



ગુજરાત જાહેર સેવા આયોગ

છ-૩ સર્કલ પાસે, છ રોડ, સેક્ટર-૧૦/એ, ગાંધીનગર-૩૮૨૦૧૦

જાહેરાત ક્રમાંક : ૩૬/૨૦૨૪-૨૫

જગ્યાનું નામ: મદદનીશ ઇજનેર(યાંત્રિક), વર્ગ-૨

(નર્મદા, જળ સંપત્તિ, પાણી પુરવઠા અને કલ્પસર વિભાગ)

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

અભ્યાસક્રમ

સીધી પસંદગીથી ભરતીની પ્રાથમિક કસોટીનો અભ્યાસક્રમ ભાગ-૧ (સામાન્ય અભ્યાસ)		
માધ્યમ: ગુજરાતી અને અંગ્રેજી		કુલ ગુણ : ૧૦૦
મુદ્દા	વિષય	ગુણ
૧	ભારતની ભૂગોળ- ભૌગોલિક, આર્થિક, સામાજિક, કુદરતી સંસાધન અને વસ્તી અંગેની બાબતો- ગુજરાતના ખાસ સંદર્ભ સાથે	૩૦
૨	ભારતનો સાંસ્કૃતિક વારસો- સાહિત્ય, કલા, ધર્મ અને રથાપત્યો- ગુજરાતના ખાસ સંદર્ભ સાથે	
૩	ભારતનો ઇતિહાસ- ગુજરાતના ખાસ સંદર્ભ સાથે	
૪	ભારતની અર્થવ્યવસ્થા અને આયોજન	
૫	ભારતીય રાજનીતિ અને ભારતનું બંધારણ: (૧) આમુખ (૨) મૂળભૂત અધિકારો અને હરખે (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 ખેગવાઈઓ (૯) નીતિ આયોગ (૧૦) બંધારણીય તથા વૈધાનિક સંસ્થાઓ- ભારતનું ચૂંટણી પંચ, કોમ્પટ્રોલર એન્ડ ઓડિટર જનરલ, માહિતી આયોગ	
૬	સામાન્ય વિજ્ઞાન, પર્યાવરણ અને ઇન્ફર્મેશન એન્ડ કોમ્યુનિકેશન ટેકનોલોજી	૧૦
૭	ખેલ જગત સહિત રોજબરોજના પ્રાદેશિક, રાષ્ટ્રીય અને આંતરરાષ્ટ્રીય મહત્વના બનાવો	૧૦

૮	<p>સામાન્ય બૌદ્ધિક ક્ષમતા કસોટી</p> <p>(૧) તાર્કિક અને વિશ્લેષણાત્મક ક્ષમતા</p> <p>(૨) સંખ્યાઓની શ્રેણી સંકેત અને તેનો ઉકેલ.</p> <p>(૩) સંબંધ વિષયક પ્રશ્નો.</p> <p>(૪) આકૃતિઓ અને તેના પેટા વિભાગ, વેન આકૃતિઓ</p> <p>(૫) ઘડીયાળ, કેલેન્ડર અને ઉમર સંબંધિત પ્રશ્નો.</p> <p>(૬) સંખ્યા વ્યવસ્થા અને તેના માનક્રમ.</p> <p>(૭) રૈખિક સમીકરણ (એક કે બે ચલમાં)</p> <p>(૮) પ્રમાણ, હિસ્સો અને ચલ.</p> <p>(૯) સરેરાશ યા મધ્યક, મધ્યસ્થ અને બહુલક, ભારિત સરેરાશ. .</p> <p>(૧૦) ઘાત અને ઘાતાંક, વર્ગ, વર્ગમૂળ, ઘનમૂળ, ગુ.સા.અ. અને લ.સા.અ</p> <p>(૧૧) ટકા, સાદુ અને ચક્રવૃદ્ધિ વ્યાજ, નફો અને નુકશાન.</p> <p>(૧૨) સમય અને કાર્ય, સમય અને અંતર, ઝડપ અને અંતર.</p> <p>(૧૩) સરળ ભૌતિક આકૃતિઓના ક્ષેત્રફળ અને પરિમિતિ, જથ્થો અને સપાટીનો વિસ્તાર (છ સમાંતર બાજુ ધરાવતો ઘન, ઘન, સિલિન્ડર, શંકુ આકાર, ગોળાકાર).</p> <p>(૧૪) રેખા, ખૂણા અને સામાન્ય ભૌમિતિક આકૃતિઓ-સાદી કે ત્રાંસી સમાંતર રેખાઓના ગુણધર્મો, ત્રિકોણની સાપેક્ષ બાજુઓના માપનના ગુણધર્મો, પાચથાગોરસનો પ્રમેય, ચતુર્ભૂજ, લંબગોળ, સમાંતર બાજુ ચતુષ્કોણ, સમભૂજ ચતુષ્કોણ.</p> <p>(૧૫) બીજગણિતનો પરિચય-BODMAS-કાનાભાગુવઓ-વિચિત્ર પ્રતિકોની સરળ સમજૂતિ.</p> <p>(૧૬) માહિતીનું અર્થઘટન, માહિતીનું વિશ્લેષણ, માહિતીની પર્યાપ્તતા, સંભાવના</p>	30
૯	<p>ગુજરાતી વ્યાકરણ</p> <p>(૧) ખેડણી</p> <p>(૨) સમાનાર્થી-વિરુદ્ધાર્થી શબ્દો</p> <p>(૩) રૂઢિપ્રયોગો અને કહેવતો</p> <p>(૪) સમાસ</p> <p>(૫) સંધિ</p> <p>(૬) અલંકાર</p> <p>(૭) છંદ</p>	૧૦
૧૦	<p>English Grammar</p> <p>(1) Articles, Pronouns, Adjectives, Prepositions, Conjunctions and Question tag.</p> <p>(2) Verb and Tense, Agreement between subject and verb, Gerund, Participles.</p> <p>(3) Modal auxiliaries. Usage of can, may, could, should, etc.</p> <p>(4) Use of some, many, any, few, a little, Since and for.</p> <p>(5) Active and passive voice</p> <p>(6) Degrees of adjectives.</p> <p>(7) Common errors of usage.</p>	૧૦

❖ મુદ્દા ક્રમાંક ૮ થી ૧૦ માટેનો અભ્યાસક્રમ ધોરણ ૧૨ સમકક્ષ રહેશે.

Syllabus for preliminary test for recruitment from Direct Selection

Part-1 (General Studies)

Medium: Gujarati and English

Total Marks: 100

Point No.	Subject	Marks	
1	Geography of India – Geographical, Economic, Social, Natural Resources and Population related topics – With Special reference to Gujarat	30	
2	Cultural Heritage of India – Literature, Arts, Religion and Architecture - With Special reference to Gujarat		
3	History of India- With Special reference to Gujarat		
4	Indian Economy and Planning		
5	Indian Politics and 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 Casts, Scheduled Tribes and Backward Classes of the society (9) NITI Aayog (10) Constitutional and Statutory Bodies: Election Commission of India, Comptroller and Auditor General, Information Commission		
6	General Science, Environment and Information & Communication Technology		10
7	Daily events of Regional, National and International Importance including Sports		10
8	General Mental Ability Test (1) Logical Reasoning and Analytical Ability (2) Number Series, Coding-Decoding (3) Questions about relationship. (4) Shapes and their Sub-sections, Venn Diagram (5) Questions based on Clock, Calendar and Age (6) Number system and order of Magnitude (7) Linear Equations - in one or two Variables (8) Ratio, Proportion and Variation (9) Average of Mean, Median, Mode- including weighted Mean (10) Power and Exponent, Square, Square Root, Cube Root, H.C.F. & L.C.M. (11) Percentage, Simple and Compound Interest, Profit and Loss (12) Time and Work, Time and Distance, Speed and Distance (13) Area and Perimeter of Simple Geometrical Shapes, Volume and Surface Area of Sphere, Cone, Cylinder, Cubes and Cuboids (14) Lines, Angles and Common geometrical figures - properties of transverse or		30

	<p>parallel lines, properties related to measure sides of a triangle, Pythagoras theorem, quadrilateral, rectangle, Parallelogram and rhombus.</p> <p>(15) Introduction to algebra-BODMAS, simplification of weird Symbols.</p> <p>(16) Data interpretation, Data Analysis, Data sufficiency, Probability</p>	
9	<p>Gujarati Grammar</p> <p>(૧) બેડણી</p> <p>(૨) સમાનાર્થી-વિરુદ્ધાર્થી શબ્દો</p> <p>(૩) રૂઢિપ્રયોગો અને કહેવતો</p> <p>(૪) સમાસ</p> <p>(૫) સંધિ</p> <p>(૬) અલંકાર</p> <p>(૭) છંદ</p>	10
10	<p>English Grammar</p> <p>(1) Articles, Pronouns, Adjectives, Prepositions, Conjunctions and Question tag.</p> <p>(2) Verb and Tense, Agreement between subject and verb, Gerund, Participles.</p> <p>(3) Modal auxiliaries. Usage of can, may, could, should, etc.</p> <p>(4) Use of some, many, any, few, a little, Since and for.</p> <p>(5) Active and passive voice</p> <p>(6) Degrees of adjectives.</p> <p>(7) Common errors of usage.</p>	10

❖ The standard of the syllabus for point No. 8 to 10 will be equivalent to Standard 12.

Part-2 (Concerned Subject)

Syllabus for the Preliminary Test for the recruitment of

Assistant Engineer(Mechanical), Class-II

Narmada, Water Resources, Water Supply and Kalpsar Department

Marks – 200

Questions – 200

Medium - English

1. THERMODYNAMICS :

- Fundamentals- thermodynamic systems and control Volume; Thermodynamic Properties, Process and state; Exact and Inexact differentials; Work- Thermodynamic definition; Temperature, Definition of thermal equilibrium and Zeroth law; Definition of heat; Definition of Pure substance, Ideal Gases and ideal gas mixtures, Real gases and real gas mixtures, Properties of pure substances, behavior of ideal and real gases; Definitions of saturated states; Identification of states & determination of properties, Mollier's chart.
- First Law for Cyclic & Non-cyclic processes; Concept of total energy E; Various modes of energy, Internal energy and Enthalpy.
- Second law - Definitions of direct and reverse heat engines; Definitions of thermal efficiency and COP; Kelvin-Planck and Clausius statements; Definition of reversible process; Internal and external irreversibility; Carnot cycle; Absolute temperature scale.
- Clausius inequality; Definition of entropy S ; Evaluation of S for solids, liquids, ideal gases and ideal gas mixtures undergoing various processes; Principle of increase of entropy; Definition of Isentropic efficiency for compressors, turbines and nozzles- Irreversibility and Availability, Availability function for systems and Control volumes undergoing different processes, Lost work. Second law analysis for a control volume. Exergy balance equation and Exergy analysis.
- Thermodynamic cycles - Basic Rankine cycle ; Basic Brayton cycle ; Basic vapor compression cycle and comparison with Carnot cycle.

2. HEAT-TRANSFER :

- Introduction to three modes of heat transfer, heat balance equation- Steady one dimensional solution for conduction heat transfer, concept of conduction and film resistances, critical insulation thickness, lumped system approximation and Biot number, heat transfer through pin fins- Two dimensional conduction solutions for both steady and unsteady heat transfer, Heissler charts.
- Heat convection, basic equations, boundary layers- Forced convection, external and internal flows- Natural convective heat transfer- Dimensionless parameters for forced and free convection heat transfer-Correlations for forced and free convection- Approximate solutions to laminar boundary layer equations (momentum and energy) for both internal and external flow- Estimating heat transfer rates in laminar and turbulent flow situations using appropriate correlations for free and forced convection.
- Interaction of radiation with materials, definitions of radiative properties, Stefan Boltzmann's law, black and gray body radiation, Wien's displacement law
- Types of heat exchangers, Analysis and design of heat exchangers using both LMTD and ϵ -NTU methods.
- Introduction mass transfer, Similarity between heat and mass transfer.

3. Fluid Mechanics :

Fluid properties; fluid statics, manometry, buoyancy, forces on submerged bodies, stability of floating bodies; control-volume analysis of mass, momentum and energy; fluid acceleration; differential equations of continuity and momentum; Bernoulli's equation; dimensional analysis; Euler's equation – theory of Rotodynamic machines viscous flow of incompressible fluids, boundary layer, elementary turbulent flow, flow through pipes, head losses in pipes, bends and fittings. Classification of water turbines, heads and efficiencies, velocity triangles- Axial, radial and mixed flow turbines- Pelton wheel, Francis turbine and Kaplan turbines.

4. Power Engineering :

Air and gas compressors; vapor and gas power cycles, concepts of regeneration and reheat.

5. I.C. Engines :

- Combustion in SI and CI engines, Combustion stages, Combustion chambers and abnormal combustion. Fuel supply systems in SI and CI engines, carburetors, Port fuel injection, direct injection and Common rail injection. Ignition system, Lubrication system and Cooling system. Testing of IC engines. Engine emissions and control. Advanced IC Engine concepts, Air-standard Otto, Diesel and dual cycles.
- Engine Management, Engine System, Engine Mapping, Open Loop Engine Control Systems, lean burn engine control. Complete Vehicle Control System, Artificial intelligence and Engine management. Maintenance and fault diagnostics of engine management system, Engine diagnostics, Troubles and Tune-up, Engine service. Vehicle performance-performance parameters.
- Heavy Earth Movers, Types of Excavators, Dumpers, Draggers, Cranes

6. Refrigeration and air-conditioning :

Vapour and gas refrigeration and heat pump cycles; properties of moist air, psychrometric chart, basic psychrometric processes.

7. Engineering Mechanics :

Free-body diagrams and equilibrium; trusses and frames; virtual work; kinematics and dynamics of particles and of rigid bodies in plane motion; impulse and momentum (linear and angular) and energy formulations, collisions.

8. Mechanics of Materials :

Stress and strain, elastic constants, Poisson's ratio; Mohr's circle for plane stress and plane strain; thin cylinders; shear force and bending moment diagrams; bending and shear stresses; deflection of beams; torsion of circular shafts; Euler's theory of columns; energy methods; thermal stresses; strain gauges and rosettes; testing of materials with universal testing machine; testing of hardness and impact strength.

9. Kinematics and Theory of Machines :

Classification of mechanisms-Basic kinematic concepts and definitions-Degree of freedom, mobility- Grashof's law, Universal Joint-Rocker mechanisms Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of linkages; cams; gears and gear trains; flywheels and governors; balancing of reciprocating and rotating masses; gyroscope.

10. Engineering Materials :

Structure and properties of engineering materials, phase diagrams, heat treatment, stress-strain diagrams for engineering materials. Young's modulus, generalized Hooke's law, yielding and yield strength, ductility, resilience, toughness and elastic recovery; Hardness: Rockwell, Brinell and Vickers and their relation to strength. Static failure theories: Ductile and brittle failure mechanisms, Maximum normal stress, Mohr-Coulomb and Modified Mohr-Coulomb; Fracture mechanics: Introduction to Stress-intensity factor approach and Griffith criterion. Fatigue failure: High cycle fatigue, Stress-life approach, SN curve, endurance and fatigue limits, effects of mean stress using the Modified Goodman diagram; Introduction to non-destructive testing (NDT).

11. Manufacturing Processes :

- Different types of castings, design of patterns, moulds and cores; solidification and cooling; riser and gating design. Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk (forging, rolling, extrusion, drawing) and sheet (shearing, deep drawing, bending) metal forming processes; principles of powder metallurgy. Principles of welding, brazing, soldering and adhesive bonding.
- Heat treatment process-Annealing, tempering, normalizing and spheroidising.
- Alloying of steel, properties of stainless steel and tool steels, maraging steels- cast irons; grey, white, malleable and spheroidal cast irons- copper and copper alloys; brass, bronze and cupro-nickel; Aluminum and Al-Cu – Mg alloys- Nickel based super alloys and Titanium alloys.
- Welding and weld Testing, Classifying Welding process, Fusion versus non-fusion, Pressure versus non-pressure, Energy source of welding, Other basis for classification and sub-classification.
- Unconventional Machining Processes: Abrasive Jet Machining, Water Jet Machining, Abrasive Water Jet Machining, Ultrasonic Machining, principles and process parameters Electrical Discharge Machining, principle and processes parameters, MRR, surface finish, tool wear, dielectric, power and control circuits, wire EDM; Electro-chemical machining (ECM), etchant & maskant, process parameters, MRR and surface finish. Laser Beam Machining (LBM), Plasma Arc Machining (PAM) and Electron Beam Machining.
- Types of Pumps, Pump viscosity, Centrifugal, NPSH, Pump curves, Progressive cavity, Screw pumps, Rope Pump, Submersible, Vertical turbine, Coupling section, Motor section, Well Section, Hydraulic Principles, General pumping fundamental.

- Spillways-Types of spillway based on most prominent features, Spillway Crest Gates
- Flood Management

12. Metrology and Inspection :

Limits, fits and tolerances; linear and angular measurements; comparators; gauge design; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly.

13. Computer Integrated Manufacturing :

Basic concepts of CAD/CAM and their integration tools. NC/CNC Technology and Part programming.

14. Operations Research :

Linear programming, simplex method, transportation, assignment, network flow models, simple queuing models, PERT and CPM

15. Current Trends and Recent Advancements in the above fields.