

लोक सेवा आयोग

नेपाल इञ्जिनियरिङ्ग सेवा, इलेक्ट्रोनिक्स एण्ड टेलिकम्युनिकेशन इञ्जिनियरिङ्ग समूह र नेपाल संसद सेवा, इञ्जिनियरिङ्ग समूह, इलेक्ट्रोनिक्स एण्ड टेलिकम्युनिकेशन इञ्जिनियरिङ्ग उपसमूह, राजपत्राङ्कित तृतीय श्रेणीको खुला र आन्तरिक प्रतियोगितात्मक 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 X अङ्कभार | समय |
|---------|-------------------------------------|-----------|--------------|------------------------------------|-------------------------|------------------|
| प्रथम | इलेक्ट्रोनिक्स एण्ड टेलिकम्युनिकेशन | १०० | ४० | वस्तुगत बहुउत्तर (Multiple Choice) | १००X१ = १०० | १ घण्टा १५ मिनेट |
| द्वितीय | इञ्जिनियरिङ्ग | 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 एकाइहरूको प्रश्नसंख्या निम्नानुसार हुनेछ भने द्वितीय पत्रको प्रत्येक एकाइको प्रश्नसंख्या सम्बन्धित पाठ्यक्रममै उल्लेख गरिएकोछ :

| प्रथम पत्रका एकाई | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|-------------------|----|----|----|---|----|----|---|----|----|----|
| प्रश्न संख्या | 10 | 15 | 10 | 5 | 10 | 15 | 5 | 10 | 10 | 10 |

- द्वितीय पत्रको विषयगत प्रश्नहरूको स्वरूप निम्नानुसार हुन सक्नेछ :
 - ५.१ लामो उत्तर दिने १० अङ्कका पूरा प्रश्नहरू सोध्न सकिनेछ ।
 - ५.२ एउटै प्रश्नलाई दुई वा दुई भन्दा बढी भागमा (Two or more parts of a single question) विभाजन गरी सोध्न सकिनेछ ।
 - ५.३ 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 १ (एक) अङ्क प्रदान गरिनेछ भने गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अर्थात् ०.२ अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा 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 भएका माथि उल्लिखित सेवा, समूह, उपसमूहहरूका पाठ्यक्रमहरू खारेज गरिएका छन् ।
- पाठ्यक्रम लागू मिति :- २०६३।२।२५ देखि

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प्रथम पत्र :- इलेक्ट्रोनिक्स एण्ड टेलिकम्युनिकेशन इञ्जिनियरिङ्ग

- 1. Electronic Device and Circuit 10%**
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 15%**
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 10%**
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 5%**
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 10%**
Difference between analog and digital communications, basic communication elements, signal and noise in communication system, AM, DSC-SC, PM, FM, Super-heterodyne AM and FM receiver, SSB, D/A and A/D Converters, sampling theorem, sample and hold circuit, A law, m-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 15%**
Different between Telecommunications and Radio Communication, return loss transformer and hybrid circuit, signal and noise measurements, echo and singing, 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** **5%**
 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** **10%**
 Radio frequency band, Propagation theory (groundwave, spacewave, tropospheric, ionospheric), Euler-Larmour 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** **10%**
 Different 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)** **10%**
 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

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) SW band (B) MW band
 (C) LW band (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)