જાહેરાત ક્રમાંક :૭૮/૨૦૧૮-૧૯

જગ્યાનું નામ :- મદદનીશ સંશોધન અધિકારી, વર્ગ-૨ (નર્મદા, જળસંપત્તિ, પા. પુ. અને કલ્પસર વિભાગ)

ભાગ-૧ અને ભાગ-૨ ના ૧૮૦ મિનિટના સંયુક્ત પ્રશ્નપત્રની પ્રાથમિક કસોટીનો અભ્યાસક્રમ

	પ્રાથમિક કસોટીનો અભ્યાસક્રમ ભાગ-૧ માધ્યમ: ગુજરાતી કુલ ગુણ :૧૦૦
૧	ભારતની ભૂગોળ- ભૌગોલિક, આર્થિક, સામાજિક, કુદરતી સંસાધન અને વસ્તી અંગેની બાબતો- ગુજરાતના ખાસ સંદર્ભ સાથે
૨	ભારતનો સાંસ્કૃતિક વારસો- સાહિત્ય, કલા, ધર્મ અને સ્થાપત્યો- ગુજરાતના ખાસ સંદર્ભ સાથે
૩	ભારતનો ઈતિહાસ- ગુજરાતના ખાસ સંદર્ભ સાથે
૪	ભારતની અર્થવ્યવસ્થા અને આયોજન
૫	ભારતીય રાજનીતિ અને ભારતનું બંધારણ: (૧) આમુખ (૨) મૂળભૂત અધિકારો અને ફરજો (૩) રાજ્યનીતિના માર્ગદર્શક સિદ્ધાંતો (૪) સંસદની રચના (૫) રાષ્ટ્રપતિની સત્તા (૬) રાજ્યપાલની સત્તા (૭) ન્યાયતંત્ર (૮) અનુસૂચિત જાતિ, અનુસૂચિત જનજાતિ અને સમાજના પછાત વર્ગો માટેની જોગવાઈઓ (૯) એટર્ની જનરલ (૧૦) નીતિ આયોગ (૧૧) પંચાયતી રાજ (૧૨) નાણા પંચ (૧૩) બંધારણીય તથા વૈધનિક સંસ્થાઓ- ભારતનું ચૂંટણી પંચ, સંઘ લોક સેવા આયોગ, રાજ્ય લોક સેવા આયોગ, કોમ્પ્ટ્રોલર એન્ડ ઓડિટર જનરલ; કેન્દ્રીયસતર્કતા આયોગ, લોકપાલ તથા લોકાયુક્ત અને કેન્દ્રીય માહિતી આયોગ
૬	સામાન્ય બૌદ્ધિક ક્ષમતા કસોટી
૭	સામાન્ય વિજ્ઞાન, પર્યાવરણ અને ઈન્ફર્મેશન એન્ડ કોમ્યુનિકેશન ટેકનોલોજી
૮	ખેલ જગત સહિત રોજબરોજના પ્રાદેશિક, રાષ્ટ્રીય અને આંતરરાષ્ટ્રીય મહત્વના બનાવો

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Syllabus of Preliminary Test Part-1 Medium: Gujarati Total Marks- 100	
1	Geography of India-Physical, Economic, Social, Natural Resources and population related topics- with special reference to Gujarat
2	Cultural heritage of India-Literature, Art, Religion and Architecture- with special reference to Gujarat
3	History of India with special reference to Gujarat
4	Indian Economy and Planning
5	Indian Polity and the Constitution of India: (1) Preamble (2) Fundamental Rights and Fundamental Duties (3) Directive Principles of State Policy (4) Composition of Parliament (5) Powers of the President of India (6) Powers of Governor (7) Judiciary (8) Provisions for Scheduled Castes, Scheduled Tribes and backward classes of the society (9) Attorney General (10) NITIAayog (11) Panchayati Raj Institutions (12) Finance Commission (13) Constitutional and Statutory Bodies: Election Commission of India, Union Public Service Commission, State Public Service Commission, Comptroller and Auditor General; Central Vigilance Commission, Lokpal and Lokayukta, Central Information Commission
6	General Mental Ability
7	General Science, Environment and Information & Communication Technology
8	Daily events of Regional, National and International Importance including Sports

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PART- II

(SUBJECT RELATED SYLLABUS)

Syllabus for the Preliminary Test for the

Recruitment of Assistant Research Officer, Class-II,

Advt. No. : 78/2018-19

Total Question: 200 Total Marks : 200 Medium: English

1. Strength of Materials :

Elastic, isotropic and homogeneous materials, mechanical properties of materials and their determination in laboratory, stresses and strains, elastic constants and their relations, stresses and strains in composite bars due to loading and temperature, principle stresses and principle planes, Mohr's Circle of stress, ellipse of stress (two dimensional), Bending moment , shear force and axial thrust diagrams, theory of bending, bending stresses and shear stresses in beams, flitched beams, Torsion of circular shafts, stresses produced, keys and coupling, closely coiled helical springs, theory of elastic failure, thin cylindrical and spherical shells, strains energy due to direct, shear and bending stresses.

2. Structural Analysis:

Bending moment and sheer force, Deflection of determinate beams by using Macaulay's method, moment area method, Mohr's theorems conjugate beam method, combined direct and bending stresses, analysis of propped, fixed and continuous beams and rigid frames by using three moment theorem, moment distribution and slope deflection methods, Columns and struts, Euler's and Rankin's formula for long columns, secant formula. Rolling loads and influence lines of determinate beams. Analysis of three hinged and two hinged arches. Deflection.

3. Geotechnical Engineering and Foundation Engineering:

(A) **Geotechnical Engineering-** Importance of Geotechniques in civil engineering, formation of soil, soil profile, Soil exploration, Planning and method, Properties of soil, phase relationships, soil structure and texture, grain size distribution curve, consistency of soil. Atterberg's limits and their significance, soil classification, identification and its various tests and interrelationships, permeability & seepage, Compressibility, consolidation and shearing resistance, soil water system, capillary phenomenon in soils, absorbed & adsorbed water in soil, permeability of soils, its field and laboratory

determination, stratified deposits, sand boil (Quick condition), seepage flow net, its property and use, compaction, optimum moisture content, filed compaction methods and control. Earth pressure theories and stress distribution in soil, properties and use of geosynthetics.

(B) Foundation Engineering: - Types of foundations & selection criteria, bearing capacity, settlement analysis, design and testing of shallow and deep foundations, principles of ground modifications.

4. Surveying:

General Principles, sign conventions, chain surveying, principles of plane table surveying, two-point and three-point problems, compass surveying, traversing, bearings, local attraction, traverse computations, corrections. **Levelling;** Temporary and permanent adjustments, fly levels, reciprocal levelling, contour levelling, volume computations, refraction and curvature corrections. **Theodolite**: Adjustments, traversing, heights and distances, tachometric surveying. Survey layout for culverts, bridges, buildings, canals and road alignment. **Curve Setting**: By chain and by theodolite, transition, horizontal and vertical curves, Principles of areal photogrammetry and hydrographic surveying, Global Positioning system, map preparation, Remote sensing concept.

5. Fluid Mechanics: Hydraulic Machines and hydropower: -

Fluid mechanics, Open channel flow, Pipe Flow, Dimensional analysis and modelling, fluid dynamics including flow kinematics and measurement, Flow net, Viscosity, Boundary layer and control, Drag, Lift, Principles in open channel flow, Flow controls, Hydraulic jump, Surges,, Pipe networks, properties of fluid, hydrostatics, pressure at a point, Centre of pressure, pressure on plane and curved surfaces, buoyancy, stability of floating bodies**. Hydro kinematics:** Fundamentals of fluid flow, Bernoulli's equation, venturimeter, free and forced vortex. Measurement of fluids: Orifices, mouthpieces, notches, weirs, flow under variable head. Impact of jets, turbines and pumps. Various pumps, Air vessels, Hydraulic turbines-types, classifications & performance parameters, power house- classification and layout, storage, pondage, control of supply.

6. Civil Engineering Materials: -

Different materials of constructions and their physical and mechanical properties, factors affecting selection, stones, bricks and clay products, limes, glass, FRP, ceramics, Aluminum, Fly ash, admixtures, timbers, aggregates(fine/coarse) , different types of iron and steel, paints, plastics, cement, mortars, different types of concrete, concrete mix designs, properties and testing of fresh and hardened concrete, polymeric materials and special uses, damp-proof, fire proof, sound proof and acoustical materials, anti-termite treatments.

7. Design of Structure: -

(a) Reinforced Concrete Structure- Philosophy, limit state and working stress methods of design, loading standard, recommendation of I.S. codes, design of rectangle T and L beams, one way and two way slabs, staircase slabs, continuous beams, design of columns, isolated and combined footings, retaining walls cantilever and counter fort type, design of circular and rectangle water tanks.

(b) Streel structures: - I.S. Standard, recommendation, computation of wind load as per as per I.S., typical roof trusses, design of tension and compression members, design of roof trusses, design of simple and plate beam, purlins, plate girder, design of simple and compound columns, column bases and connections. Design of gantry girder and trussed bridges, stiffened and un-stiffened connections to resist shear and moment, structural detailing,

(c) Prestressed Concrete: - principles, methods of prestressing anchorages, loss of prestress, analysis and design of simple prestressed beam for flexure, structural detailing.

(d) Earth quake resistant design of structures, design of masonry structures.

8. Building construction:

Cavity walls, reinforced brickwork, building services, detailing of floors, roofs, ceilings, stairs, finishing, formwork, ground water control techniques, cofferdams, Functional planning of buildings, orientation of buildings, rehabilitation, low-cost housing, building estimates, rate analyses and specifications, contracts and tenders, construction of scheduling, PERT, CPM, performance analyses and economics of earth moving and construction equipment.

9. Transportation Engineering:

Roads and Highways: Traffic engineering and traffic surveys, intersections, road signs, signals and marking. Classification of roads. Planning, geometric design, design of flexible and rigid pavements, IRC guidelines on pavement designs and design methodologies. Intersections geometric designs of road functions, Traffic safety, road signs, signals and markings.

10. Bridge Engineering: -

Fundamentals of Bridge Engineering, Bridge Site Investigation and Planning, Bridge Hydrology, Standards of loadings for Bridge design, Design of Bridge Foundations, Bridge Approaches, River Training work & Protection work, Methods of Bridge construction, Inspection, maintenance & repair of bridges, Testing of Bridges, Bridge Architecture.

11. Hydrology and Water Resource Engineering:

Hydrological Cycle, measurement and analysis of rainfall, Ground water hydrology, Well hydrology and related data analysis, Streams and their gauging, River morphology, Flood, drought and their management, capacity of Reservoirs, Water Resources Engineering; Multipurpose uses of water, River basins and their potential, irrigation systems, water demand assessment, Resources-storages and their yields, water logging, canal and drainage design, gravity dams, falls, weirs, Energy dissipaters, barrage distribution works, Cross drainage works and head-works and their design, , Slope stability analysis of Earthen embankments, earth retaining structures, types, analysis and design, Concepts in canal design, construction & maintenance- River training.

12. Geology: -

Engineering geology & its application in Civil Engineering projects.

13. Testing equipments and Testing methods for Civil Engineering materials, components and products.

14. Current Trends, Recent advancements and research in the above fields.

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