Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER – I (New)– EXAMINATION – WINTER-2019

Subject Code: 3710510 **Date: 09-01-2020**

Subject Name: Statistical Information Processing

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** In which condition entropy will be maximum? Explain with example. **07**

(b) Define the following terms **07**

(1) Ergodic process (2) Statistically independent events (3) Random variable (4) Random process (5) Probability Density Function (6) Cumulative Distribution Function (7) Bay's theorem

Q.2 **(a)** Explain Central limit theorem. **07**

(b) Explain Arithmetic Code with Example. **07**

OR

(b) Explain LZW code with Example. **07**

Q.3 **(a)** Write Short note on: Least Square Estimation. **07**

(b) Let the random variable Y be defined by $Y=aX+b$ **07**

where, a is a nonzero constant. Suppose that X has cdf $F_X(x)$,then find $F_Y(y)$

OR

Q.3 **(a)** "Power spectral density and autocorrelation is Fourier transform pair". Prove this statement. **07**

(b) The probability of a bit error in a communication line is 10^{-3}.Find the probability that a block of 1000 bits has five or more errors. **07**

Q.4 **(a)** State and prove Tchebycheff's Inequality theorem. **07**

(b) Find Shennon-Feno code for following massages. **07**

Massage	A	B	C	D	E
Probability	0.39	0.18	0.15	0.15	0.13

OR

Q.4 **(a)** Explain Binary Hypothesis testing. **07**

(b) Find Huffman code, average length, entropy, code efficiency and redundancy for the following massages. **07**

Massage	m_1	m_2	m_3	m_4	m_5	m_6
Probability	0.3	0.25	0.15	0.12	0.10	0.08

Q.5 **(a)** Explain Neyman-Pearson Criterion. **07**

(b) Write Short note on: Reed Solomon Code **07**

OR

Q.5 **(a)** Derive Equation for channel capacity of Band-Limited AWGN Channel. **07**

(b) Compare LZ-77 Code with LZ-78 Code **07**

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