

MP-08 (A)
COMMUNICATION ELECTRONICS

(Questions will be set from each unit/section with internal choice)

Units	Topics
I	<p>Signal and Noise: Fourier series, sampling function, response of linear system, normalized power, normalized power in Fourier expansion, power spectral density. Relationship between Fourier Laplace transforms, Transformation theorems, Dirac delta function, Gate function, Energy density function. Convolution, impulse response, Convolution integral, Physical interpretation on Convolution. Parseval's theorem.</p> <p>Noise: Physical source of noise, short noise, $1/f$ noise, thermal noise, external noise, internal noise. Noise calculations.</p> <p>Noise temperature, Noisy two port network, Interference and noise in AM & Pulse modulation - Pre-emphasis and De-emphasis, Demodulation in the presence of noise.</p>
II	<p>Amplitude Modulation: Necessity of modulation, principle of amplitude modulation, modulation index, power relation, multitone modulation, AM wave generation, AM square law modulator, switching modulator.</p> <p>Demodulation of AM: Synchronous detection - Nonlinear demodulation, suppress carrier AM demodulator, envelope detector, square law demodulator, DSB-SC and SSB modulation systems, sideband and carrier power, method of generation and detection of DSB-SC & SSB, Independent Side Band (ISB) system, Vestigial Side Band modulation (VSB).</p>
III	<p>Sampling and Analogue Pulse Modulation: Sampling theory, Sampling analysis, ideal sampling, ideal reconstruction, Natural sampling, major problems in practical sampling.</p> <p>Types of analogue pulse modulation, Pulse modulation characteristics, Pulse Amplitude Modulation (PAM), Pulse Duration Modulation (PDM) : Analysis, Generation and recovery of PDM. Pulse Position Modulation (PPM) : Analysis, Generation and recovery. Comparison of PDM and PPM. Signal to noise ratio in pulsed system (PAM, PDM & PPM).</p>
IV	<p>Microwave Devices and communication Klystron, magnetron and Travelling wave tubes, velocity modulation; Basic principles of two cavity Klystron and reflex Klystron principles of operation of magnetrons.</p> <p>Transferred Electron Devices: Gunn effect, principles of operation, modes of operation, IMPATT diode, TRAPATT diode.</p> <p>Advantages and disadvantages of microwave transmission, loss in free space, propagation of microwaves, atmospheric effects of propagation. Fresnel zone problem, ground reflection, fading sources, detectors, components, antennas used in microwave communication systems.</p>
V	<p>Advantages and disadvantages of digital communication, Bit transmission, Signalling rate, error probability, digital filtering, Delta modulation, Pulse code modulation, PCM generation, Binary coding, PCM bandwidth, PCM reception noise: Quantization noise analysis, S/N ratio and channel capacity of PCM.</p> <p>Code: Error detection and correction codes, digital carrier systems, teleprinters and telegraphs circuits, radio telegraphs transmitters.</p>