प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद्

पदपूर्ति समिति

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प्राविधिक तथा प्रशिक्षण सेवा, इन्जिनियरिङ्ग प्राविधिक प्रशिक्षण समूह, इलेक्ट्रोनिक्स एण्ड टेलिकमिनिकेशन उपसमूह अधिकृतस्तर तृतीय श्रेणी **इलेक्ट्रोनिक्स प्रशिक्षक** पदको खुला र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

खण्ड (क) :

द्वितीय पत्र : सेवा सम्बन्धी विषय पूर्णाङ्क - १००

1. Introduction to Electrical Circuit and System

1.1. Potential difference, current, power, energy
1.2 Introduction to electrical circuit elements
1.3 Ohm's law and Kirchhoff's laws
1.4 DC circuit analysis and network theorems
1.5 AC circuit definitions: sinusoidal current and voltage, impedance, phase angle, frequency, period, resonance, bandwidth, Q factor
1.6 AC circuit analysis: RL, RC, LC and RLC circuits and resonance (series & parallel)
1.7 Electromagnetic induction and transformers
1.8 Balance three phase supply, three phase system, star and delta supply
1.9 Thee phase power and its measurement methods
1.10 Basic concept of AC and DC generators and motors
1.11 Electrical power distribution system in Nepal
1.12 Electrical wiring, safety and hazards; electrical earthing .

2. Basic Electronics

2.1. Semiconductor theory: conduction of electrons and energy bands, semiconductor materials, characteristics and types, P-N junctions and its characteristics
2.2 Special purpose diodes and their applications (Zener diode, Varactor diode and Optical diodes)
2.3 Bio-polar Junction Transistors (BJT): theory, operation, CB, CE and CC characteristics and amplifiers
2.4 Junction Field Effect Transistor (JFET) and Metal Oxide Semiconductor; DMOSFET, EMOSFET, and CMOS
2.5 Silicon controlled rectifier (SCR) and its applications, Diac and Triace, SCR switch
2.6 Feedback amplifiers, oscillators (Wien-bridge oscillator, RC phase shift oscillator, Tuned LC oscillators, and Crystal oscillator), 555 timer and its applications
2.7 Voltage regulators: Half and full wave rectifier, regulated power supply, filters, and regulators: series and shunt, IC voltage regulator, switching mode power supply (SMPS), and UPS .

3. Amplifiers and Instrumentation

3.1. Power amplifiers: Class A, B and AB push pull amplifiers
3.2 Differential amplifiers
3.3 Operational amplifier (types and characteristics)
3.4 Application of OP-amp: adder, subtractor, integrator, and differentiator
3.5 Instrumentation amplifiers and its applications
3.6 Components of instrumentation and performance parameters
3.7 Bridge circuits: Wheat stone, inductance and capacitance
3.8 Characteristics and applications of transducers

3.9 Digital to analog and analog to digital converters (binary weighted, R-2R, counting, parallel, and successive)
3.10 Output devices; strip chart, x-y recorder, and magnetic data recorders.

4. Digital electronics and Microprocessor

4.1. Digital number system and codes
4.2 Boolean algebra and logic gates
4.3 Simplification of Boolean function; Venn diagram, Karnaugh maps and minimum realization
4.4 Combinational logic: code conversion, encoder, decoder, MUX, DEMUX, parity generation and checking, half and full adder/ subtractor, ROM, and PLA
4.5 Sequential logic, registers, counters, and memory: flip-flop types, state machine design, registers, shift registers counters, RAM, and processor
4.6 Microprocessor, microcontroller, microcomputer
4.7 Architecture and instruction set of 8085 and 8086 microprocessor
4.8 Basic assembly language programs of 8085 and 8086
4.9 Interrupt and its types
4.10 Bus types, memory addressing, and interfacing
4.11 Input/output interfaces: serial I/O standards, PIC, PPI, PIT, and DMA

5. Communication System

5.1 Signals and system: Fourier series, Fourier transform, discrete Fourier transform, FFT, Bandwidth of signals, and LTI system
5.2 Analog and digital communication system
5.3 Information measure, channel capacity, and coding
5.4 Line coding, PCM, PAM, DPCM, PWM, PPM, and delta modulation
5.5 Distortion types and distortionless transmission
5.6 Communication circuits (limiter, mixer, frequency converter, transmitters, and receivers)
5.7 Analog modulations: AM, DSB-SC, SSB, PM and FM, Multiplexing and FM stereo, AM and FM broadcast standards
5.8 Digital modulations: binary modulation techniques, QPSK, QAM, MSK, GMSK, OFDM, and spread spectrum system.

6. Telecommunication System and Networks

6.1 Telecommunication system and its components
6.2 Public-switched telephone network
6.3 T1and E1 lines, PDH, SDH, and SONET
6.4 Switching techniques: manual, electromechanical, electronic, and Stored Program Control (SPC), space division switching, time division switching, multiple stage switching, and types of private branch exchanges
6.5 Signaling: Signaling system and its types, CCITT SS7, DTMF, and pulse dialing
6.6 Common protocols: OSI model, TCP/IP, frame relay, X.25, ISDN, ATM, MPLS, RTTP, LLC, MAC, ALOHA, CSMA, SIP, DNS, HTTP, FTP, proxy server, DHCP, SMTP, POP, IMAP,
6.7 Network models and hardware: PAN, LAN, MAN, WAN, network topologies, NIC, hub, repeater, switches, bridge, router, TCP & UDP socket
6.8 IPV4 and IPV6 addressing
6.9 Network management and security (cryptography (DES and RSA), VPN, and firewall)

7. Wireless and Mobile Communication System

7.1 Evolution of wireless communication system
7.2 Cellular system concept: frequency reuse, interferences, handoff, capacity and coverage improvement techniques

7.3 Traffic theory: measurement of telephone traffic, Erlang B calculation, and queing theory
7.4 Transmission impairments and multipath propagation
7.5 Diversity techniques, equalization, RAKE receiver, and MIMO
7.6 Multiplexing and multiple access techniques (FDMA, TDMA, CDMA, SDMA, FHMA, and OFDMA)
7.7 Propagation path loss models: Free space model, indoor propagation models, outdoor propagation models (Okumura-Hata Model and its extensions), link-budget analysis
7.8 Standards: AMPS, DECT, GSM, CDMA, WCDMA, HSPA, LTE, LTE-Advanced, WLL, IEEE 802. Standards
7.9 Cellular network planning and optimization
7.10 Recent trends: 5G & IoT/M2M

8. Telecommunication Regulation and Others

8.1 International and national telecommunication regulation, overview of ITU and APT
8.2 Telecommunication numbering standards and numbering & charging system in Nepal
8.3 Spectrum management; principles and practices in Nepal
8.4 Role of ICT for socio-economic development of Nepal; WSIS action lines and SDGs
8.5 केहि ऐन नियमहरु:

८.५.१ ईञ्जिनियरिङ्ग परिषद् ऐन, २०५५ र नियमावली, इञ्जिनियरको लागि चाहिने पेशागत कोड अफ कण्डक्टहरु

८.५.२ विद्युत ऐन २०४९ एवं नियमावली

८.५.३ दूरसञ्चार ऐन, २०५३ एवं दूरसञ्चार नियमावली, २०५४

८.५.४ रेडियो ऐन, २०१४

८.५.५. सूचना तथा सञ्चार प्रविधि नीति, २०७१

८.५.६. ब्रोडब्याण्ड नीति, २०७१ एवं दूरसञ्चार नीति, २०६०

८.५.७. विद्युतीय कारोबार सम्बन्धी ऐन, २०६३

८.५.८. डिजिटल नेपाल फ्रेमवर्क, २०७६

८.५.९. सूचना प्रविधि आकस्मिक सहायता समूह सञ्चालन तथा व्यवस्थापन निर्देशिका, २०७५

८.५.१० गैर सैनिक हवाई उडान (सिभिल एभिएशन) ऐन, २०१५

८.५.११ राष्ट्रिय प्रशारण ऐन, २०४९

८.५.१२ कम्पनि ऐन, २०६३

॥समाप्त ॥