

Total No. of Questions : 8]

P1312

SEAT No. :

[Total No. of Pages : 3

[4858] - 1042

T.E. (Electronics & Telecommunication) (Semester - I)

DIGITAL COMMUNICATION

(2012 Pattern) (End -Sem.)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.

- Q1)** a) Explain with the help of block diagram forming and transmission of baseband signal. [8]
- b) Define mean, correlation, standard deviation of a random process. [6]
- c) Draw the block diagram of DM transmitter and explain its working. Comment on the drawbacks of DM. [6]

OR

- Q2)** a) Define the terms related to digital communication
- i) Messages
 - ii) Characters
 - iii) Symbols [6]
- b) Explain digital signal hierarchy using T1 carrier system. [6]
- c) The output of an oscillator is described by $x(t) = A \cos(\pi F t + \theta)$ [8]

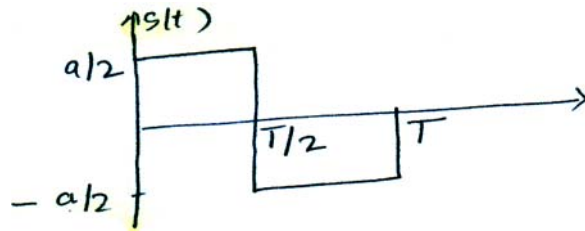
where the amplitude A is constant and F and ϕ are independent random variables. The probability density function of θ is defined by

$$f_{\phi}(\theta) = \begin{cases} \frac{1}{2\pi}, & 0 \leq \theta \leq 2\pi \\ 0 & \text{otherwise} \end{cases}$$

Find the power spectral density of $x(t)$ in terms of the probability density function of the frequency F.

P.T.O.

Q3) a) Consider the signal $S(t)$ shown in fig. [8]



Determine the impulse response of a filter matched to this signal and sketch it as a function of time, plot the matched filter output as a function of time.

b) Derive the expression of SNR for optimum filter. [8]

OR

Q4) a) Write a short note on [8]

i) MAP

ii) LRT

b) Draw & explain signal space representation of following signal. [8]

i) BPSK

ii) 8 Aray PSK

Q5) a) Explain block diagrams for generation and reception of M-ary PSK signals. With suitable mathematical expressions, signal space representation Bandwidth and PSD. [10]

b) Binary data is transmitted using PSK at a rate 3M bps over RF link having bandwidth 10MHz. Find signal power required at receiver input so that error probability is less than or equal to 10^{-4} Assume noise PSD to be 10^{-10} watt/Hz. $[Q(3.71) = 10^{-4}]$ [8]

OR

Q6) a) Explain with block diagram QPSK recieves Write an expression for its error probability [8]

b) find error probability of co-herent FSK when amplitude of I/P at coherent optimal receiver is 10mv and frequency 1MHz, the signal corrupted with white noise of PSD 10^{-9} W/Hz. the data rate is 100kbps.

$[\text{erfc}(1.01) = 0.1531, \text{erfc}(1.11) = 0.1164, \text{erfc}(1.22) = 0.0844 \text{ \& } \text{erfc}(1.33) = 0.0599]$ [10]

- Q7)** a) Draw and explain 4bit P.N. sequence generator and find maximum length sequence. [8]
- b) The signal has the following parameter number of bits per MFSK symbol $K = 2$ number of MFSK tone $M = 2^k = 4$ length of PN sequence per hop $K = 3$ total No. frequency hops $2^k = 8$ sketch the o/p transmittes freq of fast FH/MFSK signals. [8]

OR

- Q8)** a) Write a short note on personal communication system (PCS) [8]
- b) Compare DSSS with FHSS system. [8]

