



Regulation R18

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

Subject code:2P4DE

B.Tech IV Semester Supplementary Examinations, July 2022
PROBABILITY THEORY AND STOCHASTIC PROCESS

(ECE)

Maximum Marks: 70

Date:30.07.2022 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 Define probability of the event with an example.
- 2 State Bayes' theorem.
- 3 State the central limit theorem
- 4 Explain skew and coefficient of skewness
- 5 Define the joint moments about the origin.
- 6 Distinguish between joint distribution and marginal distribution.
- 7 Explain about second order stationary process.
- 8 Write short notes on Gaussian random process.
- 9 Write the expression for power spectral density.
- 10 Find auto correlation function for $S_{XX}(\omega) = \frac{8}{(9 + \omega^2)^2}$

Part-B

Answer All the following questions.

(10M X 5=50Marks)

- 11.a State and Prove the Total Probability. 4
- b. A shipment of components consists of 3 identical boxes. One box contains 2000 components of which 25% are defective, the second box has 5000 components of which 20% are defective and third box contains 2000 components of which are 600 are defective. A box is selected at random and a component is removed at random from the box. 6
 - i) What is the probability that this component is defective?
 - ii) What is the probability that it came from the second box.

OR

12. A binary communication channel carries data as one of two types of signals denoted by 0 and 1. Owing to noise, a transmitted 0 is sometimes received as 1 and a transmitted 1 is sometimes received as 0. For a given channel, assume a probability of 0.94 that a transmitted 0 is correctly received as 0 and a probability of 0.91 that a transmitted 1 is received as a 1. Further assume a probability of 0.45 10

- of transmitting a 0, if a signal is sent. Determine
- i) Probability that a 1 is received
 - ii) Probability that a 0 was received
 - iii) Probability that a 1 was transmitted, given that a 1 was received
 - iv) Probability that a 0 was transmitted, given that a 0 was received
 - v) Probability of error.
- 13.a Explain Probability Distribution Function and mention its properties. 5
- b Find the value of the constant k so that 5
- $$f_X(x) = \begin{cases} Kx^2(1-x^3) & \text{for } 0 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$$
- OR
- 14.a Explain Moments about the Origin and Moments about the Mean. 5
- b For the uniformly distributed Random Variable X, Determine 5
- i) Moment generating function
 - ii) Mean and Variance
- 15.a Define and explain joint density function of two random variables X and Y 5
- b State properties of joint probability distribution function 5
- OR
16. The joint pdf of (x, y) is given as 10
- $$f(x, y) = \begin{cases} Ke^{-(ax+by)} & \text{for } x > 0, Y > 0 \\ 0 & \text{elsewhere} \end{cases}$$
- Show that X and Y are independent.
17. Define autocorrelation function of a random process. Write its properties and prove any four of them. 10
- OR
18. Define cross correlation function of a random process. Write its properties and prove any four of them. 10
- 19 Derive the relationship between cross-power spectrum and cross correlation function. 10
- OR
- 20 Explain about cross power spectrum density and its properties with proofs 10