



R20 Regulation

Subject code: 3P4D4

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, April 2025

(ECE)

Maximum Marks: 70

Date: 28.04.2025

Duration: 3 hours

- Notes:**
1. This is 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 five full questions from each unit.
 4. Each question carries 10 marks and use letters a, b, c, d as sub questions.

Part-A

All the following questions carry 2 marks each		10X2M=20 Marks	Marks	CO	BTL
1	Define probability of the event with an example.		2M	1	L1
2	Write the axioms of probability.		2M	1	L1
3	State the central limit theorem.		2M	2	L1
4	How interval condition is different from joint condition?		2M	2	L1
5	Define cross-covariance function.		2M	3	L1
6	Prove that $\sigma^2 = \sigma_{12}^2 - \sigma_1^2 \sigma_2^2$		2M	3	L1
7	Explain about stationary process.		2M	4	L1
8	Write short notes on wide sense stationary random process.		2M	4	L1
9	Write properties of cross power density spectrum.		2M	5	L1
10	What is a WSS random process?		2M	5	L1

Part-B

Answer All the following questions.		(3X10M=30Marks)	Marks	CO	BTL
11	a) Coin A has a probability of head = 1/4 and coin B is a fair coin. Each coin is flipped five times. If X is the number of heads resulting from coin A and Y denotes the same from coin B, what is the probability for X=Y? b) State and prove Bayes' theorem.		5M	1	L2
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 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		10M	1	L2

13	Explain about moments about origin and mean.	10M	2	L2
	OR			
14	a) Define and explain joint distribution function of two random variables X and Y. b) State properties of joint probability density function.	5M 5M	2	L2
15	a) Explain characteristic function. b) If X is a uniform random variable in $-5 \leq x \leq 5$. Find $E[X]$, $E[X^2]$, $E[2X+5]$, $E[(X+1)^2]$, $E[(3x-4)/5]$	5M 5M	3	L2
	OR			
16	a) Define conditional distribution and density function of two Random variables X and Y. b) Explain the sum of two random variables.	5M 5M	3	L2
17	Define the terms: (i) Random process. (ii) Stationary random process. (iii) Wide sense stationary random process. (iv) Ergodic random process.	10M	4	L2
	OR			
18	State and prove any five properties of cross correlation function.	10M	4	L2
19	Derive the relationship between cross-power spectrum and cross-correlation function.	10M	5	L2
	OR			
20	Define autocorrelation function of a random process. Write properties of autocorrelation function of a WSS process and prove any three of them.	10M	5	L2