4144 – COMMUNICATION SYSTEMS–II

Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)			
					Theory		Practical Ex.	Total
Lectures	Practical	Credits						
3	-	3	25	25	3 Hrs	100	-	150

Pre-requisite	Source
4150	EXN

Semester	Theory	Test	Total	TW	PR	Gr Total
	75	25	100	–	–	100

Rationale: This subject deals with the various methods of radio wave propagation and the different types of antennas. It also covers pulse modulation and multiplexing techniques, which are the most widely used forms in the field of telecommunication.

Objectives: This subject will enable the students to: 1) Learn about the various methods of propagation of radio waves, 2) Identify various antennas based on their applications.

COURSE CONTENTS	Hrs	Mks
1. RADIO WAVE PROPAGATION	06	14
Structure of the atmosphere, modes of propagation (ground wave propagation, sky wave propagation, space wave propagation, tropospheric scatter propagation.), Terms related to propagation (skip distance,) Basic principles, waveform & block diagram for generation & detection of pulse-width modulation (PWM), Pulse - position modulation (PPM). Pulse code modulation (PCM)- Basic principle, quantization, quantization error, comparing, block diagram of PCM transmitter & receiver, advantages and application of PCM.basic principle and advantages of differential -PCM. Delta modulation - principle and block diagram of delta modulation transmitter and receiver, delta modulation wave-forms, granular noise & slope overload, adaptive delta modulation.		
2. TRANSMISSION LINES	04	10
Fundamentals of transmission lines, equivalent circuit and primary constants of the line, characteristic impedance, losses in the transmission line, standing waves, standing wave ratio and reflection coefficient, quarter and half-wavelength lines, Impedance matching (quarter wave transformer, stub matching.)		
3. ANTENNAS	08	16
Radiation mechanism, current and voltage distribution, definition of terms used with antennas (polarization, radiation pattern, directive gain, directivity, power gain, effective length, bandwidth, beamwidth, radiation resistance), grounded antennas (marconi antenna), ungrounded antennas (hertz antenna), VLF and LF antennas (half wave dipole, loop antenna.), antenna arrays (broadside array, end-fire array),VHF antennas (folded dipole antenna, yagi-uda antenna), UHF antennas (parabolic dish antenna and different feed mechanisms, horn antenna.).		

4. WAVEGUIDES Introduction of waveguides, definition of (group velocity, phase velocity, cut -off wavelength.), rectangular waveguides (modes -TEM, TE, TM) Applications of waveguides.	04	08
5. PULSE COMMUNICATION Noise in an information-carrying channel, Shannon -Hartley theorem, Nyquist sampling theorem, types of pulse modulation, (Pulse- amplitude modulation (PAM)-Basic principles and wave-Form of PAM, block diagram for PAM generation & detection, frequency spectrum of PAM signal and use of anti-aliasing filter, flattop sampling and aperture effect. Pulse time modulation(PTM)	14	28
6. DIGITAL CARRIER SYSTEMS Amplitude - Shift- keying (ASK) (principle of ASK, block diagram of ook (on-off keying) generator and receiver). Frequency -shift -keying (FSK) Principle of FSK, block diagram of FSK transmitter & receiver. Phase- Shift-keying (PSK)- Principle of PSK, binary PSK(BPSK) & quadrature PSK(QPSK), generation and detection of BPSK, applications of ASK, FSK, PSK.	06	12
7. MULTIPLEXING TECHNIQUES FDM- frequency division multiplexing (block diagram of FDM system), TDM- time division multiplexing (block diagram of TDM system.), advantages of FDM &TDM, critical angle, critical frequency, maximum usable frequency, virtual height.), losses in the sky wave propagated signal (fading, sun-spot cycle.)	06	12
Total	48	100