[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 formating and transmission of baseband signal. **[8]**

     b)   Define mean, corrdation, 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]**

<div align="center">OR</div>

Q2) a)   Define the terms related to digital communication

         i)   Messages

         ii)   Characters

         iii)   Symbols **[6]**

     b)   Explain digital signal hierarchy using TI carrier system. **[6]**

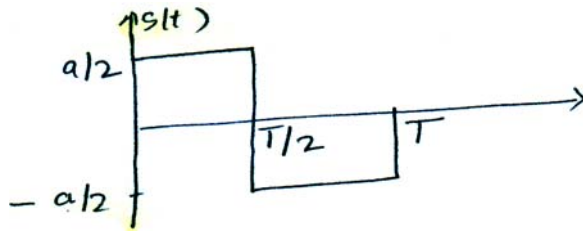   c)   The output of an oscillatus is described by $x(t) = A\cos(\pi Ft + \theta)$ **[8]**

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

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

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

<div align="right">*P.T.O.*</div>

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.

[erfc (1.01) = 0.1531, erfc (1.11) = 0.1164, erfc (1.22) = 0.0844 & 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]**

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