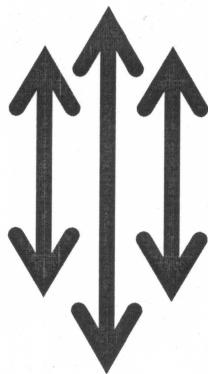
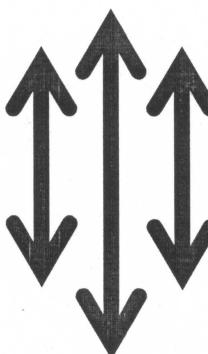


नेपाली सेना  
श्री भर्ना छनौट निर्देशनालय, कार्यरथी विभाग,  
जंगी अड्डा



प्रा.उ.से.रेडियो मेकानिक्स (आन्तरिक) पदको लिखित  
परीक्षाको पाठ्यक्रम



२०७७

## नेपाली सेना

### प्रा.उ.से.रेडियो मेकानिक्स (आन्तरिक) पदको लिखित परीक्षाको पाठ्यक्रम

समय: ४ घण्टा

पूर्णाङ्क : १५०

उत्तीर्णाङ्क : ६०

यो पाठ्यक्रम नेपाली सेनाको प्रा.उ.से.रेडियो मेकानिक्स (आन्तरिक) पदको उम्मेदवार छनौट परीक्षाको लागि निर्धारण गरिएको हो । लिखित परीक्षामा सरिक हुने उम्मेदवारहरूको पेशा सम्बन्धी विषयलाई आधारमानी प्रश्नहरू सौधिने छ ।

- (क) लिखित परीक्षाको माध्यम नेपाली/अंग्रेजी वा दुवै भाषा हुनेछ ।
- (ख) लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र अर्को चरणको परीक्षामा सम्मिलित गराईनेछ ।
- (ग) प्रश्नपत्र निर्माण गर्दा पाठ्यक्रममा समावेश भएका सबै विषयहरूलाई यथासंभव समिटनेछ ।
- (घ) बस्तुगत र विषयगत संयुक्त रूपमा 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 २०७७/०६/१८ गतेबाट लागु हुनेछ ।

#### लिखित परीक्षाको योजना र पाठ्यक्रम

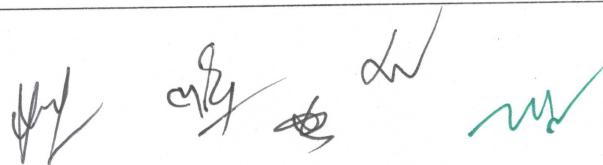
विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्न संख्या अङ्क	समय
पेशा सम्बन्धी	७५	६०	बस्तुगत (Objective)	बहु वैकल्पिक प्रश्न (MCQs)	७५ प्रश्न x १ अङ्क = ७५	१ घण्टा
	७५		विषयगत (Subjective)	छोटो उत्तर	५ प्रश्न x ५ अङ्क = २५ १५ प्रश्न x २ अङ्क = ३०	३ घण्टा
				लामो उत्तर	२ प्रश्न x १० अङ्क = २०	



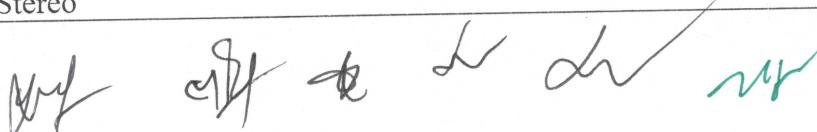



लिखित परीक्षाको पाठ्यक्रम

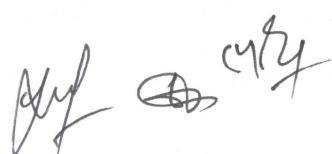
Unit	Topics
Unit 1	<p><b><u>RADIO &amp; TELEPHONE SET</u></b></p> <p>General Description, Specification, Transmitting/ Receiver Part of the following Radio Set:</p> <ol style="list-style-type: none"> <li>1. Radio Set SSB 8111</li> <li>2. BWT-133 SSB 15 Watt</li> <li>3. Radio Set: 5Watt</li> <li>4. Radio Set PRC 1077 &amp; 1099</li> <li>5. Grintek Radio Set TR2400</li> <li>6. Base Radio Sets(Kenwood, ICOM, Motorola)</li> <li>7. Different Handy sets (ICOM, Kenwood, Motorola, UBZ)</li> <li>8. Repeater sets(ICOM, Kenwood, Motorola)</li> </ol>
Unit 2	<p><b><u>INSTRUMENTATION</u></b></p> <ol style="list-style-type: none"> <li>1. INTRODUCTION:- Measurement and error, Accuracy and precision, Sensitivity, Resolution, Types of error</li> <li>2. MEASUREMENT OF VOLTAGE AND CURRENT:- Working Principle of Moving coil Galvanometer, Connection of volt meter and ammeter, DC volt meter, Ac volt meter, True RMS responding volt meter, Analog multi meter, Digital multi meter, Considerations in choosing an analog voltmeter, Differential voltmeter</li> <li>3. OSCLLOSCOPE;- General principle, Dual trace and dual beam, Multi channel, Storage coupling</li> <li>4. WAVE FORM GENERATORS AND ANALYZERS:- Basic principle Signal generation(square wave, pulse wave, sinusoidal etc), Function generation, Spectrum analyzers,</li> <li>5. TRANSDUCERS:- Classification of transducers(inductive, capacitive, Resistive), Strain gauge, Displacement transducers( Linear variable differential transformer, LVDT), Photoelectric, Thermal Sensor(PTC, NTC), Thermo couples, photo sensitive devices(LDR, Photo Diode), Photo conductive cells</li> <li>6. SIGNAL MEASUREMENTS:- Advantage of digital instrument over analog, Analog to Digital Converter(ADC), R-2R ladder, Digital to analog Converter(DAC) Principle of digital volt-meter , Ramp type Differential Volt Meter(DVM), Integrating DVM, Continuous balance DVM, Successive approximation DVM, Frequency counters, Various displays (CRT, LCD, LED)</li> </ol>



	<p><b>BASIC ELECTRICAL</b></p> <ol style="list-style-type: none"> <li>1. Introduction: Electric Charge, Current, Potential Difference, Electromotive Force, AC and DC source</li> <li>2. Resistive Circuit: Series/ Parallel Connection of Resistors, Open and Short circuit</li> <li>3. Basic principle of Electricity and Magnetism: Concept of Electricity, Magnets and their types</li> <li>4. Passive Circuit Elements: Resistors, Inductors, Capacitors, Electromagnetic Relay, Impedance, Admittance, Series/parallel RC, RL, RLC circuit, Resonance</li> <li>5. Ohm's Law and its Applications, Thevenins theorem, Nortons theorem, Law of reciprocity, Maximum power transfer</li> <li>6. Kirchoff's Law: Krichoffs voltage and current law and their applications</li> <li>7. Filter: Low Pass Filter, High Pass Filter &amp; Band Pass Filter</li> <li>8. Energy Sources:- Primary and secondary cells, Series and parallel connection of cells</li> <li>9. Transformer: Working principle, Types and applications</li> </ol>
Unit 4	<p><b>COMMUNICATION SYSTEM</b></p> <ol style="list-style-type: none"> <li>1. TRANSMISSION LINES:- Introduction, Characteristic impedance, Electrical properties of the line, Constant impedance, Cable impedance from line constant, Determining line constants R.C.L. &amp; G, Wavelengths, Velocity of propagation along the line, The line length in wave length, Propagation coefficient, and Transmission line components, Optical fiber, Types of optical fiber, snell's law and numerical aperture, Fiber splicing, UART s and USARTS, Mode of communication (simplex, half duplex, Full duplex)</li> <li>2. ANTENNA AND RADIO WAVE PROPAGATION:- Introduction, The half wave dipole antenna, The radiated wave, Polarization, Radiation patterns, Antenna size, The folded dipole, parasitic arrays antenna, Log periodic Antenna, Yagi-Uda Antenna,. Multi band antenna(End side Array and Broad side array), Helical beams antenna, Marconi antenna, Impedance matching to antenna, Radio wave propagation, Fundamentals of electromagnetics, Ground wave propagation, Ionospheric propagation, Line of sight propagation, Indirect propagation, Tropospheric wave propagation, Definition of terms associated with the propagation of radio waves</li> <li>3. DIGITAL MODULATION TECHNIQUES:- Amplitude shift keying, Frequency shift keying, FSK demodulation, Modems, Phase shift keying(PSK), Differential PSK, Frequency division multiplexing, Decoding of the FDM signals, Pulse Amplitude Modulation, Pulse width modulation, Pulse position modulation, Pulse code modulation, Delta modulation</li> <li>4. MICROWAVE SYSTEM AND DEVICES:- Introduction, Waveguides, Rectangular wave guide, Circuit wave guide, Attenuation, Wave guide selection, Couplings methods, The traveling wave tube, Microwave devices, Parametric amplifiers, Tunnel diode, Gun diode, Pin diode</li> <li>5. TELIVISION FUNDAMENTALS:- Introduction, The scanning principles, The deflection system, The video picture signal, Blacking and synchronizing pulse, Positive negative picture phase, Vestigial side band transmission, The sound carrier, Channel assignments, The receiver block diagram, The tuner, The IF amplifiers, Automatic gain control, The video amplifiers, The sound carriers, The synchronization circuit, Color, Sub carrier modulation, Multi channel TV Stereo</li> </ol>



	<p>6. SATELLITE COMMUNICATION:- Introduction, The satellite orbit, The satellite position, Linkages, The up-link, The down -link, The cross link, Assignable satellite frequencies, Satellite earth station, Aligning the satellite dish, footprint, Keplers law, Look angle, GPS, VSAT</p> <p>7. INTRODUCTION TO RADAR SYSTEM:- Fundamentals, Types of Radar(Primary and Secondary) Radar performance factor, Pulsed system, Basic pulsed radar system, Antenna and scanning, Display methods, Pulsed radar systems, Moving target indication, Radar beacons, Other radar systems, CW Doppler radar, Frequency modulation CW radar, Phased array radars, Planar array radars</p>
Unit 5	<p><b>SEMICONDUCTOR DEVICES</b></p> <ol style="list-style-type: none"> <li>1. Conductors, Insulators &amp; Semiconductors(intrinsic, extrinsic), p-type semiconductor, N-type Semiconductor</li> <li>2. P-N junction, Semiconductor Diode, Types of Diode and their application (Normal and Zener Diodes, Varactor Diode, Tunnel Diode, photo diode), seven segment display, LED: Characteristics &amp; Applications</li> <li>3. Bipolar Junction Transistors: Working principle, Input characteristics and Output characteristics Application, Biasing method, Configurations, Application of Transistors, Transistor as an Amplifier, switch and oscillator</li> <li>4. Field Effect Transistor:- Types, Working Principle, Characteristics &amp; Applications(JFET, MOSFET)</li> </ol>
Unit 6	<p><b>ELECTRONIC CIRCUIT</b></p> <ol style="list-style-type: none"> <li>1. Basic rectifiers circuits: Characteristics &amp; Applications</li> <li>2. OPERATIONAL AMPLIFIERS:- Making an IC, Differential Amplifiers, Operational Amplifiers, Operational Amplifiers characteristics ,op amp circuits(inverting and non inverting), Application of Op-amp(integrating, differentiating, logarithmic, exponential, summing, subtractor)</li> <li>3. FEEDBACK AMPLIFIERS:- Principle of feedback Amplifiers, Advantage of negative feedback, Gain stability, Increased bandwidth, Form of negative feedback, Voltage shunt negative feedback, Current shunt negative feedback</li> <li>4. OSCILATOR:- Introduction, Positive feedback oscillator, RC phase shift oscillator, Tuned circuit oscillator, Hartley oscillator, colpitt oscillator, crystal oscillator, Stability, Frequency stability, Linearity, Negative synthesizers, Phase locked loop, Pre-scaling, Application</li> <li>5. Power supplies:- linear regulators, SMPS, Transformer less dc power supplies</li> </ol>


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	<b>DIGITAL ELECTRONICS</b>
Unit 7	<ol style="list-style-type: none"> <li>1. Analog and digital signal</li> <li>2. Number System: Binary, Decimal, Octal, Hexadecimal and their conversions</li> <li>3. Basic and Universal Logic gates: OR, AND, NOT, NAND, NOR, XOR, XNOR</li> <li>4. Boolean Algebra, Sum of Product(minimization), Product of sum(Maximization), K-map, De-Morgan's Law</li> <li>5. Combinational Circuits - Half adder, Full adder, comparators, multiplexer, demux, encoder, Decoder, etc</li> <li>6. Sequential Circuits- Latch, Flip –flops(SR, JK, T, D, master-slave) Counters, Registers</li> <li>7. Hierarchy of Memory ROM, (PROM,EPROM, EEPROM), RAM (SRAM, DRAM) etc</li> <li>8. Introduction to microprocessor:- Internal architecture of microprocessor, Addressing modes operation codes for use, ALU and control unit, Applications, Introduction to micro-computer</li> </ol>
	<b>POWER ELECTRONICS</b>
	<ol style="list-style-type: none"> <li>1. Basic and Application of Silicon Controlled Rectifier (SCR, DIAC, TRIAC), Insulated Gate Bipolar Transistor(IGBT), Schottky diode, shockley diode,</li> </ol>

	<b>COMPUTER CONCEPT</b>
Unit 8	<ol style="list-style-type: none"> <li>1. Introduction to Computer System</li> <li>2. Operating System, Ms-Word, Ms-Excel &amp; Power Point</li> <li>3. Communication Network: LAN, MAN &amp; WAN, Topologies, Transmission Media (Twisted Pair, Co-axial and Optical Fiber Cable), Router, Switch &amp; Gateway</li> </ol>

	<b>WORKSHOP ADMINISTRATION &amp; MAINTEANCE MANAGEMENT</b>
Unit 9	<ol style="list-style-type: none"> <li>1. Definition and importance of management, Function of management, Planning –nature types forecasting and budgeting, Organizing –nature structure, And types, Staffing –importance and need for proper staffing types of staff, Directing and motivating –nature varying approach to direct, directing and motivating, Controlling –nature comparing performance with standard, corrective action</li> <li>2. Introduction to hygiene and safety, Cost and liability of hygiene and safety, General accident prevention and safety</li> <li>3. Spare part procurement procedure in EME, Reliability and quality of spares</li> <li>4. Spare parts management, Management of obsolete spare parts, Inventory control of spare parts</li> <li>5. Maintenance Management, Present Maintenance system in EME units (Brigade, Base workshop, EME Bn, Brigade workshop and Unit ERE)</li> </ol>


 A handwritten signature consisting of three stylized initials: 'M', 'Y', and 'A' followed by a checkmark and some cursive handwriting.

यस पेशा सम्बन्धी विषयको पाठ्यक्रमका एकाईहरूवाट सोधिने प्रश्नहरू निम्नानुसार हुनेछ

S. N.	Topics	Objective Question and Marks	Subjective Questions & Marks		
			Very Short Question and Marks	Short Question and Marks	Long Question and Marks
1	Unit1	$10 \times 1 = 10$	$2 \times 2 = 4$		
2	Unit2	$7 \times 1 = 7$	$1 \times 2 = 2$	$1 \times 5 = 5$	
3	Unit3	$5 \times 1 = 5$	$1 \times 2 = 2$		$1 \times 10 = 20$
4	Unit4	$15 \times 1 = 15$	$3 \times 2 = 6$	$1 \times 5 = 5$	
5	Unit5	$10 \times 1 = 10$	$2 \times 2 = 4$	$1 \times 5 = 5$	
6	Unit6	$8 \times 1 = 8$	$2 \times 2 = 4$	$1 \times 5 = 5$	
7	Unit7	$5 \times 1 = 5$	$1 \times 2 = 2$		
8	Unit8	$5 \times 1 = 5$	$1 \times 2 = 2$	$1 \times 5 = 5$	
9	Unit9	$10 \times 1 = 10$	$2 \times 2 = 4$	$1 \times 5 = 5$	
<b>Total</b>		<b><math>75 \times 1 = 75</math></b>	<b><math>15 \times 2 = 30</math></b>	<b><math>5 \times 5 = 25</math></b>	<b><math>2 \times 10 = 20</math></b>

### प्रयोगात्मक परिक्षाको पाठ्यक्रम

समय : ९० मिनेट

पूर्णाङ्क: ५०

उत्तीर्णाङ्क: २५

S.N.	Topic	Marks	Time (Minutes)
1.	Paper simulation	15	30
2.	Component Identification and it's application	10	20
3.	Use of Various Measuring Instrument	10	10
4.	Fault finding	10	20
5.	Workshop Administration	5	10
	<b>Total</b>	<b>50</b>	<b>90</b>

#### १. Paper simulation:

(परीक्षाको लागि दश वटा Circuit Diagram दिइनेछ, जसको Required Output लेख्नु पर्नेछ (प्रति सहि answer १.५ marks को दरले प्रदान गरिने छ ।

#### २. Component Identification and it's application:

परीक्षार्थीले Layout गरी राखिएका बिभिन्न Electronic/Electrical Components को Technical नाम लेख्नु पर्ने हुन्छ र दिइएको Component कहा कहा प्रयोग हुन्छ भन्ने समेत खुलाउनु पर्ने छ । यसमा ५ प्रकारका सामानहरू देखाइनेछ र प्रत्येक नाम र प्रयोग सहि भएमा २ अंक प्रदान गरिनेछ ।

*[Handwritten signatures/initials]*

### ३. Use of Various Measuring Instruments

परीक्षार्थीलाई बिभिन्न प्रकारका Measuring Instruments दिईनेछ । उक्त measuring Instruments प्रयोग गरेर कुनै ५ वटा components को voltage, current, continuity, resistance, polarity लेख्नु पर्नेछ । प्रति सहि answer को अंक २ प्रदान गरिनेछ ।

### ४. Fault finding

परीक्षार्थीहरुलाई कुनै २ वटा Faulty circuit दिईनेछ । उक्त faulty circuit मा भएका समस्या पता लगाउनु पर्नेछ । प्रत्येक समस्या सहि पहिचान गरेमा २.५ marks र faulty circuit correction गरेमा २.५ marks गरी जम्मा १० marks दिईने छ ।

### ५. Workshop Administration

परीक्षार्थीलाई workshop administration सम्बन्धमा Viva पश्न लिईनेछ, उक्त Viva मा ५ वटा प्रश्न सोधिनेछ । प्रत्येक सहि उत्तरको अंक १ प्रदान गरिनेछ ।

**The End**