



II B.Tech I Sem Supplementary Examination, July-2022

Probability Theory and Stochastic Processes

(ECE)

Time: 3 Hours.**Max. Marks: 70**

Note: 1. Answer any FIVE questions.

2. Each question carries 14 marks and may have a, b as sub questions.

- 1 a) State and Prove the total probability. 7M C01 BL3
 b) Define Axiomatic Probability and Relative frequency probability. 7M C01 BL1
 Also, list the axioms of probability.
- 2 If the probability density function of a random variable is given by 14M C01 BL3

$$f_X(x) = C \exp\left(-\frac{x}{4}\right), 0 \leq x \leq 1$$

$$= 0 \quad \text{otherwise}$$
 Find the value of C such that the given $f_X(x)$ is a valid pdf and evaluate the $F_X(0.5)$.
- 3 a) If X be a random variable with pdf $f_X(x) = 1/8, -4 < x < 4$ 7M C01 BL3
 then find Mean and Mean Square Values of X .
 b) Define variance and explain any three properties of it. 7M C01 BL2
- 4 Two random variables X and Y are distributed as 14M C01 BL3

$$f(x, y) = \begin{cases} ke^{-(x+y)} & \text{for } x \geq y \geq 0 \\ 0 & \text{otherwise} \end{cases}$$
 (i) Are X and Y independent? (ii) Find $E(X/Y)$
- 5 a) Define Ergodicity and explain the different types of Ergodicity. 7M C02 BL4
 b) State and prove the any 4 properties of Cross Correlation function. 7M C02 BL3
- 6 Derive the Mean, Mean squared value and Autocorrelation 14M C02 BL6
 functions for a LTI system response.
- 7 a) Find the cross power spectral density, if $R_{XY}(\tau) = \frac{A^2}{2} \cos(\omega_0 \tau)$ 7M C03 BL3
 b) Explain the properties of Power spectral density. 7M C03 BL4
- 8 Classify different noise sources and explain about effective Noise 14M C04 BL2
 Temperature, Noise equivalent bandwidth.