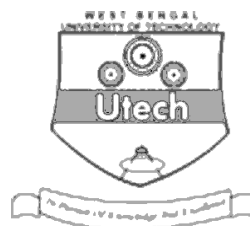


DIGITAL COMMUNICATION SYSTEM (SEMESTER - 6)

CS/B.Tech (ECE-O)/SEM-6/EC-603/09



1.
Signature of Invigilator

2.
Signature of the Officer-in-Charge

Reg. No.

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Roll No. of the
Candidate

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CS/B.Tech (ECE-O)/SEM-6/EC-603/09

ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE - 2009

DIGITAL COMMUNICATION SYSTEM (SEMESTER - 6)

Time : 3 Hours]

[Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

- This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.
- In **Group – A**, Questions are of Multiple Choice type. You have to write the correct choice in the box provided **against each question**.
 - For **Groups – B & C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
- Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
- Read the instructions given inside carefully before answering.
- You should not forget to write the corresponding question numbers while answering.
- Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
- Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
- You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
- Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

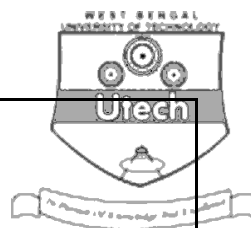
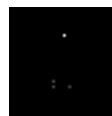
FOR OFFICE USE / EVALUATION ONLY

Marks Obtained

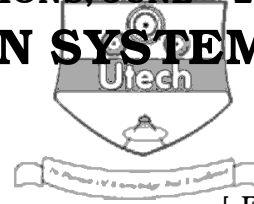
	Group – A					Group – B					Group – C					Total Marks	Examiner's Signature
Question Number																	
Marks Obtained																	

.....
Head-Examiner / Co-Ordinator / Scrutineer

6723 (09/06) (O)



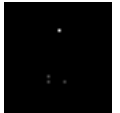
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[Full Marks : 70

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :
- $10 \log 1 = 10$
- i) If the number of bits/sample in a PCM system is increased from n to $n + 1$, the improvement in signal-to-quantisation noise ratio will be
- a) 3 dB b) 6 dB
c) $2n$ dB d) n dB.
- ii) The signal to quantisation noise ratio in an n -bit PCM system
- a) depends upon the sampling frequency employed
b) is independent of the value of n
c) increases with increasing value of n
d) decreases with the increasing value of n .
- iii) Companding is used
- a) to protect small signals in PCM from quantizing distortion
b) to overcome quantized noise in PCM
c) to overcome impulse noise
d) none of these.



4

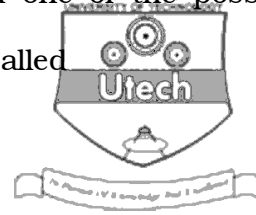
iv) If carrier modulated by a digital bit stream had one of the possible phases of 0,90,180 & 270 degrees, then the modulation is called

a) BPSK b)

QPSK

c) QAM

d) MSK.



v) The use of non-uniform quantization leads to

a) reduction in transmission BW

b) increase in maximum SNR

c) increase in SNR for low level signals

d) simplification of quantization process.

vi) The Nyquist sampling rate for the signal $g(t) = 10 \cos(50\pi t) \cos^2(150\pi t)$ where t is in seconds, is

a) 150 samples/sec.

b) 200 samples/sec.

c) 300 samples/sec.

d) 350 samples/sec.

vii) Coherent demodulation of FSK signal can be effected using

a) correlation receiver

b) BPF & envelope detector

c) matched filter

d) discriminator detection.

viii) In TDM, if the number of signals being multiplexed are band limited in f_m , the BW requirement is

a) $\leq nf_m$ b) $\geq nf_m$ c) $\leq 4nf_m$ d) $\geq 4nf_m$.

- ix) Guard bands increase the BW for

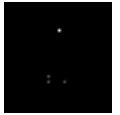
- of these.

-

(Short Answer Type Questions)

$$3 \propto 5 = 15$$

- 6723 (09/06) (O)**



6
GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.



3 × 15 = 45

7. a) Explain differential pulse code modulation system. How is SNR improved over PCM ?

b) Discuss Delta modulation technique.

c) Explain how by adaptive delta modulation slope overload noise is minimized ?

5 + 5 + 5

8. a) Explain the relationship between bits per second and baud for an FSK system.

b) Define the following terms for FSK modulation :

Frequency deviation, modulation index and deviation ratio.

c) What is the difference between standard FSK and MSK ? What is the advantage of MSK ?

d) Determine the peak deviation, minimum bandwidth and baud for a binary FSK signal with a mark frequency of 49 kHz, a space frequency of 51 kHz and an input bit rate of 2 kbps.

2 + 3 + 4 + 6

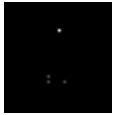
9. a) Explain a BPSK modulator system with necessary diagrams where necessary.

b) What is a constellation diagram and how is it used with PSK ?

c) Explain the relationship between the minimum bandwidth required for a BPSK system and the bit rate.

d) For a BPSK modulator with a carrier frequency of 70 MHz and an input rate of 10 Mbps, determine the maximum and minimum upper and lower side frequencies. Draw the output spectrum. Determine the minimum bandwidth and calculate the baud.

6 + 2 + 2 + 5

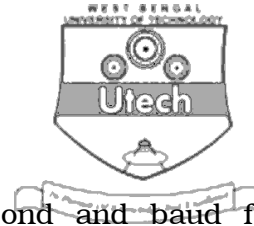


10. a) Explain QPSK demodulation operation.

b) What is Offset QPSK ?

c) Explain the relationship between bits per second and baud for an 16-PSK system.

d) Define bandwidth efficiency.



For an 8-PSK system, operating with an information bit rate of 24 kbps, determine bandwidth efficiency.

6 + 2 + 2 + 5

11. a) Discuss TDM process. Explain the need of pulse and word stuffing.

b) Explain how frame synchronization is achieved in a TDM system.

c) In a TDM-PCM system 24 voice signals are transmitted. Each signal is sampled at 8 kHz and encoded into 8-bit word per sample. The TDM signal is transmitted along with one synchronizing bit per frame. Calculate the speed of the TDM link.

12. a) Explain linear block code.

b) Discuss the encoding procedure of a systematic linear block code.

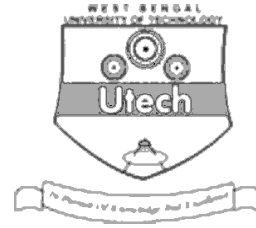
c) The generator matrix for a (6, 3) block code is given below. Find all code-vectors of this code.

4 + 5 + 6

$$G = \begin{bmatrix} 100 & 110 \\ 010 & 011 \\ 001 & 111 \end{bmatrix}$$

13. a) Consider a (7, 4) block code generated by

$$G = \begin{bmatrix} 1000 & 110 \\ 0100 & 011 \\ 0010 & 101 \\ 0001 & 111 \\ I_4 & P \end{bmatrix}$$



Explain how the error syndrome S helps in correcting a single error. What happens when more than one errors occur ?

b) What is cyclic code ? Discuss how systematic cyclic code is implemented. 10 + 5

14. Write short notes on any *three* of the following :

3 × 5

- a) Matched filter
- b) Eye pattern
- c) Clock recovery of digital communication system
- d) Equalizer
- e) Convolution code
- f) Code division multiplexing.

END