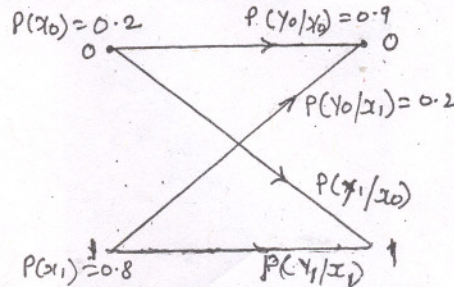


Sem IV  
T.E. J.T.

- N.B.** (1) Question No. 1 is compulsory.  
 (2) Attempt in **all five** questions.  
 (3) Assume suitable data if **required**.

1. (a) A binary source produces 0s and 1s independently with probabilities  $P(0) = 0.2$  and  $P(1) = 0.8$ . The binary data is then transmitted over a noisy channel. The probability of correct reception when a '0' is transmitted over the channel is  $P(0/0) = 0.9$ . Also the probability of reception of '0' when '1' has been transmitted is  $P(0/1) = 0.2$ — 10
- (i) Find  $P(1/0)$  and  $P(1/1)$   
 (ii) Find overall probability of receiving a '0' and receiving a '1'.  
 (iii) If a '1' is received, what is the probability that a '0' was transmitted ?



- (b) Explain sampling theorem for low pass signal. Also explain different sampling methods. 10
2. (a) For the following binary sequence sketch the various waveforms— 10  
 1011001011  
 (i) RZ, (ii) NRZ, (iii) Manchester coding, (iv) AMI
- (b) What is a matched filter ? Enumerate its properties and derive expression for probability of error in matched filter. 10
3. (a) What is noise ? In a radio receiver an RF amplifier and a mixer are connected in cascade. The amplifier has a noise figure of 10 dB and power gain is 15 dB. The noise figure of the mixer stage is 20 dB. Calculate noise factor and noise figure. 10
- (b) Explain various sources of signal noise loss in satellite communication link. 10
4. (a) Sketch the block diagram of QPSK system and explain the working with relevant expression at the output of each block. Also state the advantages of differential encoding used for QPSK. 10
- (b) A discrete memoryless source has seven symbols with probabilities as given below : 10

Symbol	$s_0$	$s_1$	$s_2$	$s_3$	$s_4$	$s_5$	$s_6$
Probability	0.25	0.125	0.125	0.125	0.125	0.0625	0.0625

Find Huffman code, Average code word length, entropy and code redundancy.

5. (a) Compare the following :— 10  
 (i) M-ary PSK and M-ary FSK  
 (ii) BPSK and DPSK
- (b) Explain block diagram of BFSK transmitter and receiver. Also comment on its bandwidth requirement. 10
6. (a) The parity check matrix of a particular (7, 4) linear block code is given by— 10

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

- (i) Find Generator matrix.  
 (ii) List all code words.  
 (iii) How many errors can be detected and corrected ? 10
- (b) Define the signature authentication process using public key crypto system. 10

7. Write short notes on : (any four) :-

- (a) Eye pattern
  - (b) JPEG
  - (c) A-law and U-law.
  - (d) Duo binary Encoder.
  - (e) Run length coding.
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