

**SANT GADGE BABA AMRVATI UNIVERSITY, AMRAVATI**  
**Summer Examination 2020**  
**HVPM's College of Engineering and Technology, Amravati**  
**Department of Electronics & Tele communication Engineering**  
**Bachelor of Engineering Sem. :- VI**

**Subject :- Digital communication**

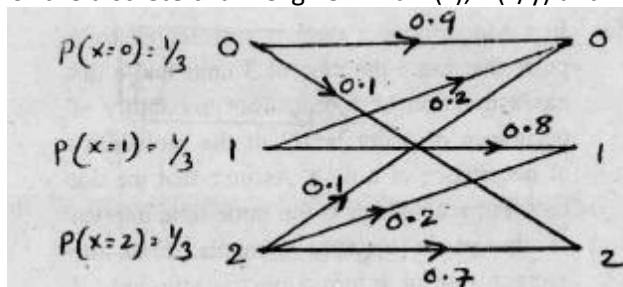
**Code :- 6ET3**

**Instructions:-**

- 1) Solve any two questions
- 2) All question carry equal marks

**Q1.**

- a) Consider the binary data sequence 100001. Draw the waveforms for the following signaling formats : a) Bipolar NRZ - AMI b) Split phase Manchester c) Unipolar RZ **02 Credit Point**
- b) For the discrete channel given find  $H(x)$ ,  $H(x/y)$  and  $H(x,y)$



- c) Explain MSK in detail with advantages and disadvantages. **02 Credit Point**
- d) Using an example explain modified duobinary signaling scheme **02 Credit Point**
- e) Design an encoder for the (7,4) binary cyclic code generated by  $g(x) = 1 + x + x^2$  and verify its operation using message vector (1100) **01 Credit Point**
- f) Explain direct sequence spread spectrum and define processing gain. **01 Credit Point**

**Q2.**

- a) Explain in detail scrambler and unscrambler. **02 Credit Point**
- b) A discrete source emits one of five symbols once every millisecond with probabilities  $\frac{1}{2}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}$  respectively. Determine –a) Source Entropy b) Information Rate. **02 Credit Point**
- c) Derive an expression for the probability of error in terms of signal parameter, noise power spectral density and receiver parameters. **02 Credit Point**
- d) Explain Eye diagram and its application. **02 Credit Point**
- e) State and prove error correction capability of a linear block code. **01 Credit Point**
- f) Explain CDMA system and list its advantages and disadvantages. **01 Credit Point**

**Q3.**

- a) Describe properties of line Codes. **02 Credit Point**
- b) State and explain Markoff statistical model for information sources. **02 Credit Point**
- c) Calculate the probability of error ( $P_e$ ) for coherent FSK signal scheme. **02 Credit Point**
- d) Explain operation of three tap transversal equalizer. **02 Credit Point**
- e) Explain the properties of cyclic codes. Also explain the steps to be performed for encoding in a systematic form. **01 Credit Point**
- f) Draw and explain the block schematic of FHSS system. Also briefly explain fast frequency hopping and slow frequency hopping. **01 Credit Point**

**Q4.**

- a) Explain HDB3 signaling scheme. Find HDB3 coded data for the given input data bit stream. 0010 0000101000000000101. **02 Credit Point**
- b) Determine the Huffman Code for the following messages bit with their probabilities given below  $x_1 = 0.15$ ;  $x_2 = 0.15$   $x_3 = 0.1$   $x_4 = 0.05$ ;  $x_5 = 0.35$ ;  $x_6 = 0.13$ ;  $x_7 = 0.1$ ; **02 Credit Point**
- c) Using an example describe DPSK system **02 Credit Point**
- d) Explain binary base band PAM system with a block diagram. What is ISI? **02 Credit Point**
- e) Parity check bits of a (8,4) block code are generated by  
 $C_5 = d_r + d_2 + d_1$   
 $C_6 = d_1 + d_1 + d_3$   
 $C_7 = d_r + d_3 + d_a$   
 $C_t = d: + dt + dc$   
Where  $d_1, d_2, d_3, d_4$  are the message digits.
  - i) Find the generator matrix and parity check matrix for this code.
  - ii) Find the minimum weight of this code.
  - iii) Find the error detecting capability of this code
  - iv) Show through an example that this code can detect three errors / code words. **01 Credit point**
- f) With the help of block diagram, explain transmitter and receiver part of the slow frequency hopping spread spectrum technique. **01 Credit Point**