उप अभियंता (यांत्रिकी) भूजल सर्वेक्षण व विकास यंत्रणा, गट-अ
पाणी पुरवठा व स्वच्छता विभाग
Deputy Engineer (Mechanical), Groundwater Survey and Development Agency, Group-A
Water Supply and Sanitary Department

परीक्षेचे टप्पे:- **१)** लेखी परीक्षा- २०० गुण **२)** मुलाखत - ५० गुण

-: परीक्षा योजना :-

विषय व सांकेतांक (११०२)	माध्यम	प्रश्नसंख्या	गुण	कालावधी	दर्जा	प्रश्नपत्रिकेचे स्वरुप
विषयाशी / विभागाशी संबंधित घटक	इंग्रजी	१००	२००	एक तास	पदवी	वस्तुनिष्ठ बहुपर्यायी

अ) नकारात्मक गुणदान -

१) प्रत्येक चुकीच्या उत्तराकरीता २५% किंवा १/४ एवढे गुण एकूण गुणांमधून वजा/ कमी करण्यात येतील.
२) एखाद्या प्रश्नाची एकापेक्षा अधिक उत्तरे दिली असल्यास अथवा ज्या उमेदवाराने उत्तरपत्रिकेत पूर्ण वर्तुळ चिन्हांकित केले नसेल अशा प्रश्नाचे उत्तर चुकीचे समजण्यात येऊन त्या प्रश्नाच्या उत्तराकरीता २५% किंवा १/४ एवढे गुण एकूण गुणांमधून वजा/कमी करण्यात येतील.
३) वरीलप्रमाणे कार्यपध्दतीचा अवलंब करताना एकूण अंतिम गुणांची बेरीज अपूर्णांकात आली तरीही ती अपूर्णांकातच राहील व पुढील कार्यवाही त्याच्या आधारे करण्यात येईल.
४) एखाद्या प्रश्नाचे उत्तर अनुत्तरित असेल तर, अशा प्रकरणी नकारात्मक गुणांची पध्दत लागू असणार नाही.

ब) अंतिम गुणवत्ता यादी ही वस्तुनिष्ठ परीक्षेतील व मुलाखतीतील एकत्रित गुणांवर आधारीत राहील.

-: अभ्यासक्रम :-

विषयाशी/विभागाशी संबंधित घटक यामध्ये खालील घटक व उपघटकांचा समावेश असेल.

Sr. No.	Topics and sub-topics
1	**Faculty of Science & Engineering :** 1. Scientific Knowledge: Nature of Science, Pre-supposition of Science, Scientific method. 2.Modernisation & Science: What is Modernisation (Definition & Modernisation), Type & Nature of Modernisation, Modernisation and Indian Society (Problems & Remedies) 3. Scientific & Technological developments (The World over, particularly in India) 4. Effect of Technological Developments on Urban & Rural Life 5. Various Indian Problems & their Scientific Solutions: - For Example – Energy problem, Food grains problem, Population Problem, Environment Problem, Education Problem, Housing Problem, Transport Problem, Communication Problem, Public Health Problem etc.
2	**Mechanical and Automobile Engineering :** Basic Mechanical Engineering. Introduction to Mechanical Engineering: Mechanical Elements: Function and Description of Uses of shaft, Axle, Key, Coupling, Bearing, Clutch, Brake- Disc Brake. Power Transmission Devices: construction, working, comparison & application of Belt drive (Flat and V Belt), Chain drive and Spur Gear Drive arranged with simple gear train.
3	**Drilling Machines :** Types of drilling machines such as D.T.H. Rotary, Reverse Rotary, Percussion, combination etc. and their applications. Selection of Drilling Machine Considering formation. Types of drilling bits & its application. Testing of Tube Well & methods of testing tube wells. Specific Yield & Draw down of Tube Wells, Cone of depression. Factors to be considered for selection of Casing pipe, slotted pipe, Screens, for tube wells.

4	**Internal Combustion Engines:** Air Standard cycles and fuels Air cycles, Spark Ignition engines and Compression Ignition engines. Engine systems & components -: Fuel Systems Lubrication System Engine Cooling System Turbochargers Superchargers
5	**Pumps:** Types, classification, principles of working, its unique applications and constructional details of Turbine pumps, Ven pump, Gear pumps. radial and axial plunger pumps, screw pumps, power and efficiency calculations, Characteristics curve, selection of pumps considering requirement of discharge and head. Classification, components of centrifugal pumps, various terms association with centrifugal pump, various heads, cavitations, priming of pumps, installation, maintenance, troubles and remedies, series and parallel operation of pumps, system resistance curve, water hammer problems in pumping system. What is a turbine, basic working principle, Unique Application: Pump as a turbine.
6	**Prime movers:** Various types of electrical motors, applications of submersible and Surface motors in pumping systems and its construction. DC motors, Brushless motor and constructional details, selection of Motors for solar energy based pumping systems. Testing of motors as per guidelines of B I S
7	**Theory and design of Compressors:** Basic theory classification and application, working of compressor, Types of compressors, reciprocating, Screw and Ven compressor, speed control mechanism of compressor, selection of compressor for various capacity drilling machines. Aspects considered for selection of compressors for drilling machines.
8	**Automobile Engine** : Automobile history and development, classification, vehicle layout- engine location and drive arrangement safety regulations, specifications of vehicles, type of vehicle bodies, chassis types, constructional Defects, Sub-frames, frameless vehicle, dimensions, details of chassis material, vehicle development, cycle overview.
9	**System Design:** Design of hydraulic/pneumatic circuits for drilling machines & other practical application. Selection of different components, reservoirs, various valves, actuators, air filters, air motors, hydraulic motors, pump design based on requirements, refrigeration, air conditioning and lift.
10	**Hydraulics activator:** Linear and rotary hydraulic Motors – Vane, Gear, Piston, Radial piston. Methods of control of acceleration and deceleration. Types of hydraulic cylinder in the hydraulic systems and mounting. Safety Devices in hydraulic system. Basics of Transducers, Sensors. Piezoelectric Actuators
11	**Inspection of Material:** Instruments, Gauges etc. used for quality control and inspection of various components like structure, pump sets and material used for their construction, cables, solar controllers etc. as per relevant IS standards.
12	**New and renewable energy sources :** Application of new and renewable energy Technologies. Sources / types of renewable energy. Solar pumping system. Types of solar panels. Efficiency and fill factors of solar panels. Testing of solar pumping system. Selection of solar pumps and Panels. Design of solar panel mounting system. Standards in force for solar panels.

	Types of lighting arrestors & Earthing systems for solar applications. Advantages of solar system over conventional energy sources. Invertors / controllers used in solar systems and its principles Methods & types of tracking systems & its advantages. Energy storage systems, Biofuel and its advantages over conventional fuel. Fuel cell operation. Introduction to Electric vehicles, Major components in EV, Concept of battery charging and battery swapping practices.

दिनांक – १० मे, २०२४

अवर सचिव
महाराष्ट्र लोकसेवा आयोग