[This question paper contains 2 printed pages.]

Sr. No. of Question Paper : 1102 **E** **Your Roll No.....**

Unique Paper Code : 251602

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

Name of the Paper : Digital Communication [ELHT–602]

Semester : VI

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all, including Question No. **1** which is compulsory.
3. Use of Scientific Calculator is allowed.

1. (a) The frequency range of a signal extends from 10 MHz to 10.2 MHz. Find the minimum sampling rate and the maximum sampling time. (3)

   (b) Draw the PAM, PWM; and PPM waveforms for a sinusoidal modulating signal. (3)

   (c) What is companding in a PCM system ? State the A law used for companding. (3)

   (d) What are I and Q channels in a QPSK modulator ? (3)

   (e) Determine the wavelength of the signal that can be detected by a photodiode which is fabricated from a semiconductor with an energy gap = 1.424 eV. (3)

2. (a) Name the different types of sampling techniques. Explain the aperture effect. (6)

   (b) How can we demodulate a PAM signal ? (5)

   (c) 5 messages are multiplexed in a PAM-TDM system at a sampling frequency of 1 kHz. If each pulse is of 150 μs, find the guard time. (4)

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3. (a) Explain with the help of suitable circuits, the generation and detection of PPM. (6)

   (b) How do we achieve synchronization in a PWM-TDM system ? (5)

   (c) Give any one application for PWM. List the disadvantage of a PWM system. Can it be avoided ? (4)

4. (a) Describe a PCM system with the help of a block diagram. (6)

   (b) What is the disadvantage of uniform quantization ? How can it be corrected ? (5)

   (c) A special PCM system uses 16 channels of data, one whose purpose is synchronization. The sampling rate is 3.5 kHz. The word length is 6 bits. Find (i) the number of available data channels (ii) the number of bits per frame. (4)

5. (a) Describe the T1 carrier system. Justify the line speed of 1.544 Mbps of this system. (6)

   (b) Explain the concept of DPCM clearly outlining its merits over a PCM system. (5)

   (c) What do you understand by ADM ? How is it better than DM ? (4)

6. (a) Discuss the generation and coherent detection of FSK. (6)

   (b) Draw the block diagram of a BPSK system. Sketch the BPSK waveform for the sequence 1100110110. (5)

   (c) An analog signal carries four bits per signal element. If 1000 signal elements are sent per second, find the bit rate. (4)

7. (a) Draw and explain the functioning of a basic fiber optic communication system. (6)

   (b) How do earth stations communicate with satellites ? Explain the concept of GPS system. (5)

   (c) What is FDMA ? (4)