

वैकल्पिक उर्जा पर्वद्धन केन्द्र
(इन्जिनियरको प्रतियोगितात्मक परीक्षाको पाठ्यक्रम एवं परीक्षा योजना)

भाग १ : – लिखित परीक्षा

पूर्णाङ्क :- १००

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या X अङ्क	समय
प्रथम	इन्जिनियरिङ्ग र अन्य	70	28	वस्तुगत	बहुवैकल्पिक प्रश्न	३५ प्रश्न X २ अङ्क	३५ मिनेट
द्वितीय	इन्जिनियरिङ्ग र अन्य	30	12	विषयगत	लामो उत्तर	१० प्रश्न X ३ अङ्क	४५ मिनेट

भाग २ : – अन्तर्वार्ता

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	20	मौखिक

1. Energy System

- 1.1 Types of energy resources; perpetual, renewable and non-renewable energy resources; conventional and non-conventional; traditional and commercial
- 1.2 Energy reserves and resources in the world and in Nepal
- 1.3 Supply potential, techno-economic viability, current status and importance of renewable energy resources in Nepal
- 1.4 Development of Renewable Energy Technology in Nepal
- 1.5 Working principles, design and techno- economic analysis of: Solar energy systems, Micro and mini hydro, Wind energy, Bio gas/ biomass/ bio-fuel technologies and other non-conventional energy technologies
- 1.6 Energy auditing
- 1.7 Energy management
- 1.8 Analysis of demand and supply and energy balances
- 1.9 National and global energy scenario
- 1.10 Sustainability of energy projects
- 1.11 Gender in energy application
- 1.12 Concept of Quality Control and Quality Assurance

2. Environmental Engineering and Pollution Control

- 2.1 Environmental Pollution- units of measurements, material balance and energy fundamentals, classification of pollution
- 2.2 Air Pollution: Causes and effects
- 2.3 Water Pollution: Causes and effects, Waste water treatment
- 2.4 Industrial Waste: Collection and disposal
- 2.5 Global warming and climate change
- 2.6 Environment assessment: IEE and EIA
- 2.7 Environmental hazards; tools and techniques of hazard assessment

3. **Engineering Survey**
 - 3.1 Introduction and basic principles
 - 3.2 Linear measurements: techniques; chain, tape, ranging rods and arrows; representation of measurement and common scales; sources of errors; effect of slope and slope correction; correction for chain and tape measurements; Abney level and clinometers
 - 3.3 Compass and plane table surveying: bearings; types of compass; problems and sources of errors of compass survey; principles and methods of plane tabling
 - 3.4 Leveling and contouring: Principle of leveling; temporary and permanent adjustment of level; bench marks; booking methods and their reductions; longitudinal and cross sectioning; reciprocal leveling; trigonometric leveling; contour interval and characteristics of contours; methods of contouring
 - 3.5 Theodolite traversing: need of traverse and its significance; computation of coordinates; adjustment of closed traverse; closing errors
 - 3.6 Uses of Total Station and Electronic Distance Measuring Instruments
4. **Engineering Design and Drawing**
 - 4.1 Types of Projection
 - 4.2 Production Drawings
 - 4.3 Loading: Tensile, Compressive, Shearing, Bending, Bearing and Torsion
 - 4.4 Common Types of Failure: Theories of failure, Stress concentration effects, Ductile and brittle materials, Factor of safety
 - 4.5 Drawing sheet composition and its essential components
 - 4.6 Suitable scales, site plans, preliminary drawings, working drawings etc
 - 4.7 Theory of projection drawing: perspective, orthographic and axonometric projection; first and third angle projection
 - 4.8 Drafting tools and equipment
 - 4.9 Drafting conventions and symbols
 - 4.10 Topographic, electrical, plumbing and structural drawings
 - 4.11 Techniques of free hand drawing
5. **Engineering Management**
 - 5.1 Role of Management and System Concepts
 - 5.2 Plant Location and Plant Layout Design
 - 5.3 Production Planning and Control: Selection of materials, methods, machines and manpower
 - 5.4 Network methods: PERT, CPM
 - 5.5 Inventory Control: Inventory costs and Inventory models
 - 5.6 Forecasting Techniques: Requirements of forecasting, Time series and Moving average methods, Regression analysis
 - 5.7 Quality Management: Importance of quality, Statistical process control
 - 5.8 Statistical Analysis: Measurement of central tendency, Deviation, Distribution
6. **Estimating and Costing Valuation and Specification**
 - 6.1 Types of estimates and their specific uses
 - 6.2 Methods of calculating quantities
 - 6.3 Key components of estimating norms and rate analysis
 - 6.4 Preparation of bill of quantities
 - 6.5 Purpose, types and importance of specification
 - 6.6 Purpose, principles and methods of valuation

7. Engineering Economics and Professional Practice

- 7.1 Types of engineering economics decisions
- 7.2 Time Value of Money: Simple interest, Compound interest, Continuous compound interest
- 7.3 Project Evaluation Techniques: Payback period method, NPV method, Future value analysis, IRR method
- 7.4 Benefit and Cost Analysis: Cost benefit ratio, breakeven analysis
- 7.5 Corporate tax system in Nepal
- 7.6 Depreciation and its types
- 7.7 Ethics and Professionalism: Perspective on morals, Codes of ethics and guidelines of professional engineering practice
- 7.8 Contract law
- 7.9 Tendering and contract documents

8. Material Science and Metallurgy

- 8.1 Types of Materials, Material Selection
- 8.2 Imperfections in Atomic Arrangement: Slip and Twinning, Dislocation, Points and Surface Defects
- 8.3 Mechanical Properties and Testing: Tension, Impact, Fatigue, Hardness Test
- 8.4 Cold working and Hot working
- 8.5 Types of steel
- 8.6 Phase Transformation and Heat Treatment: Iron-carbon equilibrium diagram, Hardening, Tempering, Annealing, Normalizing

9. Basic Electrical and Electronics Engineering

- 9.1 Electrical Engineering Materials: Conducting, insulating & semiconductor materials
- 9.2 Circuit Parameters: resistance, inductance, capacitance and temperature effect of resistance
- 9.3 Circuit Fundamentals: Series & parallel circuits, circuit elements, independent & dependent sources, Ohm's law, Kirchhoff's Voltage & current laws
- 9.4 Network Theorems: Mesh's and Nodal's analysis of electrical circuits, Thevenin's, Norton's, maximum power & reciprocity theorems.
- 9.5 AC circuits: Concept of complex impedance, phaser diagram, Active, Reactive & Apparent power, Power factor, resonance in AC circuit
- 9.6 Bi-polar junction transistor: construction, operating characteristics, use as amplifier and switch.
- 9.7 Logic circuit: Decimal, Binary and Hexadecimal system, logic gates, adder, Encoder, Decoder, Multiplexer, DE multiplexer.
- 9.8 Power Electronics Devices: Thyristor, Triac, MOSFET, UJT, GTO – Construction and their characteristics
- 9.9 Rectifier : Rectifier using diodes - half wave, full wave, single phase, three phase, capacitor and inductor filters, Controlled rectifier using thyristors - half wave, full wave, single phase, three phase.
- 9.10 DC chopper: Step down chopper, Step up chopper.
- 9.11 Inverter: Single phase voltage inverter, three phase voltage inverter, current source inverter.
- 9.12 Cyclo-converter – Single phase and three phase.
- 9.13 AC voltage controller – with resistive load and inductive load.

१० . ऊर्जासँग सम्बन्धित सान्दर्भिक नीति र कानूनी व्यवस्था

- १०.१ ग्रामिण ऊर्जा नीति, २०६३
- १०.२ नवीकरणीय ऊर्जा अनुदान नीति, २०७३ र नवीकरणीय ऊर्जा अनुदान परिचालन कार्यविधि, २०७३
- १०.३ जैविक ऊर्जा रणनीति, २०६३
- १०.४ वैकल्पिक ऊर्जा प्रवर्द्धन केन्द्र कर्मचारी सेवा शर्त नियमावली, २०६६
- १०.५ सार्वजनिक खरिद ऐन, २०६३ तथा सार्वजनिक खरिद नियमावली, २०६४
- १०.६ आर्थिक अनुशासन तथा सुशासन नियमावली, २०७५
- १०.७ कार्य संचालन निर्देशिका, २०७५
- १०.८ लैङ्गिक समानता तथा सामाजिक समावेशिकरण २०७५
- १०.९ आयोजना मूल्यांकन तथा समापन सम्बन्धी कार्यविधि २०७५
- १०.१० वैकल्पिक ऊर्जाको क्षेत्रमा वैदेशिक लगानी र सहयोग