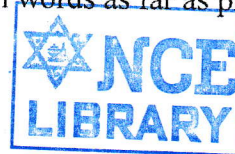


Exam.		Back	
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / I	Time	3 hrs.

Subject: - Data Communication (CT 602)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt **All** questions.
- ✓ The figures in the margin indicate **Full Marks**.
- ✓ Assume suitable data if necessary.



1. Define data and signal. Elaborate the advantages of digital communication system as compared to analog communications system. Explain the basic causes of transmission impairments in communication system. [2+2+4]
2. a) Determine whether or not the following CT signal is periodic. If the signal is periodic, determine its fundamental period. $x(t) = 3\cos(4t + \pi/3)$. [2]
b) Test the linearity of the systems, $y(t) = x^2(t)$ and $y(t) = 3x(t) + 5$ [4]
c) Test the systems static or dynamic, $y(t) = 2x(t)$ and $y(t) = 2x(t) - 3x(t-3)$ [4]
3. a) Find the output response of an LTI system when input $x(t) = e^{-t} u(t)$ and impulse response $h(t) = e^{-2t} u(t)$. [4]
b) Find magnitude and phase spectrum of $x(t) = 4 + 2\cos\frac{2\pi}{3}t + 4\sin\frac{5\pi}{3}t$. [4]
c) Discuss any four properties of Fourier Transform. [2]
4. Compare coaxial cable with optical fibre. Evaluate the maximum capacity of a channel through which a signal with power of 10 dBW is transmitted. (Assume that the noise power spectral density is given as 5 m W/Hz). [4+4]
5. a) Consider AM signal as $m(t) = 5[1 + 2\cos(2\pi + 1000t)] \cos(2\pi \cdot 10^8 t)$. Determine modulation index, total power delivered. [4]
b) Define PCM technique used to convert analog signal into digital data. In a PCM system, a bandlimited signal with maximum frequency 4 kHz is sampled at the rate of Nyquist frequency. It is quantized into 256 levels and encoded. Calculate: [2+4]
(i) Minimum data rate available at the output of the encoder.
(ii) Bandwidth of the channel required to transmit the data through a channel of 15 dB SNR.
c) What are the basic factors to be considered while line coding? Encode the binary pattern 100000000100001 using B8ZS and HDB3 encoding. [2+4]
6. Explain the major bandwidth utilization techniques used in data communication. Explain Frequency Hopped Multiple Access (FHMA) technique using its transmitter and receiver blocks. [4+6]
7. Differentiate between circuit switching and Packet switching used in computer networks with an example. [6]
8. a) Explain error detection and correction mechanism with trellis diagram. [10]
b) Differentiate convolutional code and block code. [2]