6. (a) Differentiate between Analog and Digital Modulation systems. (6)

(b) Find the Nyquist rate and Nyquist interval for the signal

$X(t) = 1/2\pi \ [\cos(5000\pi t) \ \cos(1000\pi t)]$ (6)

(c) Explain the Adaptive delta modulation with suitable diagrams. (6)

7. (a) A PC system uses a uniform quantizer followed by a 7-bit binary encoder. The bit rate of the system is equal to 100×10^6 bits/sec. (6)

(i) Calculate maximum message signal bandwidth for which the system operates?

(ii) Calculate the output signal to quantization noise ratio when a full load sinusoidal modulating wave of frequency 2MHz is applied to the input.

(b) What is Carson's rule in FM? Discuss the various types of noise which may be created within the receiver or an amplifier. (6)

(c) Differentiate between instantaneous, natural and flat top sampling. State and prove the sampling theorem. (6)

[This question paper contains 4 printed pages.]

Your Roll No...............

Sr. No. of Question Paper : 1225   **I**

Unique Paper Code : 2513040011

Name of the Paper : Communication Systems

Name of the Course : **B.Sc. (H) Instrumentation (Core)**

Semester : V

Duration : 3 Hours   Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.

2. There are **seven** questions in all, out of which you have to attempt any **five** questions.

3. **First** question is compulsory.

4. **All** questions carry equal marks.

5. Use of Non programmable Scientific Calculator is allowed.

1. (a) How many signals can be time division multiplexed, if the channel bandwidth is 2 MHz and the information signals are band-limited to 5 KHz? (3)

P.T.O.

(b) Determine the Bandwidth of a FM wave when the maximum deviation allowed is 72KHz and the modulating signal has a frequency of 20KHz.

(3)

(c) How is the thermal noise power affected if the value of the resistance is halved? (3)

(d) Why is the FM system known as constant bandwidth system? (3)

(e) What is .the difference between uniform and non-uniform quantization in PCM systems? (3)

(f) What is slope overload distortion? (3)

2. (a) Explain the generation of the high-level amplitude-modulated signal and its power distribution. (6)

(b) Two sinusoidal signals of frequencies 2 kHz and 3 kHz simultaneously amplitude modulate a 1368 KHz carrier. Sketch the frequency spectrum of the modulated signal. (6)

(c) List the advantages and applications of Optical Communication. (6)

3. (a) Compare the AM system and FM system in terms of power and bandwidth. (6)

(b) When the modulation frequency in an FM system is 30 kHz, and modulating voltage is 1.25 V, the modulation index is 50. Calculate the maximum deviation and bandwidth. (6)

(c) Explain how phase modulation could be used to generate frequency-modulated signals? (6)

4. (a) Explain and draw the block diagram of pulse code modulation system and explain the role of each block. (6)

(b) Define Sensitivity of receiver. Draw the block diagram of a super-heterodyne receiver. (6)

(c) A message signal having maximum frequency 3.5 KHz is required to be transmitted by 10-level PCM system. If the bit rate of this PCM system is 36 k bits, find the appropriate value of the sampling frequency. (6)

5. (a) Explain the working principle of superheterodyne receiver. (6)

(b) How SSB receivers are different from FM Receivers. Explain. (6)

(c) A 500 W carrier is modulated to a depth of 70%. Calculate the total power in the modulated wave. (6)

P.T.O.