

MUNICIPAL CORPORATION OF GREATER MUMBAI

ON-LINE EXAMINATION - RECRUITMENT OF JUNIOR ENGINEER-MECHANICAL / ELECTRICAL

INFORMATION HANDOUT

This handout contains details pertaining to various aspects of the online exam you are going to undertake and important instructions about related matters. You are advised to study the handout carefully as it will help you in preparing for the examination.

The on-line examination will comprise the following objective type multiple choice tests as stated below :

Sr. No.	Test	No. of Questions	Marks	Time
1	General Knowledge	20	20	Composite Time of 60 minutes
2	Intellectual Potential	20	20	
3	Technical Knowledge	60	60	
	Total	100	100	

The time for the test is 60 minutes; however you may have to be at the venue for approximately 180 minutes including the time required for logging in, collection of the call letters, going through the instructions etc. All tests will be in English. You can attempt any question from 1 to 100 at any point of time within these 60 minutes. All the questions will have multiple choices. Out of the five answers to a question only one will be the correct answer. **You have to select the most appropriate answer and 'mouse click' that alternative which you feel is appropriate/correct. The alternative/ option that you have clicked on will be treated as your answer to that question. There will be no penalty for wrong answers marked by you. However, you are advised not to mark your answers by random guessing.**

The Scores of Online Examination will be obtained by adopting the following procedure :

- Number of questions answered correctly by a candidate in each objective test.
- The Scores so obtained by a candidate are made equivalent to take care of the minor difference in difficulty level, if any, in each of the objective tests held in different sessions to arrive at the Equated Scores*

*Scores obtained by candidates on any test are equated to the base form by considering the distribution of scores of all the forms.

- Testwise scores and scores on total is reported with decimal points upto two digits.

Note : Cutoffs will be applied on total score

Please note that the types of questions in this handout are only illustrative and not exhaustive. In the actual examination you will find questions of a higher difficulty level on some or all of these types and also questions on the types not mentioned here.

SAMPLE QUESTIONS

GENERAL KNOWLEDGE

This test is intended to give an index of your awareness of people and events past and present in different walks of life.

- Q.1.** Tarapore atomic power plant is located in ——
(1) Bihar (2) Gujarat (3) Madhya Pradesh (4) Rajasthan (5) Other than those given as options
- Q.2.** The total number of commercial banks nationalised so far is ——
(1) 7 (2) 14 (3) 20 (4) 24 (5) Other than those given as options
- Q.3.** To combat the menace of money laundering, which of the following financial institutions has introduced the 'Know Your Customer' Scheme ?
(1) IDBI (2) RBI (3) NABARD (4) SIDBI (5) Other than those given as options
- Q.4.** OSCAR awards are given for best performance in which of the following field ?
(1) Films (2) Literature (3) Sports (4) Science (5) Social Service
- Q.5.** Who among the following is the current Prime Minister of India ?
(1) Dr. A. P. J. Abdul Kalam (2) Dr. Manmohan Singh (3) Mrs. Sonia Gandhi
(4) Shri Atal Bihari Vajpayee (5) Other than those given as options

INTELLECTUAL POTENTIAL

This is a test designed to see how fast and accurately you can deal with numbers viz. computation, quantitative reasoning, interpretation of data etc.

- Q.1.** In a certain code language, '1, 2, 3' means 'bright little boy'; '1, 4, 5' means 'tall big boy' and '6, 3, 7' means 'beautiful little flower'. Which numeral in that language means 'bright' ?
(1) 1 (2) 6 (3) 3 (4) 4 (5) Other than those given as options
- Q.2.** Four of the following five are alike in a certain way and so form a group. Which is the one that does not belong to the group ?
(1) Helicopter (2) Aircraft (3) Steamer (4) Auto-mobile (5) Chariot
- Q.3-7.** Read the information given below and answer the questions.
Six plays A, B, C, D, E and F of a famous playwright are to be staged one on each day from Monday to Saturday. The schedule of the plays is to be in accordance with the following.
(1) A must be on the immediately previous day of the on which E is staged.
(2) C must not be staged on Tuesday.
(3) B must be on a day which immediately follows the day on which F is staged.
(4) D must be staged on Friday only and should not be immediately preceded by B.
(5) E must not be staged on the last day of the schedule.
- Q.3.** Which of the following is the schedule of plays, with the order of their staging from Monday ?
(1) E A B F D C (2) A F B E D C (3) A F B C D E
(4) F A B E D C (5) Other than those given as options
- Q.4.** Play C cannot definitely be staged on which of the following days in addition to Tuesday ?
(1) Monday (2) Wednesday (3) Thursday (4) Friday (5) Saturday
- Q.5.** Play D is between which of the following pairs of plays ?
(1) C and E (2) E and F (3) A and E (4) B and E (5) C and F
- Q.6.** Which of the following plays is on Monday ?
(1) E (2) A (3) F (4) B (5) C
- Q.7.** Which of the following plays immediately follows B ?
(1) F (2) E (3) D (4) C (5) A

TECHNICAL KNOWLEDGE

Questions in the Technical Knowledge test may be based on the given areas.

- **Basics of Mechanical Engineering** : Concept of mechanical technology:-Milling, planning, shaping, drilling, reaming, grinding, riveting, welding and joining process:- types, defects
Super finishing processes:-Honing, lapping, buffing
Casting, forging, rolling, drawing, forming processes
Classification, Selection and application of Machine Tools, Cutting tool material, Coolants, Design of cutting tools or Tool design.
- **Theory of Machines** : Belt Drives, Gear Drives, Joints and Coupling, single and multi cylinder engines and v engines, belts and chain drives, degree of freedom.
- **Machien Design Concepts** : Torson, Spring, Joints, Bearing- Types and Design, Theory of Failure, Factor of Safety, Combined stresses, Struts and Columns, Design of Screw and bolts, Design of Shafts and Springs, Keys.
- **Strength of Material** : Stress Strain Analysis, Trusses & Trough, Shear Stress, Torsion, bending moment & shear force concept, Shear Force and Bending moments in Beam, Deflection of Beams and different conditions, shafts and helical springs, impact load, torsion of bars
- **Fluid Mechanics** : Pumps, Types, Selection, Efficiency, characteristics etc., Compressible fluid flow, Fluid properties, Pressure, Thrust, Buoyancy, Viscosity; Bernoulli's theorem; Hydraulic jump, non-uniform flow, Reynold's number, hydraulic gradient, water hammer
- **Manufacturing Planning and Control** : Manufacturing Planning and Control System, Forecasting, Planning Function, Planning for Material Requirements, Scheduling and Sequencing, Project Management, Advance concepts of Production Planning I and II.

- **IC engines** : Volumetric and thermal efficiency, SI engines, CI engines, combustion, knocking, supercharging, Cooling lubrication and ignition system
- **Refrigeration and Air Conditioning** : Thermal Engineering- Ton of refrigeration, concept of latent heat, Evaporation concept
 Thermodynamics - Laws of thermodynamics, Various Cycles w.r.t. P-H curves
 Design of Refrigeration system - Compressor, Expansion unit, Accumulator, Evaporator, Condenser, Duct design, Vapour Absorption and Compression Refrigeration system
 Design of Air Conditioning system- Temp. Vs Humidity (8 different concepts), Types of system:- Split, centralised
 Latest Refrigerants and Their examples.
- **Parts of Vehicles** : Engine, Chassis, Transmission, drive assembly, alternator, axle, body, wheels, brakes, steering, suspension etc.
- **Transmission** : Gear drive design and analysis, Stepped drive Vs Step less drive
- **Concept of SI and CI Engines** : Carnot cycle, Reverse Carnot cycle, Rankin's cycle, Otto cycle, Diesel Cycle, SI Vs CI engine
- **Efficiency** : Thermal, Volumetric, Mechanical, Electrical system etc.
- 4 wheel drive Vs 2 Wheel drive, Differential mechanism
- Recent trends in Automobiles
- **Electrical Fundamentals** : Supply voltage, AC & DC supply, voltage, current ,inductance, resistance, capacitance, 3 phase & 1 phase supply system, electrical power, electrical energy, hv /lv supply, active and reactive power transfer and distribution, Reactive power consumption
- **Electrical power transmission & distribution** : Substation & receiving station, earthing, substation equipment, Bus Bar, CT, PT, Protection relay numerical/digital, circuit breaker, on load isolator, offload isolator, Surge arrestor, system grounding, equipment grounding, lightning protection etc. IS 3043, Single line diagram, control circuit, ladder diagram (PLC).
- **Insulating material** : Classification, dielectric strength, test & section (Bakelite, FRP, Teflon, PVC, HDPE, Mica, SF6, Vacuum, Oil etc).
- **Electric Motors (Induction Motors)** : Principle of working, 3 phase, 1 phase motors, motor starting methods, selection rating, cooling and enclosures, HV/LV motors, Motor protection relay, Motor control circuits, IS325, speed control methods-V/F control, slip recovery scheme, pole changing, construction of induction motors and their applications for pump, compressor, crane, actuator, tools. Maintenance & testing
- **Cables and wires** : Types, construction, HV/LV cables, testing, fault finding, cable rating and selection, cable jointing, termination
- **Statutory requirement of electric installation** : Oil, filtration, die electrical testing, insulation resistance testing, compliances with electrical inspector, safety precautions, permit to work (Lock out) procedure, safety equipment and test instrument. Indian Electricity Rules 1956- provisions, IEEE, IEC, ESSA.
- **Illumination (Lights)** : Types of of light, solar lighting, LED , CLF,HPSV, Mercury lamp, tube lights etc.
- **Principles of Digital Instruments** : Working principles of digital Voltmeter, Ammeter, Frequency meter, multimeters, Measurement of Resistance Megger Earth Test Potentiometer
- **Power Electronics** : SCR, MOSFET, FET devices, rectifiers and inverter, SMPS, PWM convertor, application
- Batteries and UPS
- Power factor improvement and energy conservation Energy conservation method, audit, solar energy collectors, area calculations, Wind energy , Energy Conservation Act 2006, BEE initiatives and star rating to efficient electrical equipment

- Provision of National Building Codes on Building services & ventilation, electrical & allied installation, air conditioning, ventilation, acoustic, sound insulation and noise control, installation of lifts and escalators
- **Concepts of Electronics** : Diode, Triode, Semiconductor, Forward bias, Reverse bias, Transistor:- NPN, PNP.
- Logic Gates, De' Morgans Theorem, Boolean Logic
- Counter, Adder, Flip flops and types
- **PLC concepts** : Ladder logic, Programming, architecture
- **SCADA** : Concept, Hardware, Software etc
- **Automation** : Timer, Sequencing, Logic
- **Network Design** : Lan, MAN, WAN , Topology:- Ring, Star, Bus
- **Data Transmission** : Single, Half duplex, Full duplex, Fibre optic concept
- Computer Integrated Manufacturing and Technology Driven practices
- Databases and Warehousing
- Enterprise Resource Planning
- Computers in Industrial Engineering
- Internet vs Intranet

(A) Details of the On-line Examination Pattern

- (1) The examination would be conducted on-line i.e. on a computer.
- (2) All tests will be in English.
- (3) All the questions will have multiple choices. Out of the five answers to a question only one will be the correct answer. **The candidate has to select the most appropriate answer and 'mouse click' that alternative which he/ she feels is appropriate/ correct. The alternative/ option that is clicked on will be treated as the answer to that question. Answer to any question will be considered for final evaluation, only when candidates have submitted the answers by clicking on "Save & Next" or "Mark for Review & Next".**
- (4) The clock has been set at the server and the countdown timer at the top right corner of your screen will display the time remaining for you to complete the exam. When the clock runs out the exam ends by default - you are not required to end or submit your exam.
- (5) The question palette at the right of screen shows one of the following statuses of each of the questions numbered:



You have not visited the question yet.



You have not answered the question.



You have answered the question.



You have NOT answered the question but have marked the question for review.



You have answered the question but marked it for review.

The Marked for Review status simply acts as a reminder that you have set to look at the question again. *If an answer is selected for a question that is Marked for Review, the answer will be considered in the final evaluation.*

- (6) To select a question to answer, you can do one of the following :
 - (a) Click on the question number on the question palette at the right of your screen to go to that numbered question directly. Note that using this option **does NOT save your answer** to the current question.

- (b) Click on **'Save & Next'** to save answer to current question and to go to the next question in sequence.
- (c) Click on **'Mark for Review and Next'** to save answer to current question, mark it for review, and to go to the next question in sequence.
- (7) To select your answer, click on one of the option buttons.
- (8) To change your answer, click another desired option button.
- (9) To save your answer, you **MUST** click on **Save & Next**.
- (10) To deselect a chosen answer, click on the chosen option again or click on the **Clear Response** button.
- (11) To mark a question for review click on **Mark for Review & Next**. *If an answer is selected for a question that is Marked for Review, the answer will be considered in the final evaluation.*
- (12) To change an answer to a question, first select the question and then click on the new answer option followed by a click on the **Save & Next** button.
- (13) Questions that are saved or marked for review after answering will ONLY be considered for evaluation.**
- (14) Sections will be displayed on the top bar of the screen. Questions in a section can be viewed by clicking on the section name. The section you will view will be highlighted.
- (15) After clicking the **Save & Next** button on the last question for a section, you will automatically be taken to the first question of the next section.
- (16) You can move the mouse cursor over the section names to view the status of the questions for that section.
- (17) You can shuffle between sections and questions anytime during the examination as per your convenience.
- (18) The candidates are requested to follow the instructions of the "Test Administrator" carefully. If any candidate does not follow the instructions / rules, it would be treated as a case of misconduct/ adoption of unfair means and such a candidate would be liable for debarment from appearing for examinations for a period as decided by MCGM.
- (19) The candidates may ask the Test Administrator about their doubts or questions only before the commencement of the test. No query shall be entertained after the commencement of the examination.
- (20) After the expiry of 60 minutes, the candidates will not be able to attempt any question or check their answers. The answers of the candidate would be saved automatically by the computer system even if he/ she has not clicked the "Submit" button.
- (21) Please note :**
 - (a) Candidates will not be allowed to "finally submit" unless they have exhausted the actual test time.**
 - (b) Under no circumstances should a candidate click on any of the 'keyboard keys' once the exam starts as this will lock the exam.**

B] General Instructions:

- (1) Please note date, time and venue address of the examination given in the call letter.
- (2) You may visit the venue one day before the Online Examination to confirm the location so that you are able to report **on time** (as printed on the call letter) on the day of the examination. Late comers will not be allowed.
- (3) The call letter should be brought with you to the examination venue along with your recent passport size photograph duly pasted on it.
- (4) You must scrupulously follow the instructions of the Test Administrator and MCGM Representative at the examination venue. If you violate the instructions you will be disqualified and will be asked to leave the examination venue.
- (5) No use of calculators (separate or with watch), books, note books or written notes, cell phones (with or without camera facility), or any other electronic device will be allowed during the examination.

- (6) Please bring the call letter with your photograph affixed thereon, currently valid Photo identity proof in original and a photocopy of the same ID proof which you bring in original - THIS IS ESSENTIAL. Please hand over the call-letter alongwith photocopy of photo identity proof duly stapled together to the invigilator. Currently valid photo identity proof may be PAN Card/Passport/ Driving Licence/Voter's Card/Bank Passbook with photograph/Photo Identity proof issued by a Gazetted Officer on official letterhead /Photo Identity proof issued by a People's Representative on official letterhead/Valid recent Identity Card issued by a recognised College/University/Aadhar Card with a photograph/Employee ID/Bar Council Identity card with photograph. **Please Note - Ration Card and E-adhar Card will NOT be accepted as valid ID proof for this project.** Please note that your name as appearing on the call letter (provided by you during the process of registration) should exactly match the name as appearing on the photo identity proof. Female candidates who have changed first/last/middle name post marriage must take special note of this. If there is any mismatch between the name indicated in the Call Letter and Photo Identity Proof you will not be allowed to appear for the exam.
- (7) Your responses (answers) will be analysed with other candidates to detect patterns of similarity of right and wrong answers. If in the analytical procedure adopted in this regard, it is inferred/ concluded that the responses have been shared and scores obtained are not genuine/valid, your candidature may be cancelled. Any candidate who is found copying or receiving or giving assistance or engaging in any behaviour unbecoming of a candidate will not be considered for assessment. MCGM may take further action against such candidates as deemed fit by it.
- (8) You should bring with you a ball-point pen. A sheet of paper will be provided which can be used for rough work or taking down the question number you would like to review at the end of the test before submitting your answers. After the test is over you MUST hand over this sheet of paper to the Test Administrator before leaving the venue.
- (9) The possibility for occurrences of some problem in the administration of the examination cannot be ruled out completely which may impact test delivery and/or result from being generated. In that event, every effort will be made to rectify such problem, which may include the conduct of another examination if considered necessary. Decision of the test conducting body in this regard shall be final. Candidates not willing to accept such change shall lose his/her candidature for this exam.
- (10) If the examination is held in more than one session, the scores across various sessions will be equated to adjust for slight differences in difficulty level of different test batteries used across sessions. More than one session are required if the nodes capacity is less or some technical disruption takes place at any centre or for any candidate.
- (11) Please note that a candidate is allowed to appear only once in the online examination. Multiple appearance in online examination will result in cancellation of candidature. In case more than one call letter has been generated, candidates are advised to appear only once on the date and at the time mentioned on the respective call letter. All other call letters are to be surrendered.
- (12) Anyone found to be disclosing, publishing, reproducing, transmitting, storing or facilitating transmission and storage of test contents in any form or any information therein in whole or part thereof or by any means verbal or written, electronic or mechanical or taking away the papers supplied in the examination hall or found to be in unauthorised possession of test content is likely to be prosecuted.
- (13) Instances for providing incorrect information and/or process violation by a candidate detected at any stage of the selection, process will lead to disqualification of the candidate from the selection process and he/she will not be allowed to appear in any recruitment process of the MCGM in the future. If such instances go undetected during the current selection process but are detected subsequently, such disqualification will take place with retrospective affect.

IMPORTANT POINTS TO REMEMBER

You are advised to bring with you the following:

- (i) Call letter with photo affixed thereon and photo ID card in **Original** and photocopy as mentioned in point 6.
- (ii) One Ball point pen.

WISH YOU GOOD LUCK