

Nepal Telecom

Nepal Doorsanchar Company Ltd.

Syllabus

Part II: (Specialized subject for Electronics and Communications Engineers)

Level 7 Tech.-For Telecom Maintenance Engineer)

Time: 2 hours

Full Marks: 100

Pass Marks: 40

Part II (Specialized Module) All the Questions are Compulsory

Types of question	Number of questions	Marks	Total Marks	Remarks
Objective Questions	30	1	30	1/4 marks will be deducted for each incorrect answer
Short Questions	10	4	40	
Long Questions	3	10	30	
			100	

Use of non-programmable calculator is permitted in the examination hall.

1. Electronic Devices and circuit (Weightage 5%-15%)

Bipolar transistors switching characteristics, MOS transistor switching characteristics, 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 & Demultiplexers, Flipflops, Shift register, Counters, Power electronics: Thyristor-Controlled rectifier circuits, 7 segment display, Untuned amplifier, Push-pull amplifier, tuned power amplifiers, Feed back amplifiers, bode plot analysis, Wien bridge oscillators, tuned LC oscillators, resonant circuits, crystal oscillator.

2. Electromagnetic field and waves (Weightage 5%-15%)

Coulomb's law and Electric field intensity, Electric Flux Density and Gauss' law, Maxwell's first equation and application, energy & potential, Laplace equation and Poisson equation, Biot-Svart's law, Ampere's circuital law, Wave motion in free space, Perfect dielectric and losses, Wave medium, Skin effect, Impedance matching, Antenna fundamental, Polarizations, Radiation from dipole antenna, wave guides and mixtures, Feeder Cable, Antenna System.

3. Signal Analysis and Processing (Weightage 5%-15%)

Information theory, Shannon-Hartley law, Transmission of signals, Impulse response and convolution, Fourier series, Fourier Transform, Unit step, Delta, Sinc & Signum function, Helbert transform, LTI system, System described by Differential & Difference equations, Discrete Fourier Transforms, IDFT, Parseval's theorem, Energy & power, Z transform.

- 4 Basic Analog and Digital Communications (Weightage 15%-25%)**
Difference between analog and digital communications, Basic communications elements, Signal and noise in communication system, AM, DSB-SC, SSB-SC, PM, FM, Super heterodyne AM and FM receiver, Digital to analog and analog to digital conversion, Sampling theorem, Sample & hold Circuit, A law, μ -law, Quantizer, Coding: NRZ/HDB3/AMI, PCM/ADPCM, Digital Modulation: ASK/PSK/FSK /QPSK /MSK / QAM, Modulation and demodulation circuits, Phase locked loop
- 5 Telecommunications and advanced communications (Weightage 15%-25%)**
Evolution of telecommunications, Telecommunication network, Transmission media, transmission lines, characteristic impedance, Return loss, transformer and hybrid circuit, signal and noise measurements, echo & singing, space/time/frequency/wave length division multiplexing, Erlang B formula, Packet, Message and circuit switching, X.25 Protocol, Frame relay, TCP/IP Protocol, OSI layers, Functions of switching, Stored Programmed Controlled switch, TS/ST/TST/STS switching, No 5 and No 7 signaling, ISDN, BISDN, ATM, PDH/SDH, DSL, Numbering, Routing and charging plans. UMTS, IMT-2000, NGN (Next Generation Network), Real time protocol, Voice over IP, IP/PSTN Platform, Introduction to IN(Intelligent Network).
- 6. Optical Communication (Weightage 10%-20%)**
Total internal reflection, Snell's law, Optical Fiber types and properties, optical transmission, Optical transmitters and receivers, Interconnected and switched; splices, connectors & coupling, Fiber Optics Networks, Optical switching, International communications through optical system.
- 7. Wireless Communications (Weightage 10%-20%)**
Evolution from 1G to 3G, LOS (Line of Sight) & Non-LOS model, Okumura and Hata Model, GMSK, QPSK, BPSK, FDMA/TDMA/CDMA technologies (DECT, GSM, CDMA 2000-1x), Fundamental of satellite communication, satellite orbit and radio spectrum, satellite wave propagation and satellite antennas, earth stations, Kepler's laws of orbital motion, signal to noise ratio, interference between different wireless systems.
