testing of sewer, Construction of manholes, flushing tanks, Over flows junctions, catch-basin inverted syphons and public conveniences, maintenance of sewer lines.
4. Pumping sewage – Treatment of sewage before disposal objects. Characteristics of sewage, Modern methods of treatment including diffused air and other process, Collection and disposal of solid refuse, Screening and pulverising – various methods of composting – utilization and disposal.
5. Elements of Public Health Engineering – Latrines, Drainage refuse collection and disposal, plumbing, food and milk sanitation, restaurants, market places, slaughter houses, cemeteries, parks, hospitals, playgrounds and cinema halls.

6. Elements of town Planning –Housing, Zoning, Lighting and Ventilation factors, Dust control, Developing environment beautifying town, malaria control, fly and rodent control, rural sanitation, fairs and festivals and disinfection.

(b) Water Supply:

7. Value and Importance of water Supply – Domestic, Commercial and Public requirement – allowance for prospective population – variation in demand.
8. Quantity of Water – estimating the quantity of water for a town or city, considering various modifying influences affecting consumption per capita, Estimating the quantity of water available from a source (surface water from rainfall and catchments and underground water by pumping and other methods), Sources of Water – impounded, perennial streams, artesian wells, shallow wells, deep well and infiltration galleries.
9. Quality of Water – Pollution, contamination and infection waterborne diseases, sanitary survey, conservation of catchments and basin, Water analysis, physical bacterial, chemical and microscopic, Protection of water supplies – control of algae, river pollutions and its control, Purity of water, PH value.
10. Construction of water works – General principles of economics, construction and arrangement of the several types of water intake works for different sources.
11. Purification of water – Study of impurities (suspended, dissolved and colloidal) plain sedimentation, sedimentation with coagulation, types of coagulants and their uses, slow and rapid filtration, pressure and other filters modern methods of sterilization and ariation –purification of water for industrial use, different methods.
12. Pumping and Distribution system – System of supply, construction of pipe lines and conduits, pumping machinery service reservoirs, balancing reservoirs, stand pipes and water towers, Distribution system (grid iron, dea-end and ring system), Appurtenances such as valves, hydrant, rate controllers and meters, expansion joints, manholes, Principles to be followed in the design of distribution system, maintenance and repairs, detection of leakages, prevention of waste.

ಕಿರಿಯ ಇಂಜಿನಿಯರ್ ಹುದ್ದೆಗಳ ಪಠ್ಯಕ್ರಮ

SYLLABUS FOR GENERAL KNOWLEDGE

1. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ -1- ಸಾಮಾನ್ಯಜ್ಞಾನ

General Paper- Covering General Knowledge topics relating to Current Events, General Science, Indian History, Indian Geography, Social Science, General Mental Ability, matters of every day observation and practical knowledge as may be expected of a person who has passed the prescribed qualifying examination.

2. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ- 2 ನಿರ್ದಿಷ್ಟ ಪತ್ರಿಕೆ

I. MATERIALS OF CONSTRUCTION

Stones: classification, characteristics, properties and uses, quarrying, deterioration, retardation, preservation and decay of stones, artificial stones and tests on stones.

Timber: classification and sources, defects, decay and its prevention, seasoning and conservation of timber.

Bricks: manufacturing, uses, classification, requirement of good bricks, types of bricks and their uses, test of bricks and their objectives, substitute for bricks.

Clay products: characteristics, types and uses of clay tiles, terracotta, application of clay bricks in engineering field, ceramic tiles, commercial sizes of ceramic tiles, popular brand names.

Ferrous metals: types, properties and uses of ferrous metals. Market forms of cast iron, wrought iron and mild steel, deformed bars - their types, properties and uses, high tensile steel - its types, properties and uses.

Non ferrous metals: properties, uses and advantages of non-ferrous metals - copper, aluminum, zinc and tin, their market forms and application in engineering field.

Alloys: types, properties and uses-aluminum alloys, copper alloys and steel alloys.

Cement: definitions -composition of ordinary cement, functions of ingredients of cement, manufacturing of ordinary cement, storage of cement, hydration of cement, types of cement and their specific uses and properties, tests on cement as per specification, field tests on cement.

Coarse and fine aggregates: sources, functions of fine and coarse aggregate in mortar and concrete, properties of fine and coarse aggregates, bulking of sand, tests on fine and coarse aggregates and objectives.

Mortar: definition, classification and suitability of different mortars.

Cement concrete: ingredients, advantages, grades of concrete, RCC-advantages, uses and properties.

Paints, varnish and distempers: objects of paints, ingredients of paints and their functions, characteristics of good paint, types and brands available in the market, objects of varnishes, ingredients of varnishes and their functions, types of varnishes, objects of distempers, properties of good distempers, types of distemper, cement paints and market forms of cement paint and brands available in market, methods of painting varnishing and distempers.

Miscellaneous and modern building materials: glass and glass wool, plastic, fibre reinforced plastic, asbestos, asphalt, metal paste, sealants for joints, steel putty, heat insulating materials, electrical insulating materials, sound insulating materials, water proof compounds, thermocol, p.v.c., epoxy, polyurethane, geotextiles, ferro-cement products, cladding materials.

II. SURVEYING

Definition, principles of surveying, chain surveying, compass surveying, leveling, contouring, computation of area and volume, principles of Theodolite surveying, traversing and its plotting and applications.

Trigonometrical levelling, tacheometry - principles and applications.

Curves: types of curves, elements of a simple circular curve, preparation of curve table and setting out of curves by chain and tape and instrument method, obstacle in curve ranging, definition and elements of a compound curve, setting out compound curve and simple problems, definition and elements of a reverse curve, transition curves, requirements and length of transition curve, functions of transition curves.

Modern surveying: remote sensing, global positioning system, geographical information system.

Modern surveying instruments: (i) electronic theodolite (ii) EDM (iii) total station

III. SOLID MECHANICS

Composition and resolution of forces moments and their applications, parallel force and couples.

Geometrical properties of sections.

Properties of materials — elasticity, plasticity, hardness, toughness, brittleness, ductility, creep, fatigue, stress, strain, elongation, types of stresses and strains, elastic limit, Hooke's law - stress strain diagram — working stress, yield stress, ultimate stress and breaking stress, factor of safety, linear strain, lateral strain. volumetric strain and Poisson's ratio, elastic constants- Young's modulus, rigidity modulus & bulk modulus and their relations, bars of varying cross section, composite sections, temperature stresses and strain, strain energy, resilience, proof resilience and modulus of resilience, equation for strain energy stored in a body. Bending moment and shear force: theory of simple bending, slope and deflection of beams by moment area method, columns and struts, torsion.

IV. CONSTRUCTION TECHNOLOGY

Soils: types of soils and their suitability to construction of the structures, bearing capacity and determination of safe bearing capacity of the soils by plate load test, method of improving the safe bearing capacity, SBC values for various types of soils.

Foundations: definition and purpose of foundation, types of foundations, causes for failure of foundation and preventive measures.

Stone masonry: types and construction and uses of stone masonry.

Brick masonry: types and construction and uses of brick masonry.

Dampness and prevention of dampness: definition and causes of dampness, effects of dampness and prevention of dampness, materials used for damp proof course.

Plastering, pointing and painting: objects of plastering and requirements of good plaster. method of cement plastering, types of plaster finishes, method of pointing and types of pointing, methods of painting, distemping and varnishing on different surfaces.

V. CONCRETE TECHNOLOGY

Ingredients of concrete, water cement ratio, properties of fresh and hardened concrete, concept of design mix, methods of curing, admixtures. special concretes - high performance concrete, self compacting concrete, fiber reinforced concrete, high volume fly ash concrete, foam concrete and ready mix concrete, geo-polymer concrete. Working stress and limit state methods of designing of beam, slabs, columns and footings.

Introduction, types and advantages and disadvantage of prestressed concrete and comparison with RCC. Concrete mix design: introduction, properties of concrete, methods of proportioning concrete mix. special concrete: ferro cement concrete, fiber reinforced concrete and its types, light weight concrete, polymer concrete and its types, foam concrete, high strength concrete. Concreting under special conditions: introduction, cold weather concreting, hot weather concreting, underwater concreting, concreting in alkali soils. Handling and transportation of concrete, construction and earth moving equipments.

VI. TRANSPORTATION ENGINEERING

Introduction to highway engineering, alignment and surveys of roads, geometries of roads. rigid pavements and flexible pavements.

Tunnel engineering: introduction, tunnel surveying, size and shape of tunnels, construction of tunnels, tunnel lining, ventilation of the tunnels, drainage of tunnels.

VII. DESIGN OF STEEL AND MASONRY STRUCTURES

Introduction to steel structures, design of bolted joints, design of welded joints, design of steel beams, design of steel columns, design of steel column bases, design of steel compression member, design of steel tension members.

Analysis and design of masonry dams, analysis and design of retaining walls.

VIII. ESTIMATING AND COSTING

Introduction to estimation, specifications, analysis of rates, detailed and abstract estimate. detail estimates and abstract of cost of culverts, lined canal, tank weirs, tank sluice.

IX. CONSTRUCTION MANAGEMENT

Construction planning and organization, contracts and tenders, measurement of works and stores management, inspection and quality control, safety in construction works, entrepreneurship and management.