



## ગુજરાત જાહેર સેવા આયોગ

સેક્ટર - ૧૦-એ, ૯-૩ સર્કલ પાસે, ૯ રોડ,  
ગાંધીનગર - ૩૮૨૦૧૦

જાહેરાત ક્રમાંક: ૩૯/૨૦૨૪-૨૫, મદદનીશ ઈજનેર (યાંત્રિક), વર્ગ-૨ (GMC) ની જગ્યા પર  
ભરતી માટેની પ્રાથમિક કસોટીમાં ભાગ-૧ અને ભાગ-૨ ના ૧૮૦ મિનિટના સંયુક્ત  
પ્રશ્નપત્રનો અભ્યાસક્રમ

### સીધી પસંદગીથી ભરતીની પ્રાથમિક કસોટીનો અભ્યાસક્રમ

#### ભાગ-૧

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	
૨	ભારતનો સાંસ્કૃતિક વારસો- સાહિત્ય, કલા, ધર્મ અને રચાપત્યો- 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 હક્કો (૩) રાજ્યનીતિના માર્ગદર્શક સિદ્ધાંતો (૪) સંસદની રચના (૫) રાષ્ટ્રપતિની સત્તા (૬) રાજ્યપાલની સત્તા (૭) ન્યાયતંત્ર (૮) અનુસ્થાપિત ખાતિ, અનુસ્થાપિત જનખાતિ અને સમાજના પછાત વર્ગો માટેની ખેગવાઈઓ (૯) નીતિ આયોગ (૧૦) બંધારણીય તથા વૈધાનિક સંસ્થાઓ- ભારતનું ચૂંટણી પંચ, કોમ્પ્યુટર એન્ડ ઓડિટર જનરલ, માહિતી આયોગ	૩૦
૬	સામાન્ય વિજ્ઞાન, પર્યાવરણ અને ઈન્ફર્મેશન એન્ડ કોમ્યુનિકેશન ટેકનોલોજી	૧૦
૭	ખેલ જગત સહિત રોજબરોજના પ્રાદેશિક, રાષ્ટ્રીય અને આંતરરાષ્ટ્રીય મહત્વના બનાવો	૧૦
૮	સામાન્ય બૌદ્ધિક ક્ષમતા કસોટી (૧) તાર્કિક અને વિશ્લેષણાત્મક ક્ષમતા (૨) સંખ્યાઓની શ્રેણી સંકેત અને તેનો ઉકેલ. (૩) સંબંધ વિષયક પ્રશ્નો. (૪) આકૃતિઓ અને તેના પેટા વિભાગ, વેળ આકૃતિઓ (૫) ઘડીયાળ, કેલેન્ડર અને ઉંમર સંબંધિત પ્રશ્નો. (૬) સંખ્યા વ્યવસ્થા અને તેના માનક્રમ.	૩૦

	<p>(૭) શૈક્ષિક સમીકરણ (એક કે બે ચલમાં)  (૮) પ્રમાણ, હિરચો અને ચલ.  (૯) સરેરાશ યા મધ્યક, મધ્યચય અને બહુલક, ભારિત સરેરાશ. .  (૧૦) ઘાત અને ઘાતાંક, વર્ગ, વર્ગમૂળ, ઘનમૂળ, ગુ.સા.અ. અને લ.સા.અ  (૧૧) ટકા, સાદુ અને ચક્રવૃદ્ધિ વ્યાજ, નહો અને નુકશાન.  (૧૨) સમય અને કાર્ય, સમય અને અંતર, ઝડપ અને અંતર.  (૧૩) સરળ ભૌતિક આકૃતિઓના ક્ષેત્રફળ અને પરિમિતિ, જથ્થો અને સપાટીનો વિસ્તાર  (છ સમાંતર બાજુ ધરાવતો ઘન, ઘન, સિલિન્ડર, શંકુ આકાર, ગોળાકાર).  (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.  (૧૫) બીજગણિતનો પરિચય-BODMAS-કાનાભાગુવઓ-વિચિત્ર પ્રતિકોની સરળ સમજૂતિ.  (૧૬) માહિતીનું અર્થઘટન, માહિતીનું વિશ્લેષણ, માહિતીની પર્યાપ્તતા, સંભાવના</p>	
૯	<p>ગુજરાતી વ્યાકરણ (ગુજરાતી માધ્યમ-Gujarati Medium Only)  (૧) ખેડણી  (૨) સમાનાર્થી-વિરુદ્ધાર્થી શબ્દો  (૩) રૂઢિપ્રયોગો અને કહેવતો  (૪) સમાસ  (૫) સંધિ  (૬) અલંકાર  (૭) છંદ</p>	૧૦
૧૦	<p>English Grammar (અંગ્રેજી માધ્યમ- English Medium Only)  (1) Articles, Pronouns, Adjectives, Prepositions, Conjunctions and Question tag.  (2) Verb and Tense, Agreement between subject and verb, Gerund, Participles.  (3) Modal auxiliaries. Usage of can, may, could, should, etc.  (4) Use of some, many, any, few, a little. Since and for.  (5) Active and passive voice  (6) Degrees of adjectives.  (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

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 parallel lines, properties related to measure sides of a triangle, Pythagoras theorem, quadrilateral, rectangle, Parallelogram and rhombus. (15) Introduction to algebra-BODMAS, simplification of weird Symbols. (16) Data interpretation, Data Analysis, Data sufficiency, Probability		30

9	<p>Gujarati Grammar (ગુજરાતી માધ્યમ-Gujarati Medium Only)</p> <p>(૧) જોડણી  (૨) સમાનાર્થી-વિરુદ્ધાર્થી શબ્દો  (૩) રૂઢિપ્રયોગો અને કહેવતો  (૪) સમાસ  (૫) સંધિ  (૬) અલંકાર  (૭) છંદ</p>	10
10	<p>English Grammar (અંગ્રેજી માધ્યમ- English Medium Only)</p> <p>(1) Articles, Pronouns, Adjectives, Prepositions, Conjunctions and Question tag.  (2) Verb and Tense, Agreement between subject and verb, Gerund, Participles.  (3) Modal auxiliaries. Usage of can, may, could, should, etc.  (4) Use of some, many, any, few, a little. Since and for.  (5) Active and passive voice  (6) Degrees of adjectives.  (7) Common errors of usage.</p>	10

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



**Syllabus for the preliminary test for the recruitment on the post  
of Assistant Engineer (Mechanical), Class-II (GMC) (Part-2)**

Marks – 200

Questions – 200

Medium - English

**1. MECHANICS OF SOLIDS:**

- Stress-strain relations, uniaxial loading, stress/strain tensor applied to a body subject to loads, thermal stress. Beams: bending moment and shear force diagram, bending stresses and deflection of beams, shear stress distribution.
- Design of solid and hollow circular shaft subjected to torque and combined loading for rigidity and stiffness; Design of Keys and splines.
- Helical springs, combined stresses, Design of fly wheels, leaf springs, thick and thin walled pressure vessels, strain energy concepts and theories of failure.

**2. ENGINEERING MATERIALS :**

Basic concepts of structure of solids, Crystalline materials, Defects in Crystalline material, Alloys and binary phases diagrams, structural properties of common engineering materials, Heat treatment of steel, plastics, ceramics composite materials, common applications of various materials.

**3. THEORY OF MACHINES :**

- Simple mechanism, kinematics and their classifications, link mechanism.
- Inversion: Four bar chain mechanism, Flexible power transmission system, Geometrical configuration.
- Gyroscope, cam profile, sound and vibrations of mechanical system.
- Balancing: Dynamic balancing, rotor balancing, etc. Balancing of single and multi-cylinder engines, linear vibration analysis of



mechanical systems, Spring- Mass-Dashpot system subject to axial load, Electrical analogy (single degree and two degrees of freedom). Automatic Controls, Analysis and design of sliding and rolling contact (anti-friction) bearings, Hydrodynamic bearings.

#### **4. MANUFACTURING PROCESSES :**

Conventional manufacturing processes like Turning, Welding, Shaping, Molding, Foundry Technology, Drilling etc. Merchant force analysis, Taylor's tool life equation, machine ability and machine economics, rigid small and flexible automation, NC, CNC. Recent machining methods - EDM, ECM and ultrasonic. Application of lasers and plasmas, analysis of forming processes. High energy rate forming jigs, fixtures, tools and gauges. Inspection of length, position, profile and surface finish, computer aided manufacturing.

#### **5. THERMODYNAMICS :**

Basic concepts, open and closed systems, Application of thermodynamic laws, gas equations. Laws of Thermodynamics, First law, Second law, Zeroth law Statement and Explanation. Gas Law : Boyle's law, Charles' law, Perfect gas equation, Thermodynamic cycles : Rankine cycle, Otto cycle, Diesel cycle, Dual cycle, Brayton cycle, etc.

#### **6. IC ENGINES, FUELS AND COMBUSTION :**

Spark Ignition and compression ignition engines. Four stroke and two stroke engines. Mechanical, thermal and volumetric efficiency. Heat balance, Combustion process in SI and CI engine, Pre ignition, detonation in SI engines. Diesel knock in CI engines. Choice of engine fuels octane and Cetane rating. Alternate fuels, carburetion and fuel injection. Engine emission and control. Solid, liquid and gaseous fuels, stoichiometric air requirement and excess air factor, fuel gas analysis, higher and lower calorific values and their measurements.

#### **7. DESIGN OF TRANSMISSION SYSTEMS :**



- Flexible transmission elements- design of flat belts & pulleys, design of chains and sprockets.
- Gear transmission- speed ratios and number of teeth, force analysis, tooth stresses, dynamic effects, fatigue strength, factor safety, gear materials; Design of straight tooth spur gear and parallel axis helical gears based on strength and wear considerations. Straight bevel gear-tooth terminology, tooth forces and stresses, equivalent number of teeth.
- Worm gear, merits & demerits, terminology, thermal capacity, materials, forces & stresses, efficiency, estimating the size of worm gear pair.
- Gear box - geometric progression, standard step ratio; Ray diagram, kinematics layout; Design of sliding mesh gear box- Design of multi-speed gear box for machine tool applications; constant mesh gear box, speed reducer unit; Variable speed gear box; Fluid couplings, Torque converters for automotive applications.
- Design of plate clutches, axial clutches, cone clutches, internal expanding rim clutches;
- Electromagnetic clutches; Band and Block brakes, external shoe brakes, internal expanding shoe brake.

## 8. HEAT TRANSFER, REFRIGERATION AND AIR CONDITIONING:

One and two dimensional heat conduction, Heat transfer from extended surfaces, heat transfer by forced and free convection Heat exchangers. Fundamentals of diffusive and convective mass transfer. Radiation laws, heat exchange between black and non-black surfaces, Network analysis, Heat pump refrigeration cycles and systems, condensers, evaporators and expansion devices and controls. Properties and choice of refrigerant. Cooling load calculation, solar refrigeration.

## **9. AUTOMOBILE ENGINEERING :**

Anatomy of vehicles, Automobile Systems - Necessity of clutch, Types of clutch, Constructional and functional details of clutch, Necessity of Transmission, Types of Transmission system, Brake and suspension systems, control systems, conventional steering and power steering, Electrical systems- for starting, ignition and lighting, repairs and maintenance of automobiles.

## **10. COMPUTER AIDED DESIGN AND COMPUTER AIDED MANUFACTURING (CAD/CAM) :**

CAD work station, Graphic packages-types and features, Geometric modeling, Various CAD softwares, Introduction to CNC machines- constructional features and working. Automatic tool changer (ATC) and Automatic pallet changer (APC). CNC Part Programming.

## **11. POLLUTION AND VEHICLE INSURANCE**

Exhaust gasses emission control systems. CNG conversion, Vehicle noise and its control. National and International standard norms for exhaust gas pollution control. PUC Certification. Licensing, Regulations of motor vehicles, Motor vehicle insurance.

## **12. DIAGNOSIS AND TESTING OF VEHICLE :**

Testing of various elements of the vehicle systems-Battery, clutch, brakes, wheels and tyres (wheel alignment, wheel balancing), etc. Performance test.

## **13. ENVIRONMENTAL SCIENCE**

Ecosystem, Air and Noise pollution, Water and Soil pollution, Renewable sources of Energy, Solid waste management, ISO 14000 & Environmental Management

## **14. ELECTRIC AND HYBRID VEHICLES**

Electric vehicles, Hybrid vehicles, Electric Propulsion System, Energy

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Storage Devices, Fuel Cell and Solar Powered Vehicles

**15. Role of AI (Artificial Intelligence) and Machine Learning (ML) in Automotive Industry, Predictive Vehicle Technology and Future of Automobiles (Self Driving Technology), Cruise control for the Driverless Cars, Collision Avoidance Technology (CA System)**

**16. CURRENT TRENDS AND RECENT ADVANCEMENTS IN THE RELEVANT FIELD.**



**(Praoun Patel)  
DEPUTY SECRETARY  
GUJARAT PUBLIC SERVICE COMMISSION**