

रेडियो प्रसार सेवा विकास समिति
ईन्जिनियरिङ सेवा, ईन्जिनियरिङ समूह
ईन्जिनियर(इलेक्ट्रोनिक्स) तह ७ को
खुल्ला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

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

प्रथम चरण :- लिखित परीक्षा

पूर्णाङ्क :- २००

द्वितीय चरण :- अन्तर्वार्ता

पूर्णाङ्क :- ३०

प्रथम चरण – लिखित परीक्षा योजना (Examination Scheme)

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या Xअङ्कभार	समय
प्रथम	इलेक्ट्रोनिक्स एण्ड टेलिकम्युनिकेशन	१००	४०	वस्तुगत बहुउत्तर (Multiple Choice)	५०X२ = १००	१ घण्टा
द्वितीय	ईन्जिनियरिङ	१००	४०	विषयगत (Subjective)	१०X१० = १००	३ घण्टा

द्वितीय चरण

विषय	पूर्णाङ्क	परीक्षा प्रणाली
व्यक्तिगत अन्तर्वार्ता	३०	मौखिक

- लिखित परीक्षाको माध्यम भाषा अंग्रेजी वा नेपाली, अथवा अंग्रेजी र नेपाली दुवै हुन सक्नेछ ।
- माथि उल्लिखित सेवा, समूह, उपसमूहहरूको पाठ्यक्रमको प्रथम पत्रको विषयवस्तु एउटै हुनेछ । द्वितीय पत्रका विषयवस्तु समूह/उपसमूह अनुसार फरक फरक हुनेछन् ।
- माथि उल्लिखित समूह/उपसमूहहरूको प्रथम पत्रको परीक्षा संयुक्त वा छुट्टाछुट्टै हुन सक्नेछ, भने द्वितीय पत्रको परीक्षा छुट्टाछुट्टै हुनेछ ।
- प्रथम पत्रको प्रश्नपत्र तयार गर्दा हरेक इकाइबाट समानुपातिक रूपमा तयार गरिनेछ ।
- द्वितीय पत्रको विषयगत प्रश्नहरूको स्वरूप निम्नानुसार हुन सक्नेछ :
 - १ लामो उत्तर दिने १० अङ्कका पूरा प्रश्नहरू सोध्न सकिनेछ ।
 - २ एउटै प्रश्नलाई दुई वा दुई भन्दा बढी भागमा (Two or more parts of a single question) विभाजन गरी सोध्न सकिनेछ ।
 - ३ एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिने छ ।
- प्रथम पत्रमा वस्तुगत बहुउत्तर (Multiple Choice) प्रश्नहरूको उत्तर सही दिएमा प्रत्येक सही उत्तर बापत २ (दुई) अङ्क प्रदान गरिनेछ, भने गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अर्थात् ०.४ अङ्क कट्या गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्या पनि गरिने छैन ।
- यस पाठ्यक्रममा जेसुकै लेखिएको भएता पनि पाठ्यक्रममा परेका ऐन, नियमहरू परीक्षाको मिति भन्दा ३ (तीन) महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा रहेको सम्झनु पर्दछ ।
- प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ ।
- यस भन्दा अगाडि लागू भएको पाठ्यक्रम खारेज गरिएको छ ।

रेडियो प्रसार सेवा विकास समिति
ईन्जिनियरिङ सेवा, ईन्जिनियरिङ समूह
ईन्जनीयर(इलेक्ट्रोनिक्स) तह ७ को
खुल्ला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

प्रथम पत्र:इलेक्ट्रोनिक्स ईन्जिनियरिङग

पूर्णाङ्क: १००

1. Electronic Device and Circuit

Diodes (Tunnel, varactor, zener, diac, Triac, bridge, Impatt, Gunn, photo) and applications, Bipolar transistors switching characteristics, unijunction transistor, MOS transistors switching characteristics, SCR, UJT, TTL logic circuits, NMOS/CMOS logic circuits, memory: RAM, DRAM, PROM, EPROM, operational amplifiers, Butterworth and Chebysev filters, A/D converters, adders, arithmetic operations, digital comparators, parity check generator, multiplexer and demultiplexer, flip-flops, shift register, counters, sequence generators, oscillators(wien bridge oscillators, tuned, LC oscillators, crystal, clap modification), resosant circuits, thyristor, controlled rectifier circuits, 7 segment display, amplifier (Untuned, push-pull, feed back amplifiers, Klystron, Magetrons) bode plot analysis, Emitter, clipper, collector, clamper circuits

2. Communication Engineering

Frequency spectrum (discrete and continuous) and bands, coulomb's law and electric field intensity, electric flux density and gauss' law, Spectral density, Noises (atmospheric, thermal, partition, white noise, Gaussian noise, Noise ratio(s)), Maxwell's first equation and application, divergence theorem, energy and potential, Fourier series, Laplace equation and Poisson equation, biot-svart's law, ampere's circuital law, curl, wave motion in free space, perfect dielectric and losses, wave medium, skin effect, impedance matching, antenna fundamental (Horn, slot, parabolic, yagi, Cassegrain, lens), polarization, radiation from dipole antenna, wave guides(broad-band guides, Cylindrical, ridged)

3. Instrumentation & Control System

Dynamometer, Multimeter, Oscilloscopes, Signal generator, Impedance Bridges (Maxwell, Hay, Schering, Anderson, Desauty), Transducers (Strain Guages, Thermistor, Piezoelectric tacheometer, thermocoupler) Open loop and closed loop control system, system stability and sensitivity, system transfer functions and responses, poles and zeros location and their significance, root locus method, frequency response method, Bolometers technique for measurement of power

4. Signal analysis and processing

Discrete probability theory, Information theory, Shannon-Hartley law, transmission of signal, impulse response and convolution, Fourier series, Fourier transform, unit step, delta, sinc and signum function, helbert transform, LTI system, system described by differential and difference equations, FIR and IIR filters, discrete Fourier transforms, IDFT, FFT, circular convolutions, Parseval's theorem, energy, power and autocorrelation, Z transform

5. Basic Analog and Digital Communications

Difference between analog and digital communications, basic communication elements, signal and noise in communication system, AM, DSB-SC, PM, FM, Super-heterodyne AM and FM receiver, SSB, D/A and A/D Converters, sampling theorem, sample and hold circuit, A law, μ -law, quantizer, coding (NRZ/HDB3/AMI), error detection and correction, Parity check, PCM/ADPCM, digital modulation (ASK/PSK/QPSK/MSK/QAM/CDMA/FDMA/DSSS), pulse modulation, modulation and demodulation circuits, Frequency hopping, frequency converter and mixers, phase locked loop

6. Telecommunications and advanced communications

Difference between Telecommunications and Radio Communication, return loss transformer and hybrid circuit, signal and noise measurements, echo and ringing, space/time/frequency /wave length division multiplexing, erlang B formulae, queuing theorem, OSI layers, telephony, functions of switching, electro mechanical switches, stored programmed controlled switch (TS/ST/TST/STS switching, no. 5 and no. 7 control signaling), general concept of ISDN, BISDN, ATM, PDH/SDH, DSL, HDSL, ADSL, numbering, routing and channeling plans; UMTS, IMT-2000, NGN (Next Generation Network), real time protocol, VoIP, IP/PSTN platform, Overview to IN (Intelligent Network), Basics of GIS (Geographical Information System)

7. Optical System

Laser, Photocell, photo device (LED, CRT, photovoltaic, photo-multipliers, APD's PCN), Principle of optical communication, Total internal reflection, Snell's law, Chemical vapour Deposition, optical fibers types, capacity and properties, optical transmission, optical transmitters and receivers, interconnected and switched, Joining techniques, splices, connectors and coupling, fiber optics networks, optical switching, underground cabling (Route and ambient consideration, tension prediction)

8. Wireless Communications

Radio frequency band, Propagation theory (groundwave, spacewave, tropospheric, ionospheric), Euler-Larmor theory, LOS (line of sight) and non-LOS model, Okumara and Hata model, Mobile Technologies (DECT, GSM, CDMA2000-1x and etc.), Fundamental of satellite communication (tracking, Satellite orbits and Radio spectrum, satellite wave propagation and satellite antennas), digital satellite communication system, earth stations, Kepler's laws of orbital motion, signal to noise ratio, interference between different wireless systems. Antennas (Directional, Non-directional, reflective), impedance and effective length of antenna as transmitter & receiver, Radiation pattern, broad-side pattern, Eudfire pattern, Pattern synthesis

9. Computers and Network

Difference between analogue and digital computer, Binary system and Boolean algebra, Gates, Computer structure (I/O devices, Storage devices, Memories) and typical processor architecture, CPU and memory organization, buses, Characteristics of I/O and storage devices, Processing unit and controller design, hardware and micro program control, Instruction sets and addressing modes, memory systems (main, auxiliary, virtual, cache), assembly language programming, I/O and interrupt servicing, Multiplexing, (time, frequency and code division multiplexing), Digital networks: ISDN, frame relay and ATM. Protocols: (such as ISO/OSI reference model, X.25, IP), LAN/WAN

topologies, access schemes, medium access and logic layers; CSMA/CD and token ring protocols; segmented and hubbed LANs, Operating system principles, components, and usage (Multitasking and/or multiprocessing, Real-time aspects)

10. Information and Communications Technology (ICT)

Computer architecture, microprocessor fundamental, microcomputer systems, parallel and serial interfaces, RS-232 standards, flow charts, algorithms, variables, constants, data types, arithmetic expressions, arrays, concept of Operating System, Basic concept on internet, e-mail and web-page (such as DNS, IP, URL, http, ftp, IRQ, Routers). Server (Web, email, printer), General concept of Cyber security (digital signature, SPAM, VIRUS, WORM, hiking, cracking), Unicode

11.a Rules, Regulations & Policy 10%

ITU overview, ICAO Overview, ICT policy, Telecommunication Policy, Radio Act & Regulations, National Broadcasting Act & Regulation, Cyber-law, National Frequency Allocation Plan

11.b नेपालको अन्तरिम संविधान, २०६३ (संशोधन सहित)

रेडियो प्रसार सेवा विकास समिति, कर्मचारी सेवा शर्त नियमावली, २०५७

रेडियो प्रसार सेवा विकास समिति, आर्थिक नियमावली, २०४९

विकास समिति ऐन, २०१३

रेडियो प्रसार सेवा विकास समिति, गठन आदेश, २०४१

वस्तुगत बहुउत्तर नमूना प्रश्नहरू (Sample questions)

1. In which configuration do you get maximum power amplification?

- (A) Common base (B) Common collector
(C) Common emitter (D) Common field effect

Correct Answer Is (C)

2. The quality of sound is very good in
(A) MW broadcasting (B) SW broadcasting
(C) FM broadcasting (D) SSB broadcasting

Correct Answer Is (C)

3. Mobile cellur communication uses

- (A) SWband (B) MWband
(C) LWband (D) SHF band

Correct Answer Is (D)

4. Which of the following is related to computer

- (A) C⁺⁺ (B) B⁺
(C) D⁻ (D) F⁺

Correct Answer Is (A)

5. Signal to noise ratio is very good in

- (A) Analog communication (B) Digital Communication
(C) SSB Communication (D) DSB Communication

Correct Answer Is (B)

रेडियो प्रसार सेवा विकास समिति
ईन्जिनियरिङ सेवा, ईन्जिनियरिङ समूह
ईन्जनीयर(इलेक्ट्रोनिक्स) तह ७ को
खुल्ला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र: सेवा समूह सम्बन्धी

पूर्णाङ्क: १००

1. Electronics Device, Circuit and Techniques

Use, operation and characteristics of Diode, triode, pentode, Transistors, thyristor; measurement of resistance, capacitance, inductance, current, voltage in different R-C-L circuit, different types of amplifiers and rectifiers' usage and characteristics, Strain gauge and application, SCR (simple, phase control, temperature control, light control), close/open loop control and choppers, Boolean algebra, Logical gates and switching algebra, Memory (statics, volatile), A/D & D/A converter circuits, Sampling theory

2. Information Technology

Computer, Microprocessor, Signal processing, Database Management, Computer Architects and computer Graphics, Internet, email and Web-pages, e-strategies (e-government, e-business, e-learning, e-health, e-employment, e-environment, e-agriculture, e-science), Tele-culture (Tele-education, Tele-medicine, tele-centre, Tele-phony, and etc.)

3. Communication

Radio propagation in different waves (long wave to SHF), propagation characteristics, frequency availability, limitation element at VHF, UHF, discrete and continuous spectrums, stray capacitance, internal load inductance, dummy load, Traveling and standing waves, match and mismatch lines, distribution component of line, Variable impedance along a mismatched line, Tune circuit and filters, Phase velocity, phase shift, group velocity, wave guides, antenna fundamentals (types, characteristics, pattern, matching), Modulation & demodulation types and techniques for analogue and digital system, different types of Noise and calculation, frequency generation, counters. Random signal theory (Ergodic processes, correction function, white noise)

4. Navigation, surveillance, Avionics

Radar range equation, Radar direction indication, Radar Display, different between PAR, SSR, Doppler effect, MTI Radar, HF-SSB communication, General concept of Navigation system (MLS, ILS, Radio Beacons and determinations, VOR, DME, GPS) and Airborne equipment (FIS, altimeter, ICAO Annex 11)

5. Frequency Management & Monitoring

Radio Frequency band and allocation, Frequency Channel plan (as per separation and system), spurious emissions, system (Simplex, duplex, dual) Type of radio services, Terrestrial line-of-sight communication links (propagation, effects of atmosphere, interference, fading) Broadcasting band, Frequency monitoring systems (techniques and procedures, scanning, location & direction finding), Satellite communication (orbital locations, choice of frequency, modulation techniques) and earth station (antenna, terminal equipment, ground networking, earthling) National Frequency Allocation Plan

6.Power supplies

Single phase and Polyphase AC power supply systems, Electrical motors, AC/DC generators, Rectifiers and filters, Regulator power supply system, Uninterruptible Power Supply Systems.

7. Management Concepts

Role of Science and technology in development, Parameters of development, Measurement of Development, Targeting Vision, mission, goal and objectives; strategies and work description of organization and its' structures, authority and power delegation, leadership, motivation, group's dynamics, time management, conflict management, use of MIS, decision support system, customer care, out sourcing, use of inventory and training, service port folio

विषयगत नमूना प्रश्नहरू (Sample Questions)

1. Why do we need frequency planning and allocation? Which organization provides guidelines on frequency management? [10]
2. In which type of modulation, signal to noise ratio is the best? Explain with necessary justifications. [10]
3. How can you use ICT for realizing the concept of telemedicine? Explain with necessary block diagram. [10]
4. What do you mean by RADAR? Where is it used? How does it work? [10]
5. Explain what are the parameters of fifth generation computers. Show how can you use computer for controlling the quality of industrial product. [10]