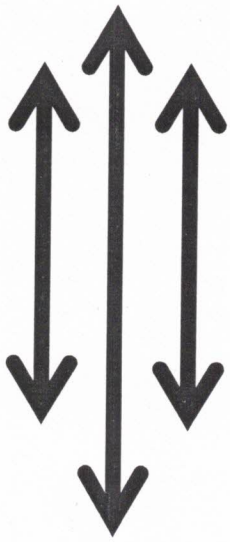
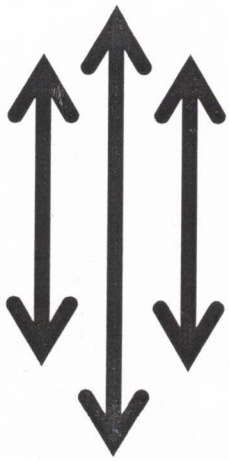
नेपाली सेना

श्री भर्ना छनौट निर्देशनालय कार्यरथी विभाग

जंगी अड्डा



प्रा.उ.से. ईलेक्ट्रिकल एण्ड ईलेक्ट्रोनिक्स इन्जिनियर (आन्तरिक) पदको लिखित परीक्षाको पाठ्यक्रम



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समयः ४ घण्टा १५ मिनेट

पुर्णाङ्कः १५०
उत्तीणाङ्कः ६०

यो पाठ्यक्रम नेपाली सेनाको प्रा.उ.से. ईलेक्ट्रिकल एण्ड ईलेक्ट्रोनिक्स इन्जिनियर (आन्तरिक) पदका उम्मेदवार छनौट परिक्षाको लागि निर्धारण गरिएको हो । लिखित परीक्षामा सरिक हुने उम्मेदवारहरुको पेशा सम्बन्धि विषयलाई आधारमानी प्रश्नहरु सोधिने छ ।

(क) लिखित परीक्षाको माध्यम नेपाली/अंग्रेजी वा दुवै भाषा हुनेछ ।

(ख) लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र अर्को चरणको परीक्षामा सम्मिलित गराईने छ ।

(ग) प्रश्नपत्र निर्माण गर्दा पाठ्यक्रममा समावेश भएका सबै विषयहरुलाई यथासंभव समेटिनेछ

(घ) बस्तुगत र विषयगत संयुक्त रुपमा पूर्णाङ्क र उत्तीर्णाङ्क कायम गरिनेछ ।

(ङ) बस्तुगत र विषयगत परीक्षाको पाठ्यक्रम एउटै हुनेछ ।

(च) बस्तुगत र विषयगत विषयको लिखित परीक्षा एकैपटक वा छुट्टाछुट्टै गरी लिन सकिनेछ

(छ) यो पाठ्यक्रम मिति २०७८/०५/११ गतेबाट लागु हुनेछ ।

लिखित परीक्षाको योजना र पाठ्यक्रम

विषय	पुर्णाङ्क	उत्तीणाङ्क	परीक्षा प्रणाली		प्रश्न संख्याxअंङ्क	समय
पेशा सम्बन्धी	७५	६०	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQs)	७५ प्रश्न x १ अंङ्क = ७५	१ घण्टा १५ मिनेट
	७५		विषयगत (Subjective)	छोटो उत्तर	७ प्रश्न x ५ अंङ्क = ३५	३ घण्टा
				लामो उत्तर	४ प्रश्न x १० अंङ्क = ३०	

प्रा.उ.से.ईलेक्ट्रिकल एण्ड ईलेक्ट्रोनिक्स इन्जिनियर (आन्तरिक) पदको लिखित परीक्षाको पाठ्यक्रम

1. SAFETY RULES AND REGULATIONS

1.1. Safe Use of Electrical Components: Safe use of Electrical tools, Static charge in high voltage equipment's & Electrical insulation techniques.

1.2. Electrical Shocks: Reasons of electrical shocks, Possible damage due to electrical shocks, Safe value of electric current and voltage through human body, First Aid for electric shock, Cardiopulmonary Resuscitation (CPR) & Safety precautions and regulations.

1.3. Earthing: Connecting a non-current carrying parts of electrical equipment to ground, Touch and step potential, Various types of electrodes used for earthing, Earthing mat & Concepts of instruments used for earth resistance measurement.

1.4. Fire hazards and firefighting techniques: Causes of fire hazards due to electricity, Fire classification & Firefighting techniques.

2. BASIC ELECTRONICS

2.1. Introduction: Introduction and use of electronics engineering in different fields, Independent and dependent voltage and current sources, Passive and active components DC and AC quantities, Intrinsic and extrinsic semiconductors (Si &Ge) and their electrical properties, majority and minority charge carriers, depletion layer and barrier potential.

2.2. PN Junction Diode: Construction of PN Junction diode, Forward and reverse biasing, Reverse breakdown phenomena and Zener diode, Rectifier circuits (Half wave and full wave rectifier circuits. Peak value, RMS value and average value.

2.3. Bipolar Junction Transistor (BJT): Construction and working principle in active region as amplifier

2.4. Field Effect Transistor (FET): Construction and working principle of FET, Construction and working principle of MOSFET.

2.5. Special Semiconductor Devices and Circuits: Working principle & basic application of Varactor Diode, Photodiode, LED, Solar Cell, Schottky Diode, Opto-coupler, UJT and SCR.

3. COMPUTER CONCEPT

3.1. Introduction to computer system

3.2. Problem solving using computer.

3.3. Communication network: LAN, MAN and WAN, transmission media (Twisted pair, co-axial and Optical fiber cable), router, switch and Gateway.

3.4. Introduction to C program & output statement, control statement &structure of programs, Arrays

3.5. Modular programming & sub-programs, Data files, Data structure, structured programming, programming project & software management.

4. DIGITAL LOGIC

4.1. Analog and Digital signal

4.2. Number systems: Decimal, Binary, Octal & Hexadecimal Number system, Conversion of different number system.

4.3. Logic Gates: AND, OR, NOT, NAND, NOR, XOR & XNOR Gates, DeMorgan's Theorems, Building Logic Circuits from Logic Equations

4.4. Combinational Logic Circuits: Adders, Sub-tractors, Encoders, Decoders, Multiplexers & Demultiplexers.

4.5. Sequential Logic Circuits: Latch & flip-flop, Shift-Registers & Counters

4.6. Analog and Digital conversion: A/D & D/A Conversion, Digital Displays (7 Segment Display)

5. ELECTRICAL AND ELECTRONICS ENGINEERING MATERIAL

5.1. Magnetic material: Classification, use & their characteristics, eddy current losses, Corrosion of ferrous materials, causes, effects and methods of prevention and typical application of commonly used nonferrous materials and their alloy (copper, aluminum, brass, bronze, silver, gold)

5.2. Dielectric materials: Introduction, Dielectric constant, Dielectric, insulating materials & Electrical characteristics of insulating materials.

5.3. Semiconductor materials: Elements of semi-conductor materials, electrical nature, electronic properties of silicon, germanium, Electrical conduction in semi-conductor, N type semiconductor, P type semiconductor.

6. PRINCIPLE OF ELECTRICAL ENGINEERING

6.1. Basic Concept of Electricity: Electric Circuit fundamentals, Electrical Power and Energy, Electrolysis and its applications, Electrostatics, Magnetism and Electromagnetism, Electromagnetic Induction

6.2. DC Network Theorems and Circuit Analysis: Kirchhoff's Voltage and current law and their application, Ohm's Law and its application, Thevenin's theorem and Norton's theorem.

6.3. AC Fundamentals: Generation of alternating voltage & currents, Sine Wave, Average & rms value of different waves, AC through pure ohmic Resistance, pure Inductance & pure Capacitance and their phaser diagram.

6.4. Three phase system: Generation of three phase voltages, phase sequence, star & delta connection, neutral point, Effect of imbalanced load in three phase system, Star delta or delta star conversion.

7. ELECTRONICS CIRCUITS

7.1. BJT Circuits: Biasing analysis and Transfer Characteristics

7.2. FET Circuits: Biasing analysis and Transfer Characteristics

7.3. Feedback Amplifiers: Negative & Positive feedback amplifier circuits

7.4. Operational Amplifier: Concept of differential amplifier, Inverting and non-inverting amplifiers, Low pass and high pass filter amplifiers.

7.5. Power Amplifier & Heat Sink: Concept of Class A, Class B and Class AB amplifiers, Power dissipation in BJT and working principle of heatsink.

7.6. Oscillators: LC & RC Oscillators, 555 IC circuits.

8. MICROPROCESSOR

8.1. Introduction to Computer Architecture, Computer Instructions Assembly Language Programming,

8.2. Microcomputer System, Interrupt Operations, Stacks, Push and pull Instruction,

8.3. Static and Dynamic Variables Allocations, RISC and CISC Architecture, DSP Processors.

9. ELECTRICAL MACHINES

9.1. Single phase and Three Phase Transformer: Working Principle, Construction, No Load and Load Operation, Testing, Parallel Operation, Parts of Power Transformer & Auto Transformer

9.2. DC Generators: Construction, Working Principle, Armature Reaction and Commutation.

9.3. DC Motors: Construction, Working Principle, Types & Speed control of dc motor

9.4. Three Phase Induction Motor: Construction, Operation, Standstill & Running Condition, Starting Method, Speed Control & Induction Generator.

9.5. Single Phase AC Motor: Split Phase Induction Motor, Capacitor start and Induction run Motor, Capacitor start and run Motor, AC Series Motor

9.6. Synchronous Motor: Principle of Operation and Starting Method, General Feature and Application.

9.7. Asynchronous Motor: Principle of Operation and Starting Method, General Feature and Application.

10. ELECTRICAL INSTRUMENTATION

10.1. Electrical Measuring Instruments: Indicating Instrument construction and Working principle, Measurement of Resistance & Capacitance, Power, Energy and Frequency and potentiometer

10.2. Measuring Instruments for measurement of Non-electrical Quantities: Thermocouple, Lux Meter, Piezometer & Transducers.

11. TRANSMISSION AND DISTRIBUTION OF ELECTRICAL POWER

11.1. Introduction: Importance of Electrical Power, Role of transmission and Distribution,

11.2. Supply System: Transmission and Distribution Voltage, Single phase and three phase transmission, Advantage of three phase, Advantages of interconnected transmission network (Grid System).

11.3. Transmission Line Components: Overhead vs Underground cable, Components of Overhead Transmission, Mechanical & Electrical Consideration.

11.4. Distribution System: Single phase and three phase Distribution, Underground Cables for distribution.

11.5. Voltage Control: Necessity of Voltage Control, Excitation Control of Generator, Tap Changing transformers, Synchronous Condenser, Static Compensating Devices.

12. POWER SYSTEM PROTECTION

12.1. Fundamentals: Current Transformers and Potential Transformers

12.2. Circuit Interrupting Devices: Fuses, MCB & MCCB, Contractors, Isolators

12.3. Circuit Breakers: Arc Phenomena, Arc Extinction Method, Duties of Circuit Breakers, Construction, Working Principle and Application & Testing of CB

12.4. Earthing: System Earthing and Body Earthing, Overvoltage Protection & Lightning Arrestor (Horn Gap & Rod Gap)

12.5. Protective Relays: Classification & Selection, Method of Earth Fault Detection, Construction & Working Principle of Electromagnetic relays, Overcurrent relays, Bidirectional relay, Distance Relay, Maintenance & testing of relay.

13. COMMUNICATION SYSTEMS

13.1. Introduction: Modulation, Analog Communication system, Electromagnetic spectrum and its various ranges, Communication channel & Noise in Communication

13.2. Amplitude Modulation: AM principle, characteristics, applications

13.3. Frequency Modulation: Principle, characteristics, applications

13.4. Optical fiber communication: Working Principle, Block Diagram, Communication Link, Optical Sources, Optical detectors,

13.5. Pulse Modulation: Basic ideas about PAM, PPM, PWM

13.6. Demodulation: Principle of demodulation of AM & FM Wave.

14. POWER ELECTRONICS

14.1. Power Electronics Devices: Construction and characteristic of Power Diode, Power Transistor, Thyristor, TRIAC, MOSFET & IGBT

14.2. Rectifier: Half wave and full wave single phase rectifier, Single-phase full wave-controlled rectifier with two thyristors and two diodes with resistive load, Single-phase full converter with four thyristors,

14.3. Inverter: Single Phase square wave inverter, Single Phase bridge Inverter, Application of inverter.

15. INDUSTRIAL ELECTRIFICATION

15.1. Installation of Distribution Board, Building and Industrial wiring installation, Consumer intake, Installation of Earthing system, DOL starter, Installation of EPABX & CCTV System & Installation Testing.

15.2. Design of Illumination Scheme: Law of Illumination, Various Types of light sources, Factory Lighting, Street Lighting, Methods of Calculation, Illumination of different occupancies and arrangement & selection of luminaries.

15.3. Power Factor: Power Factor, Power Factor Correction Method

यस विषयको पाठ्यक्रमका एकाईहरुबाट सोधिने प्रश्नहरुको संख्या निम्नानुसार हुनेछ ।

विषय	परिक्षा प्रणाली			कै
	वस्तुगत (Objective)	बिषयगत (Subjective)		
	बहुवैकल्पिक प्रश्न (MCQs) (प्रश्न X अंक)	छोटो उत्तर (प्रश्न X अंक)	लामो उत्तर (प्रश्न X अंक)	
१	५x१	१x५	१x१०	
२	६x१			
३	३x१	१x५		
४	५x१			
५	४x१		१x१०	
६	६x१	१x५		
७	७x१			
८	३x१	१x५	१x१०	
९	७x१			
१०	४x१	१x५		
११	५x१			
१२	६x१	१x५	१x१०	
१३	४x१			
१४	६x१	१x५		
१५	४x१			
जम्मा	७५x१ = ७५	७x५ = ३५	४x१० = ४०	

प्रयोगात्मक परीक्षाको पाठ्यक्रम

समयः १ घण्टा ~~६० मिनेट~~

पूर्णाङ्कः ५०

उत्तीर्णाङ्कः २५

सि.नं.	विषय	अंक भार	समय (मिनेट)
१	Paper Simulation	१५	१५
२	Component Identification & its application	१०	१०
३	Use of Various Measuring Instrument	१०	१०
४	Fault Finding	१०	१५
५	Viva	५	१०
जम्मा		५०	६०