

सूर्यवर्नायक नगरपालिका
इन्जिनियरिङ्ग सेवा, मेकानिकल समूह, निर्माण उपकरण संभार उपसमूह, पाचौं तह, मर्मत संभार टेक्निसियन पदको
प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पाठ्यक्रमको रूपरेखा :- यस पाठ्यक्रमको आधारमा निम्नानुसार चरणमा परीक्षा लिइने छ :

प्रथम चरण :-	लिखित परीक्षा	पूर्णाङ्क :- १००
द्वितीय चरण :-	अन्तर्वार्ता	पूर्णाङ्क :- २०

प्रथम चरण – लिखित परीक्षा योजना (Written Examination Scheme)

पत्र/विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या X अङ्कभार	समय
सेवा सम्बन्धी	१००	४०	वस्तुगत बहुवैकल्पिक (Multiple Choice)	५० प्रश्न X २अङ्क = १००	४५ मिनेट

द्वितीय चरण

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	२०	मौखिक

द्रष्टव्य :

१. यो पाठ्यक्रम योजनालाई प्रथम चरण (लिखित परीक्षा) तथा द्वितीय चरण (अन्तर्वार्ता) गरी दुई भागमा विभाजन गरिएको छ ।
२. प्रश्नपत्र अंग्रेजी र नेपाली भाषामा हुनेछ ।
३. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
४. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत अङ्क कट्टा गरिने छैन ।
५. परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
६. परीक्षामा यथासम्भव सबै इकाईबाट प्रश्न सोधिने छ ।
७. नगरपालिकाबाट संचालन हुने परीक्षामा परीक्षार्थीले मोबाइल वा यस्तै प्रकारका विद्युतीय उपकरण परीक्षा हलमा लैजान पाइने छैन ।
८. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाका मिति भन्दा ३ महिना अगाडि (संशोधन भएको वा संशोधन भई हटाईएको वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्भन्नु पर्दछ।
९. लिखित परीक्षामा छनौट भएका उम्मेदवारहरूलाई मात्र अन्तर्वार्तामा सम्मिलित गराइनेछ ।
१०. लिखित परीक्षा र अन्तर्वार्ताको कुल अङ्क योगका आधारमा अन्तिम परीक्षाफल प्रकाशित गरिनेछ ।

विषय- सेवा सम्बन्धी

1. Electrical Technology

- 1.1 Electric current, Voltage, Resistance- definition, symbol, units and measurements, Types of electrical measuring equipments
- 1.2 The Electric Field- Basic phenomena, Laws of electric field, Capacitors
- 1.3 The magnetic field- Magnetic field Quantities, Field line patterns, Electro- magnetism, Inductance, Application of electro-magnetism
- 1.4 Direct Current Circuit, Electric circuit ,Series, parallel and mixed circuits, Ohm's Law, Kirchoff's first and second law, Electrical work,

energy and power- definition, symbols , units and measurements, Heat produced by electric current, current density and fuse, Efficiency

- 1.5 A.C. Circuits- Alternating current generation, sinusoidal voltage, characteristic quantities such as instantaneous value, maximum and r.m.s. (effective)value, frequency; period and cycle; vector representation and phase angle, Ohmic resistance, inductive reactance, capacitance and impedance concept, symbol, unit, voltage and current characteristic in vector diagram, phase angle, their connections, AC power – active, reactive and apparent power and their calculation, power factor, Three phase current-application of single phase and three phase currents, generation of three phase current, connection of sources and loads in 3 phase system such as star and delta connection, power of a 3- phase system, the measurement of power, rotary field
- 1.6 Electrical Machines- Transformer, A.C. Motors, D.C. Motors, Generators- Working Principle, Construction and types
- 1.7 Selection of electric motors
- 1.8 Electrical supply and Distribution, Electrical Apparatus, Control and Protective Devices, Basic concept on electrical wiring, Earthing
- 1.9 Electrical Engineering Application- Electro-chemistry, Periodic system, chemical compounds and bounds, Conductance in fluids, electrolysis, Primary and secondary cells - construction, properties, mode of function and application connection of cells, Corrosion and its prevention
- 1.10 Maintenance and Safety- Repair and maintenance of electrical motors, control and protective devices, Safety use of electrical system – concept and safety rules & regulation First Aid in accident, steps to be taken in electrical accidents.

2 Auto Electronics

- 2.1 Fundamentals in Applied Electronics- Semiconductor diode, Transistor: BJT, JFET, MOSFET, Thyristor
- 2.2 Basic Electronics Circuit, Introduction to binary system and binary calculations, Gates, truth tables, electric analogy of gates, Concept of memory, flip-flop, IC counters, decade counters, seven segment display
- 2.3 Digital Electronics, Half wave, full wave and bridge rectifiers, and filter, Amplifier and Op-amp, Regulated power supply, Difference amplifier, comparator, adder circuits
- 2.4 Sensing Devices, Mechanical sensors, Electrical sensors, Electronic Sensors, Magnetic sensors, Optical sensors, Thermal sensors,
- 2.5 Motor Control circuits, Servo-mechanism, Thyristor controlled DC motors, DC motor control by SCR, AC motor control using triac, Stepper motor, Motor control using PLC

3. Drinking Water

3.1 Drinking Water.

- Present status of Water Supply and Sanitation
- Design norms and principles
- Principles related to unit operation:-
 - a) Aeration.
 - b) Flocculation and coagulation.
 - c) Sedimentation process including coarse material removal.
 - d) Filtration process/Slow sand filtration /Rapid filtration.
 - e) Disinfection process.
 - f) Sludge handling and disposal.

3.2 Design and Treatment:-

3.2.1 Design of the system

3.2.1.1 Drinking Water supply

- ◆ Introduction to pollutants (sources, types and effects), sources and characteristics of water, water demand and quantity, estimation of future population, design period.
- ◆ Water sources and intakes.
- ◆ Design of intake structures for rural and urban water supply system.
- ◆ Pipeline design: design criteria, design of transmission and distribution system
(including pipe networks).
- ◆ Reservoirs: types, size determination.

3.3 Water treatment

3.3.1 Drinking Water treatment

- ◆ Design of pre-treatment facility: Intake screen, aeration and etc.
- ◆ Design of treatment facilities: Sedimentation, Flocculation, Filtration systems and Disinfection.

Advanced treatment: Absorption by activated carbon, ion exchange, multimedia filtration, ultra filtration and reverse osmosis, ozonation, ultra violet disinfection, demineralization, new development in water treatment operation.

3.3.2 Management and other related aspects:-

- ◆ Pipe materials and related aspects.
- ◆ Sludge management, handling and disposal.
- ◆ Operation and Maintenance of Water system.
- ◆ Legal and Management aspects of Water system.
- ◆ Financial aspects: Tariff structure, tariff rates and affordability, System cost recovery.
- ◆ Education and training.

3.4 Ground water development.

3.4.1 Ground water flow.

- ◆ Ground water occurrences and prospecting, chemical characteristics and properties of ground water.
- ◆ Ground water exploration and Methods of ground water withdrawal.

3.4.2 Ground water recovery and tube-well design

- ◆ Ground water recovery.
- ◆ Tube well design.

3.4.3 Ground water quality

- ◆ Ground water treatment (aerator, iron removal plant) requirement based on ground water quality
- ◆ Disinfecting wells and piping
- ◆ Maintaining well yield
- ◆ Sanitary protection for ground water supplies
- ◆ Conservation and utility of ground water