SREE VIDYANIKETHAN ENGINEERING COLLEGE
(An Autonomous Institution, Affiliated to JNTUA, Ananthapuramu)

II B.Tech II Semester (SVEC-19) Regular Examinations August – 2021
PROBABILITY AND STOCHASTIC PROCESSES
[Electronics and Communication Engineering]

Time: 3 hours   Max. Marks: 60

Answer One Question from each Unit
All questions carry equal marks

UNIT-I

1.	a)	A pack contains 4 white and 2 green pencils, another contains 3 white and 5 green pencils. If one pencil is drawn from each pack, find the probability that: i) Both are white. ii) One is white, and another is green	6 Marks	L2	CO1	PO4
	b)	Explain about joint and conditional probability.	6 Marks	L1	CO1	PO2

(OR)

2.	a)	An urn contains 10 white and 3 black balls while another urn contains 3 white and 5 black balls. Two are drawn from the first urn and put into the second urn and then a ball is drawn from latter. What is the probability that it is a white ball?	6 Marks	L2	CO1	PO4
	b)	State and prove the Baye's theorem.	6 Marks	L1	CO1	PO2

UNIT-II

3.	a)	Let X be a Continuous random variable with density function f(x) = (x/9)+ K $0 \leq x \leq 6$ = 0 otherwise Find the value of K and also find $P\{2 \leq X \leq 5\}$.	6 Marks	L3	CO2	PO4
	b)	Let X and Y be the random variables defined as X=Cosθ and Y=Sinθ, where θ is a uniform random variable over (0, 2π) i) Are X and Y Uncorrelated? ii) Are X and Y Independent?	6 Marks	L2	CO2	PO4

(OR)

4.	a)	Prove that $P(x_1 < X \leq x_2) = F_x(x_2) - F_x(x_1)$.	6 Marks	L2	CO2	PO1
	b)	If X is a normal variate with mean 30 and standard deviation 5. Estimate the probabilities when. i) $26 \leq X \leq 40$. ii) $X \geq 45$.	6 Marks	L2	CO2	PO2

UNIT-III

5.	a)	Explain the Gaussian Random Variable and Exponential Random variable with corresponding neat sketches.	6 Marks	L1	CO2	PO2
	b)	The ranks of 16 students in Mathematics and Statistics are as follows. (1,1) (2,10) (3,3) (4,4) (5,5) (6,7) (7,2) (8,6) (9,8) (10,11) (11,15) (12,9) (13,14) (14,12) (15,16) (16,13). Calculate the rank correlation coefficient for proficiencies of this group in Mathematics and Statistics.	6 Marks	L3	CO2	PO2

(OR)

6.	a)	If the joint PDF of two dimensional random variable (x, y) is given by: $F_{XY}(X,Y) = 2$; for $0 < x < 1$, $0 < y < x$ = 0; otherwise Find the marginal density function of X and Y.	6 Marks	L2	CO2	PO4

b)	Discuss the properties of conditional distribution function.	6 Marks	L3	CO2	PO2

<div align="center">UNIT-IV</div>

7.	a)	Find the cross-correlation function corresponding to the cross power spectrum $S_{XY}(\omega)= 6/[(9+\omega^2)(3+j\,\omega)]^2$.	6 Marks	L3	CO3	PO4
	b)	Write short notes on cross power density spectrum.	6 Marks	L3	CO3	PO2

<div align="center">(OR)</div>

8.	a)	A random process has the power density spectrum $S_{YY}(\omega)= 6\,\omega^2/[1+\omega^4]$. Find the average power in the process.	6 Marks	L3	CO3	PO4
	b)	Find the auto correlation function of the random process whose psd is $16/[\omega^2+4]$.	6 Marks	L3	CO3	PO4

<div align="center">UNIT-V</div>

9.	a)	An amplifier has a bandwidth of 500KHz, and an input resistance of 150. When a 0.5×10^{-6}v input signal level is applied to the amplifier input under matched condition, the output SNR=0dB. Determine the noise figure of the amplifier.	6 Marks	L2	CO4	PO4
	b)	Discuss the following external noises with examples. i) Atmospheric noise. ii) Extra-terrestrial noise. iii) Manmade noise.	6 Marks	L1	CO4	PO2

<div align="center">(OR)</div>

10.	a)	An antenna having a noise temperature of 40K is connected to an amplifier having a gain of 250dB and an equivalent noise bandwidth of 3.5MHz. The equivalent noise temperature of the amplifier is 270K. Find the available noise power.	6 Marks	L2	CO4	PO4
	b)	Write a short note on Linear Transformations of Gaussian Random Variables.	6 Marks	L1	CO4	PO2

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