

Con. 2785-09.

Principle of Digital Communication

3 p.m. to 6 p.m.

VR-5106

(REVISED COURSE)

(3 Hours)

[Total Marks : 100]

N.B. : (1) Question No. 1 is compulsory.

(2) Attempt any **four** questions out of remaining **six** questions.(3) Assumptions made should be **clearly** stated.(4) Illustrate answers with **sketches** wherever **required**.1. Attempt any **four** :—

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(a) What the system link budget tells the system engineer ?

(b) What is bandwidth efficiency ? State its significance.

(c) What is the difference between probability of error and bit error rate ?

(d) Explain the relationship between bits per second and baud for an 8 PSK system.

(e) What is the significance of Euclidean distance ?

(f) What is the purpose of clock recovery circuit ? When is it used ?

2. (a) What is meant by equalization ? Sketch and explain the working of 10
Traversal equalizer.(b) Define cumulative distribution function and probability density function. 10
List their properties.3. (a) Draw block diagram of DPSK system (transmitter & receiver) and explain 10
why detection of DPSK does not require a differential decoder.(b) State and explain the condition for orthogonality of BPSK signals. 10
Determine their spectrum and hence the bandwidth required for transmission
of signals.4. (a) What is line coding ? Draw the waveforms for different line coding. 10
Assume the binary sequence 101100011.(b) What is matched filter ? Derive the expression for the minimum probability 10
of error of the matched filter ?

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5. (a) Explain the Shannon capacity theorem. Show that channel capacity for 10 channels of infinite bandwidth is $C(\infty) = \lim_{B \rightarrow \infty} C = 1.44 \frac{S}{N_0}$.

(b) What is Huffman code ? Explain its algorithm. A memory less source 10 emits six symbols with probabilities shown in table. Find the 4-ary Huffman code and determine its average word length, entropy of the source, code efficiency and redundancy.

Symbol	M1	M2	M3	M4	M5	M6	M7
Probability	0.3	0.25	0.15	0.12	0.10	0.08	0.00

6. (a) Consider (7, 4) cyclic code. If generator polynomial is $g(x) = 1 + x + x^3$ 10 draw the syndrome calculator circuit and explain its working for the received code : 0111011.

(b) Explain in detail convolution coding. 10

7. Write short notes on any **three** :— 20

(a) Noise figure, noise temperature and line loss

(b) Sources of signal loss and noise

(c) Digital signature and password

(d) Ideal secrecy and perfect secrecy.