10-06-2026 TE EXTC SEM-V C SCHEME RSA QP CODE: 20009354

Time: 3 hours **Max. Marks: 80**

N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

1 **Attempt any FOUR** [20]

a Explain the central limit theorem. [5]

b Explain any two properties of Co-variance Function. [5]

c State and prove Bayes theorem and total probability theorem. [5]

d State and prove properties of probability density function. [5]

e Justify Strict sense stationary is difficult to prove. [5]

2 a Write a note on characteristic function of Gaussian distribution and Rayleigh distribution [10]

b If the probability of a bad reaction from medicine is 0.002, determine the chance that out of 1000 persons more than 3 will suffer a bad reaction from medicine. [10]

3 a Find the mean and variance of Binomial distribution. [10]

$$P(x) = \binom{n}{x} P^x q^{n-x}$$

b Write a note on regression and model building. [10]

4 a Explain in detail the difference between SSS and WSS. [10]

b If x and y are two independent exponential variables with common parameters λ. Evaluate the pdf of (U, V) where U=X+Y and V=X-Y. Also find f(u) and f(V). [10]

5 a Consider a random process, $Y(t) = X(t)\cos(W_0 t + \theta)$ where X(t) is WSS, θ is a uniform random variable independent of X(t) and is distributed uniformly in (-π, π), W_0 is constant, prove that Y(t) is WSS process [10]

b Discuss Mean and correlation Ergodic processes. [10]

6 a Design and find coefficient of correlation between x and y using the data [10]

X	65	67	66	71	67	70	68	69
Y	67	68	68	70	64	67	72	70

b $F_x(x) = K\,(9x - x^3), Where\ 0 \le x \le 3$ [10]
Evaluate K, Mean, Variance, Standard deviation, first 4 raw moments.

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