



# **Gujarat Public Service Commission**

Advertisement No: 128/2019-20

Syllabus for Competitive Examination For the posts of  
Inspector of Motor Vehicle, class-II.

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**Scheme of Competitive Examination For the posts  
of Inspector of Motor Vehicle, class-II.**

Paper	Nature Of Exam	Part	Subject	Marks	Time	Total Allotted Marks
Paper I	Objective	Part A	Concerned Subjects	125	2 Hours	200
		Part B	Acts/ Rules/ Guideline/ Institute/ Judgements	75		
Paper II		Part A	English	50	1 Hour	100
		Part B	Gujarati	50		
Total Marks in Written Examination						300
Personality Test (Only for the Candidates who are declared qualified in Written Examination)						25
Total Marks to be considered for Final Selection						325

Note: The medium of written examination shall be English except Part B of Paper-II.

Syllabus of Paper-I of Written  
Examination for Competitive  
Examination For the posts of Inspector  
of Motor Vehicle, class-II.

## **Part A: Concerned Subjects**

**Total Questions: 125**

**Total Marks: 125**

**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 connective 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.

## **Part-B: Acts/Rules/Guideline/Institute/Judgements**

**Total Questions: 75**

**Total Marks: 75**

**Medium: English**

**1. The Motor Vehicle Act 1988 (with 2019 amendments)**

**2. The Central Motor Vehicles Rules, 1989 (CMVR)**

- Chapter I : Preliminary
- Chapter II : Licensing of Driving of Motor Vehicles
- Chapter III : Registration of Motor Vehicles
- Chapter IV : Control of Transport Vehicles
- Chapter V : Construction Equipment & Maintenance of Motor Vehicle

**3. THE GUJARAT MOTOR VEHICLES RULES, 1989**

- Chapter I : Preliminary
- Chapter II : Licensing of Drivers of Motor Vehicles
- Chapter III : Licensing of Conductors of Stage Carriages
- Chapter IV : Registration of Motor Vehicles
- Chapter V : Control of Transport Vehicles
- Chapter VII : Construction Equipment & Maintenance of Motor Vehicle

**4. Gujarat Road Safety Policy 2016-17**

**5. Motor Vehicle (Driving) Regulations, 2017**

**6. Gujarat Road Safety Authority Act 2018**

**7. Supreme Court Committee on Road Safety guidelines**

**8. National Green Tribunal**

**9. Traffic Signs, Road Markings and Road Furniture**

**10. Latest Technology in Vehicle Manufacturing related to Road Safety & Environment (including Bio Fuels)**

**11. Electric Vehicles**

**12. Landmark Judgement of Hon.Supreme Court related Road safety and Road and vehicle organisation**

- i. in the Supreme Court of India Civil Appeal no. 5826 of 2011  
**Mukund Dewangan vs the Oriental Insurance Co. Ltd. Etc...**

(Regarding No Necessity of obtaining endorsements to drive the transport vehicles when the transport vehicle is class of light motor vehicles (LMV).)

- ii. In the Supreme Court of India write petition (Civil) No. 265 of 2011  
**Avishek Goenka vs Union of India & Anr.**

(Regarding Restriction of use of Black film on the vehicles)

- iii. In the Supreme Court of India write petition (Civil) No. 235 of 2012



**Save life Foundation & Anr. vs Union of India & Anr.**

(Regarding No harassment to Samaritans i.e. bystanders for helping road accidents victim)

- iv. In the Supreme Court of India (Civil) appeal No. 11369 of 2018  
**Prakash Chand Doga vs Savita Sharma & Anr.**

(Regarding in accidents cases all the liabilities are of vehicles registered owner)

- v. In the Supreme Court of India write petition (Civil) 510 of 2005  
**Maninderjit Singh Bitta vs Union of India & Anr.**

(Regarding Scheme regulating issuance and fixation of High Security Registration Plates (HSRP))

- vi. In the Supreme Court of India write petition (Civil) No. 243 of 2005  
**Rajive Raturi vs Union of India & Others**

(Regarding For Divyang People safe access to road and transport facilities)

Syllabus of Paper-II of Written  
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## **PART-A (ENGLISH)**

**Total Questions: 50**

**Total Marks: 50**

1. Tenses , Concord- Participles, Gerund
2. Common Errors- on miscellaneous items
3. Usage: Articles, Prepositions, Adjective, Adverb, Conjunction, and Question tag
4. Usage: Some, many, any, little, a little, few, a few, since, for, modal Auxiliaries (can, may, have to, ought to, must, should, would), Voice, Degree.
5. Vocabulary
6. Idioms Phrases
7. Spellings
8. Homonyms, Autonyms, Synonyms, One word substitute, Words confused
9. Comprehension

## **Part-B (Gujarati)**

**કુલ પ્રશ્નો-૫૦**

**કુલ ગુણ-૫૦**

1. ગદ્યાર્થગ્રહણ
2. કહેવતો
3. રૂઢિપ્રયોગો
4. સમાનાર્થી શબ્દો
5. વિરુદ્ધાર્થી શબ્દો
6. જોડણી
7. અલંકાર
8. સમાસ
9. શબ્દસમૂહો માટે સામાસિક કે પારિભાષિક શબ્દો
10. સંધિ
11. છંદ