This question paper contains **4** printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **6479**

Unique Paper Code : **251602** **D**

Name of the Paper : **Digital Communication [ELHT-602]**

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

Semester : **VI**

Duration : **3 Hours** Maximum Marks : **75**

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

Attempt *Five* questions in all.

Question No. **1** is compulsory.

Non-programmable calculators are allowed.

1. (*a*) Consider a voice message signal on a telephone line limited to 3.3 kHz. Calculate the sampling frequency if the guard band is of 1.4 kHz.

(*b*) State three reasons which make digital transmission a popular means of communication.

(*c*) What is the difference between delta modulation and adaptive delta modulation ?

(*d*) Explain the Hartley and Shanon law for information capacity.

(*e*) In satellite communication, which of uplink and downlink frequency is higher and why ? 5×3=15

P.T.O.

2. (*a*) State and prove sampling theorem. What is aliasing effect ? Explain guard band with the help of a diagram. 6

(*b*) A signal $x_1(t)$ is band limited to 4.5 kHz. There are three more signals $x_2(t)$, $x_3(t)$ and $x_4(t)$ which are band limited to 1.5 kHz each. These signals are to be transmitted by a TDM system : 5

(*i*) Design a TDM system where each signal is sampled at its Nyquist rate.

(*ii*) What must be the speed of the commutator ?

(*iii*) Calculate the minimum transmission bandwidth of the channel.

(*c*) Draw block diagram of PPM. Give advantages of using PPM over PWM. 4

3. (*a*) What is companding ? Why is it used ? Draw a typical companding curve. 6

(*b*) Explain the working of regenerative repeaters with the help of a block diagram. Why are they used in PCM system ? 5

(*c*) Sketch the waveforms for encoding binary data 11011001 in :

(*i*) Non-return to zero signalling

(*ii*) Return to zero signalling

(*iii*) Bipolar signalling or AMI

(*iv*) Manchester coding. 4

4. (*a*) Draw the block diagram of FSK system and explain its working. 6

(*b*) What are coherent and Non-coherent Digital Demodulators ? 5

(*c*) For a BPSK modulator with a carrier frequency of 70 MHz and an input bit rate of 10 Mbps, determine the maximum and minimum upper and lower side frequencies, draw the output specturm, determine the minimum Nyquist bandwidth and calculate the baud rate. 4

5. (*a*) A Television signal having a bandwidth of 4.2 MHz is transmitted using binary PCM system. Given that the number of quantization levels are 512, determine code word length, transmission B.W, and output (S/N) ratio. 6

(*b*) What is crosstalk in TDM systems ? How can it be suppressed ? 5

(*c*) Explain the concept of slope overload and granular noise in Digital Modulation Systems. 4

6. (*a*) Give the important characteristics of T1 carrier system. Discuss channel associated signalling in T1 system. 6

(*b*) Explain Differential Pulse Code Modulation (DPCM) with the help of a block diagram. 5

(*c*) How do Earth Stations communicate with satellites ? Explain the concept of GPS system. 4

7. Write short notes on : 3×5=15

(*i*) Mobile Communication

(*ii*) Code Division Multiple Access (CDMA)

(*iii*) Quantization Noise.