

सशस्त्र प्रहरी बल नेपाल
प्राविधिक सशस्त्र प्रहरी निरीक्षक (ईन्जिनियर - मेकानिकल/अटोमोबाईल (Mechanical/Auto Mobile Engineer) पदको खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम
एवं परीक्षा योजना

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

प्रथम चरण :- लिखित परीक्षा

पूर्णाङ्क :- २००

द्वितीय चरण :- अन्तर्वार्ता

पूर्णाङ्क :- ३०

१. प्रथम चरण : - लिखित परीक्षा						पूर्णाङ्क :- २००	
पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या X अङ्क	समय
प्रथम	Technical Subject and General Awareness	१००	४०	वस्तुगत	बहुवैकल्पिक प्रश्न (MCQs)	१०० प्रश्न x १ अङ्क	१ घण्टा १५ मिनेट
द्वितीय		१००	४०	विषयगत	छोटो उत्तर लामो उत्तर	६ प्रश्न X ५ अङ्क ४ प्रश्न X १० अङ्क	३ घण्टा
					समस्या समाधान	२ प्रश्न X १५ अङ्क	

२. द्वितीय चरण : - अन्तर्वार्ता							
विषय		पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली			समय
अन्तर्वार्ता		३०	-	मौखिक			

द्रष्टव्य :

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- प्रथम र द्वितीय पत्रको पत्रको विषयवस्तु एउटै हुनेछ ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- लिखित परीक्षामा यथासम्भव पाठ्यक्रमका सवै एकाईबाट प्रश्नहरु सोधिनेछ ।
- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरुको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।
- विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरु हुनेछन् । परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरुको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
- पाठ्यक्रम लागू मिति :- २०६२/०४/२९ गते/१

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प्रथम तथा द्वितीय पत्र :- Technical Subject and General Awareness

Part I : Technical Subject

Section - (A)

1. Material Science and Metallurgy

- 1.1 Basic concepts on structure of solids
- 1.2 Crystalline materials
- 1.3 Imperfections in atomic arrangement
- 1.4 Slip and Twinning
- 1.5 Dislocation
- 1.6 Points and Surface Defects
- 1.7 Alloys and binary phase diagrams
- 1.8 Iron-carbon equilibrium diagram
- 1.9 Types of steel
- 1.10 Heat treatment of steels
- 1.11 Plastics
- 1.12 Ceramics and composite materials

2. Machine Component Design and Drawing

- 2.1 Types of projection, sectional views, auxiliary views
- 2.2 Developments and Intersections
- 2.3 Production Drawings
- 2.4 Terminologies of mechanisms
- 2.5 Mobility and Degrees of Freedom
- 2.6 Design Process
- 2.7 Factors affecting choice of materials for design: Strength, Toughness, Durability, Hardness
- 2.8 Loading: Tensile, Compressive, Shearing, Bending, Bearing and Torsion
- 2.9 Common Types of Failure: theories of failure, stress concentration effects, ductile and brittle materials, factor of safety

Section - (B)

3. Production Engineering

- 3.1 Workshop hand tools. basic hand operations
- 3.2 Metal Forming: basic principles of forging, drawing and extrusion
- 3.3 Metal Casting: Gating and Riser design, melting furnaces
- 3.4 Metallurgy of Welding
- 3.5 Principles of Gas, Arc, Shielded Arc Welding, Weldability
- 3.6 Machine tools: Lathe, Shaper, Milling, Grinding, Drilling Machines.
- 3.7 Metal Cutting: Turning, Methods of Screw Production, Drilling, Boring, Milling, Gear Manufacturing, Production of flat surfaces

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- 3.8 Grinding and finishing processes
- 3.9 Computer Controlled Manufacturing Systems - CNC, DNC, FMS, Automation and Robotics
- 3.10 Cutting Tools Materials, Tool Geometry, Mechanism of Tool Wear, Tool Life and Machinability, Jigs and Fixtures.
- 3.11 Fits and tolerances, Linear Measurement: Block Gages, Length Bars, Comparators

4. Industrial Engineering

- 4.1 Plant Location and Plant Layout Design
- 4.2 Production Planning and Control: Selection of materials, methods, machines and manpower
- 4.3 Product development, Break-even analysis, Capacity planning
- 4.4 Network methods: PERT, CPM
- 4.5 Control Operations: Inventory control ABC analysis, EOQ model, Materials requirement planning. Job design, Job standards, Work measurement
- 4.6 Quality Management - Quality analysis and control
- 4.7 Forecasting Techniques: Requirements of forecasting
- 4.8 Time series and moving average methods, regression analysis
- 4.9 Value engineering: Value analysis for cost/value

5. Thermodynamics

- 5.1 Basic concepts, open and closed systems, heat and work
- 5.2 Zeroth, First and Second Law of thermodynamics
- 5.3 Properties of ideal gases and vapors
- 5.4 Thermodynamic Cycles: Carnot cycle, Otto cycle, Diesel cycle, Brayton cycle, Rankine cycle
- 5.5 Refrigeration: Reversed Carnot cycle, vapor compression cycle, absorption refrigeration systems, Refrigerants and their properties
- 5.6 Air Conditioning: Psychometric properties and psychometric chart, heating, cooling, humidification and dehumidification process
- 5.7 IC engines: Classifications, components, two stroke and four stroke operations, performance of IC engines, Ignition system, Cooling system, Lubrication system. Pre-ignition, Detonation and Diesel-knock, Fuel injection and Carburation, Supercharging
- 5.8 Engine Cooling, Emission and Control

6. Maintenance Management

- 6.1 Maintenance objectives and maintenance costs
- 6.2 Workshop Layout
- 6.3 Types of maintenance schemes
- 6.4 Basic maintenance decisions
- 6.5 Occupational safety and health

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Section - (C)

7. Fluid Mechanics

- 7.1 Properties and classification of fluids, forces on immersed surfaces, center of pressure, buoyancy, elements of stability of floating bodies
- 7.2 Equations of Fluid Flow: types of flow, continuity equation, Bernoulli's equation, and momentum equation, fully developed flow through pipes, pressure drop calculations, measurement of flow rate and pressure drop
- 7.3 Elements of boundary layer theory, integral approach, laminar and turbulent flows, separations
- 7.4 Dimensionless numbers, dimensional analysis
- 7.5 Flow measurement: Pitot-static tube, Orifice, Venturimeter, Nozzle, Rotameter

8. Hydraulic and Electric Machines

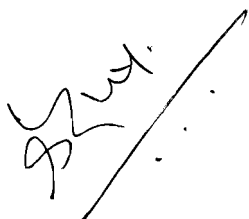
- 8.1 Performance, operation and control of Pelton, Francis, Kaplan and Cross flow turbines
- 8.2 Performance, operation and control pumps: Centrifugal pump and Reciprocating pump, Hydraulic ram
- 8.3 DC Motors: shunt field, series field and compound field motors, torque-speed characteristics
- 8.4 DC Generators: shunt, series and compound field machines, voltage/speed/load characteristics, effects of variable load, variable torque
- 8.5 Synchronous and Induction Machines: Basic structure of synchronous machines, Generator on isolated load, Generator on large system, Synchronous motor

9. Professional Practice

- 9.1 Ethics and Professionalism: perspective on morals, codes of ethics and guidelines of professional engineering practice
- 9.2 Legal aspects of Professional Engineering in Nepal: Engineering Council Act, Provision for private practice and employee engineers
- 9.3 Contract law
- 9.4 Tendering and contract documents

10. Renewable Energy

- 10.1 Solar Energy and its application
- 10.2 Biomass Energy Technologies
- 10.3 Wind Energy Systems
- 10.4 Micro and Small Hydroelectric Systems
- 10.5 Economics of Renewable Energy Systems



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Section - (D)

11. Automobile Engineering

11.1 Automotive Engine Systems

- 11.1.1 Engine Construction and Operation: Four stroke SI and CI engines, Working principle, function, materials, constructional details of engine components, Valve timing diagram, Firing order and its significance
- 11.1.2 Fuels and Combustion: Properties and rating of fuels (petrol and diesel), chemical energy of fuels, properties of air/fuel mixture
- 11.1.3 Combustion in CI Engines, Knock, methods of controlling knock
- 11.1.4 Intake and Exhaust system of automotive engines
- 11.1.5 Carburetion and Gasoline Injection
- 11.1.6 Diesel Injection
- 11.1.7 Engine Performance
- 11.1.8 Lubrication and Cooling
- 11.1.9 Supercharging and Scavenging

11.2 Automotive Transmission

- 11.2.1 **Clutch and Gear Box:** Requirements of transmission system, Different types of clutches, Objective of the gearbox, Determination of gear ratios for vehicles, Performance characteristics at different speeds, Different types of gearboxes operation, Differentials
- 11.2.2 **Hydrodynamic Drive:** Fluid coupling, principle of operation, constructional details, torque capacity, performance characteristics, reduction of drag torque, Torque converters, Principle of operation, constructional details, performance characteristics, converter coupling, multistage and poly phase torque converters
- 11.2.3 **Automatic Transmission:** Ford-T model gearbox, Wilson gearbox, Automatic over drive, Hydraulic control system, Applications (Chevrolet Turbo glide transmission, Toyota "ECT-i" Power glides Transmission (Intelligent Electronic control system), Mercedes Benz Automatic transmission, Hydraulic actuation system)
- 11.2.4 **Hydrostatic and Electric Drives:** Hydrostatic drive: principle, types, advantage and limitations, Comparison of hydrostatic drive with hydrodynamic drive. Construction and working of typical Janny hydrostatic drive, Electric drive, Principle of early and modified Ward Leonard Control system

11.3 Automotive Chassis

- 11.3.1 Automotive Suspension Systems
- 11.3.2 Automotive Steering Systems
- 11.3.3 Automotive Brakes: ABS Brake Diagnosis and Service

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11.3.4 Tires and Wheels: Tubes, tires and speed ratings; Tire and Wheel Inspection, Balance, Service and Repair

11.3.5 Vehicle Aerodynamics: Car Body Types, Bus Body Types, Commercial Vehicle Types, Body Materials, Trim and Mechanisms.

11.4 Automotive Electrical Systems

11.4.1 Storage Battery, Charging System (Cutout, Voltage and current regulators, Bridge rectifiers)

11.4.2 Starting System (Behavior of starter during starting, principle and construction of starter motor)

11.4.3 Ignition System (Spark plugs ignition, Electronic ignition systems, programmed ignition, distributor less ignition)

11.4.4 Lighting System and Accessories (Fusing of circuits, low and high voltage automotive cables, wiring diagram for typical automotive wiring system, headlamp, fog lamps, temperature gauge, oil pressure gauge, fuel gauge, speedometer, odometer)

Part II: General Awareness

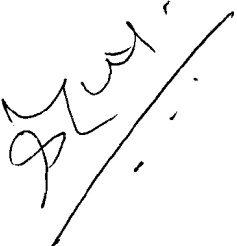
Section - (E)

1. सामान्य ज्ञान

- 1.1 नेपालको भौगोलिक, ऐतिहासिक, आर्थिक, सामाजिक, सांस्कृतिक र राजनैतिक अवस्था सम्बन्धी सामान्य जानकारी
- 1.2 राष्ट्रिय र अन्तर्राष्ट्रिय महत्वका समसामयिक घटनाहरू : राजनैतिक, आर्थिक, वैज्ञानिक, खेलकूद, सूचना प्रविधि, पुरस्कार
- 1.3 विद्यमान नेपालको संविधानको सामान्य जानकारी
- 1.4 सशस्त्र प्रहरी बल र सुरक्षा निकाय सम्बन्धी सामान्य जानकारी
- 1.5 सशस्त्र प्रहरी ऐन, २०५८ र सशस्त्र प्रहरी नियमावली, २०७२

2. विविध

- 2.1 व्यवस्थापनको अवधारणा र प्रकार
- 2.2 निर्देशन
- 2.3 नेतृत्व
- 2.4 उत्प्रेरणा
- 2.5 निर्णय प्रक्रिया
- 2.6 द्वन्द व्यवस्थापन
- 2.7 समावेशीकरण



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प्रथम तथा द्वितीय पत्रमा यथासम्भव निम्नानुसार प्रश्नहरू सोधिनेछ ।

प्रथम पत्र				
Part	Section	अङ्कभार	प्रश्न संख्या	
			वस्तुगत	विषयगत
I	A	१५	१५ प्रश्न X १ अङ्क = १५	-
	B	२५	२५ प्रश्न X १ अङ्क = २५	-
	C	२५	२५ प्रश्न X १ अङ्क = २५	-
	D	१५	१५ प्रश्न X १ अङ्क = १५	-
II	E	२०	२० प्रश्न X १ अङ्क = २०	-
द्वितीय पत्र				
Part	Section	अङ्कभार	प्रश्न संख्या	
			विषयगत	समस्या समाधान
I	A	२०	४ प्रश्न X ५ अङ्क = २० ४ प्रश्न X १० अङ्क = ४०	२ प्रश्न X १५ अङ्क = ३०
	B	३०		
	C	३०		
	D	२०		
II	E	१०	२ प्रश्न X ५ अङ्क = १०	-

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