ELECTRONICS & TELECOMMUNICATION

ENGINEERING

(For both objective and conventional type papers)

1. Physical Electronics, Electron Devices and ICS

Electrons and holes in semiconductors, Carrier statistics, Mechanism of current flow in a semiconductor, Hall effect, Junction theory; Different types of diodes and their characteristics; Bipolar junction transistor; Switching characteristics of diodes and transistors; Field effect transistors; Power switching devices like SCRs. GTOs, Power MOSFETs; Basics of ICs-bipolar, MOS and CMOS types; Basics of Opto-electronics.

2. Signals and Systems

Classification of signals and systems, Basic signals, System modelling in terms of differential and difference equations; State variable representation; Fourier series, Fourier transforms and their application to system analysis; Convolution and superposition integrals and their applications; Z-transforms and their applications to the analysis and characteristics of discrete time systems; Random signals and probability, Correlation functions; Spectral density; Response of linear system to random inputs.

3. Network Theory

Network analysis techniques: Network theorems. Transient response steady state sinusoidal response; Network graphs and their applications in network analysis; Network theorems, Tellegen's theorem, Maxim power transfer. Two port networks: Z, Y, h and transmission parameters, Combination of two ports, Analysis of common two ports, Network functions; Parts of network functions, Obtaining a network function from a given part. Transmission criterion: Delay and rise time; Elmore's and other definition effect of cascading elements of network synthesis. Driving point and transfer functions. State equations for networks.

4. Electromagnetic Theory

Analysis of electrostatic and magnetostatic fields; Laplace's and Poison's equations; Boundary value problems and their solutions; Maxwell's equations: Application to wave propagation in bounded and unbounded media; Transmission lines: Basic theory, Standing waves, Matching applications, Microstrip lines; Basics of waveguides and resonators: Elements of antenna theory. Radar and optical fibers.

5. Electronic Measurement and Instrumentation

Basic concepts, standards and error analysis; Measurements of basic electrical quantities and parameters; Bridge measurement, Cathode ray oscilloscope, Electronic measuring instruments and their

principles of working: Analog and digital, comparison characteristics and applications, Transducers. Signal converters, Data acquisition and conversion.

1. Analog Electronic Circuits

Transistor biasing and stabilization. Small signal analysis. Power amplifiers, Frequency response. Cascade amplifiers, Wide banding techniques, Feedback amplifiers, Tuned amplifiers and applications. Oscillators, Rectifiers and power supplies, Op Amp and other linear integrated circuits and applications. Pulse shaping circuits and waveform generators, 555 timer and its applications.

2. Digital Electronic Circuits

Transistor as a switching element, Boolean algebra, Simplification of Boolean functions, Karnaugh map and applications, IC Logic gates and their characteristics: IC logic families: DTL, TTL, ECL, NMOS and CMOS gates and their comparisons; Interfacing between TTL and MOS; Combinational logic circuits; Half adder, Full adder; Digital comparator, Multiplexer, Demultiplexer, ROM and their applications, Various flip flops; Different types of counters and resisters; Waveform generators, A/D and D/A convertors, Semiconductor memories: Organization and construction of RAM, SRAM, DRAM, RAMBUS ROM, PROM, EPROM, EEPROM, PAL and PLAs etc.

3. Control Systems

Modeling of dynamic systems; Transient and steady state response of control systems; Effect of feedback on stability and sensitivity; Time-domain analysis of closed loop systems; Solution of state equations; Root locus techniques; Frequency response analysis. Concepts of gain and phase margins; Constant-M and Constant-N Nichol's Chart; Approximation of transient response from Constant-N Nichol's Chart; Observability & controllability of systems. Frequency-domain compensation.

4. Communication Systems

Basic information theory; Modulation and detection in analogue and digital systems; Sampling and data reconstruction, Quantization and coding; Time division and frequency division multiplexing, Equalization; Optical communication: in free space and fiber optic; Propagation of signals at HF, VHF, UHF and microwave frequency; Satellite communication; Mobile and spread spectrum communication; Digital switching systems.

5. Microwave Engineering

Microwave tubes and solid state devices, Microwave generation and amplifiers, Waveguides and other microwave components and circuits, Microstrip circuits. Microwave antennas. Microwave networks and component transmission line ports of microwave networks. Microwave measurements, Masers lasers; Microwave propagation. Microwave communication systems-terrestrial and satellite based.

5. Computer Engineering

Number systems; Data representation; Programming; Elements of a high level programming language C. Use of basic data structures; Fundamentals of computer architecture; Processor design; Control unit design; Memory organisation. I/O System organisation. Microprocessors: Architecture and instruction set of microprocessors 8085 and 8086. Input-output interfacing. 8051 Interfacing, applications and serial communication. Assembly language programming. Microprocessor based system design: Typical examples. Personal computers and their typical uses.