Seat No.

Total No. of Pages : 3

T.E.(E & TC) (Semester - V)Examination, May - 2019
DIGITAL COMMUNICATION
Sub. Code : 66318

Day and Date :Wednesday, 08 - 05 - 2019. **Total Marks :100**
Time : 2.30 p.m. to5.30 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Use of non programmable calculator is allowed.**
3) **Neat diagrams must be drawn whenever necessary.**
4) **Figures to the right indicate full marks.**

SECTION-I

Q1) Solve any three **[18]**

a) What is an Ergodic process? What is difference between Ergodic & Stationary process?

b) Define probability & properties of probability

c) Write short notes on :

i) Gaussian distribution

ii) Binomial distribution

d) The PDF of Random variable is given by $f_x(x) = e^{-3x}$ for $x \geq 0$ find the probability that X will be in the range 1 to 4.

Q2) Solve any two. **[16]**

a) Derive expression for Joint and conditional entropy.

b) With an example explain the Shannon Fano coding

c) Apply the Huffman coding procedure for the following message ensemble.

$[X] = [X_1 X_2 X_3 X_4 X_5 X_6 X_7]$ with respective probabilities.

[P] = [0.4 0.2 0.12 0.08 0.08 0.08 0.04]. Take M=3. Determine code efficiency.

P.T.O.

Q3) Solve any two. **[16]**

a) Explain PCM with neat block diagram? What is companding in PCM?

b) Explain Adaptive delta modulation?

c) Explain mid tread and mid rise quantizer, with suitable figure.

SECTION-II

Q4) Attempt any two. **[2×8 = 16]**

a) Draw and explain QPSK signaling scheme.

b) Draw and explain eye diagram.

c) Compare line coding techniques.

Q5) Attempt any two **[2×8 = 16]**

a) Draw and explain scrambler and unscramble implementation using shift register structure..

b) Explain optimum detection using ML criteria.

c) Discuss coherent detection schemes in ASK, FSK and PSK.

Q6) Attempt any two **[2×9 = 18]**

a) For a systematic linear bock code the three parity check digits C_4, C_5, C_6, are given by $C_4 = d_1+d_3$, $C_5=d_2+d_3$, $C_6=d_1+d_2+d_3$

i) Construct parity check matrix.

ii) Prepare suitable decoding table.

iii) Find syndrome and decode the received words 101111 and 101110.

b) A Generator polynomial of a (7,4) cyclic code is $g(x) = 1+x+x^3$ then find systematic and non-systematic codeword for data vector (1011).

c) For convolution encoder shown in figure sketch the code tree and determine the output digit sequence for the data digits 1100.