Total No. of Questions : 8]

SEAT No. :

P2501

[Total No. of Pages : 3

[5253] - 522

T.E. (E & TC)

DIGITAL COMMUNICATION

(2015 Pattern)

Time : 2 ½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) What is delta - sigma modulator? Draw its block diagram, what are its advantages? **[7]**

b) What is time division multiplexing? Explain how allocation of time slots in TDM depends on bit rate. **[7]**

c) What is a strictly stationary process? Explain . **[6]**

OR

Q2) a) A binary channel with 36 kbps bit rate is available for PCM voice transmission Find. **[6]**

i) Number of quantization levels.

ii) Number of bits per sample.

iii) Sampling frequency.

The voice signal is band limited to 3.4 kHz

b) What is bit synchronisation? Explain any one bit synchroniser. **[7]**

c) If a white Gaussian noise is passed through a ideal low pass filter find the autocorrelation function of the filtered noise. Assume passband amplitude response of filter H (f) = 1 and cufoff frequency W Hz. **[7]**

P.T.O

SPPUQuestionPapers.com

Q3) a) Explain likelihood ratio test (LRT). **[6]**

b) A received binary signal has amplitude ± 2V and bit durahon is T_b. The signal is corrupted by AWGN having power spectral density 10^{-4} volt^2/ Hz. If the signal is processed by integrate & dump filter, what will be required value of T_b so that error probability is less than or equal to10^{-4}. Given Q (3.71) = 10^{-4} **[7]**

c) State any one property of matched filter. **[3]**

OR

Q4) a) Derive the expression for signal - to - noise ratio of integrate - and - dump filter. **[8]**

b) Find impulse response of matched filter whose input is given by **[6]**

$$g(t) = A \sin\left(\frac{2\pi t}{T}\right);\ 0 \le t \le T$$

$$= \quad 0 \quad ;\ \text{otherwise}$$

c) Draw the block diagram of correlation receiver for binary digital input signal . **[2]**

Q5) a) Explain the band - pass transmission model (Both transmitter & receiver) **[6]**

b) Binary data is transmitted using PSK at a rate 2 Mbps over RF link having bandwidth 2MHz, find signal power required at the receiver input so that error probability is not more than 10^{-4}. Given noise PSD $\frac{N_o}{2} = 10^{-10}$ Watt/ Hz and Q (3.71) = 10^{-4} **[6]**

c) Explain QPSK signal generation. **[6]**

OR

SPPUQuestionPapers.com

Q6) a) Explain M-ary PSK transmitter & receiver. **[6]**

b) Binary data is transmitted using M-ary PSK at a rate 2 Mbps over RF link having bandwidth 2MHz find signal power required at the receiver input so that bit error probability is less than 10^{-5}.

Given M = 16 and Noise PSD $\frac{N_o}{2}=10^{-8}$ Watt / Hz erf (3.1) = 0.99996 **[8]**

c) Explain coherent binary FSK signal generation. **[4]**

Q7) a) Draw the block diagram of spread spectrum digital communication and explain the various blocks. **[8]**

b) State and explain properties of PN sequence. **[6]**

c) What are advantages of FHSS. **[2]**

OR

Q8) a) Draw the block diagram of FHSS transmitter and receiver and explain the various blocks. **[8]**

b) The DSSS communication system has message bit duration (T_b) = 4.095 ms and chip duration (T_c) = 1 µsec. with $\frac{E_b}{N_o}=10$ for average error probability less than 10^{-5}. Calculate processing gain & Jamming margin. **[6]**

c) What are disadvantages of DSSS. **[2]**

ⓘⓘⓘ

SPPUQuestionPapers.com
CEGP013091 49.248.216.238 27/11/2017 09:23:29