

92 年中央大學通訊系在職專班 工程數學考題

1. Please explain the following terminologies (50%).

- (a) probability distribution
- (b) random variable
- (c) expected value and variance
- (d) conditional probability
- (e) central limit theorem

2. Suppose that we have a fuse box containing 20 fuses, of which 5 are defective. If 2 fuses are selected at random and removed from the box in succession without replacing the first, what is the probability that both fuses are defective?(10%)

3. A coin is biased so that a head is twice as likely to occur as a tail. If the coin is tossed 3 times, what is the probability of getting 2 tails and 1 head?(15%)

4. What is the probability of getting a total of 7 or 11 when a pair of dice are tossed?(10%)

5. The following is the probability distribution of a random variable X.

x	0	1	2	3
f(x)	0.51	0.38	0.1	0.01

Calculate its mean (expected value) and variance (15%).

九十二年度中央大學通訊系在職專班

Principles of communication Systems

1. A system with Amplitude response and phase shift as shown in Fig1. Find the output signal if input signals is $\cos 10\pi t + \cos 26\pi t + \cos 32\pi t$ (15%)

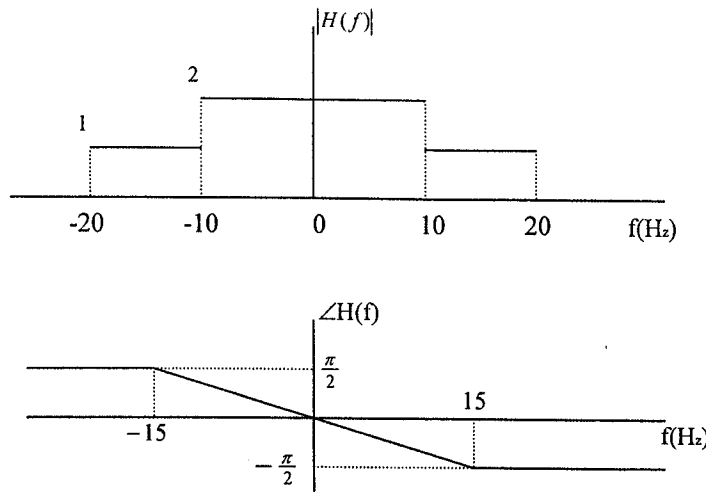


Fig 1

2. Consider a channel for which the following sample values of channel pulse response are given
 $P_c(-2\Gamma) = -0.05$ $P_c(-\Gamma) = 0.2$ $P_c(0) = 1.0$
 $P_c(\Gamma) = 0.3$ $P_c(2\Gamma) = -0.07$
 Find the zero-forcing tap coefficients (15%)
3. An MSK system has a carrier frequency of 10MHz and transmit data at a rate of 10Kbps (15%)
 (A) For the data sequence 101010... what is the instantaneous frequency?
 (B) For the data sequence 000000... what is the instantaneous frequency?
 (C) For the data sequence 111111... what is the instantaneous frequency?
4. For a Binary source, the probability of sending Binary one is $P(1) = \alpha$ and Binary zero
 $P(0) = 1 - \alpha$ (15%)
 (A) Find the entropy of source $H(\alpha)$ as function of α
 (B) Find the minimum and maximum of entropy and corresponding α values
5. An systematic Block code has the parity check matrix $[H] = \begin{bmatrix} 1101100 \\ 1110010 \\ 0111001 \end{bmatrix}$ (15%)
 (A) Determine the Generator matrix
 (B) If information sequence is $[A] = \begin{bmatrix} 1 \\ 1 \\ 0 \\ 1 \end{bmatrix}$ find the encoded code word
 (C) If the received sequence is 0110101 is it a code word? If not a code word give the correct code sequence
6. Describe the following definition or theorem (25%)
 (A) Sampling Theorem
 (B) Carson's Rule
 (C) Shannon-Hartley Theorem
 (D) Delta Modulation
 (E) Granular Noise

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