#### PSG COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

## MSc(SS) DEGREE EXAMINATION MAY 2025

(Second Semester)

## Branch - SOFTWARE SYSTEMS (Five Year Integrated)

#### PROBABILITY AND STATISTICS

Time: Three Hours

Maximum: 75 Marks

### SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

 $(10 \times 1 = 10)$ 

		ALL questions carry EQUAL marks (10	77	<del></del>
Module	Question	Question	K Level	СО
No. 1	No1	What is the probability of the sample space S?  a) 0  b) 1  c) It depends on the event  d) Cannot be determined	<b>K</b> 1	CO1
	2	When the event are claimed to be mutually exclusive events? a) $P(A \cap B) = P(A) + P(B)$ b) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$ c) $P(A \cup B) = P(A) + P(B) - P(A \cup B) = 1$	K2	CO1
	3	When the mean of a Poisson distribution is $\lambda$ , what is the variance?	K1	CO2
2	4	Outline the key properties of the normal distribution.  a) It is skewed, with two modes b) It is symmetric around the mean, with a bell-shaped curve c) It is uniform with equal probabilities for all values b) It applies only to discrete random variables	K2	CO2
3	5	Which test is appropriate for comparing the means of two populations assuming equal variances?  a) Z-test b) t-test with pooled variance c) t-test without assuming equal variances	K1	CO3
	6	Outline the factors that influence the power of a hypothesis test.  a) Sample size and significance level b) Type I error rate and test statistic c) Population mean and standard deviation	K2	.CO3
4	7	What is the main purpose of the t-test for a single mean?  a) To test the variance of a single sample b) To compare the means of two independent samples c) To determine if the sample mean is significantly different from a known population mean d) To test the correlation between two variables.	K1	CO4
	8	Outline the procedure for conducting a one-way ANOVA.  a) Calculate the test statistic and compare with critical value b) Calculate sample means and variances c) Compare proportions between groups  Test the correlation between variables	K2	CO4
5	9	What is the purpose of spotting trends using regression analysis  a) To predict the values of independent variables b) To understand the underlying relationships and patterns in data c) To calculate the mean of the dependent variable	7 K1	CO
	10	a) Strong positive relationship.  a) No relationship.  d) Negative relationship.	K2	со

#### SECTION - B (35 Marks)

# Answer ALL questions ALL questions carry EQUAL Marks

 $(5\times7=35)$ 

Module	Question	Question	K Level	со	
No. 1	No. 11.a.	Compare the law of multiplication and conditional probability.		į	
		(OR)			
	11.b.	A bag contains 4 red balls, 3 blue balls, and 2 green balls. If one ball is drawn at random, identify the complement of the event that the ball is red. Utilize the complement rule to solve for the probability of this complementary event.	K4	CO1	
2	12.a.	Identify the differences between discrete and continuous random variables.	K3	CO2	
		(OR)			
	12.b.	Solve the expected value of X with the PDF $f(x) = 2x, 0 \le x \le 1$ .	<b></b>		
	13.a.	Compare two means: $\bar{x}_1 = 75(n = 40)$ and $\bar{x}_2 = 80(n = 35)$ . Choose the appropriate test and interpret the results.	K4	CO3	
3	(OR)				
	13.b.	Describe the process of constructing a confidence interval for a population proportion.		<del> </del>	
4	14.a.	Describe how ANOVA can be used to compare means across multiple groups.	K2	CO4	
		(OR)			
	14.b.	Explain how to perform an F-test for comparing the variances			
. 5	15.a.	Identify the roles of independent and dependent variables in a regression model.	K3	COS	
		(OR)		1003	
	15.b.	Apply the least squares method to construct a linear regression model.	1		

# SECTION -C (30 Marks) Answer ANY THREE questions

ALL questions carry EQUAL Marks

 $(3\times10=30)$ 

Module	Question	Question	K Level	CO
No	No.	Distinguish between simple and compound events with	K4	CO1
1	16	Distinguish between simple and compound examples.	N4 	
2	17	List the assumptions of binomial and Poisson distributions.	K4	CO2
3	18	Distinguish confidence intervals for a population mean with known and unknown standard deviation.	K4	CO3
4	19	Compare the chi-square tests for independence and	<b></b>	CO4
5	20	Analyze the concept of linear regression using the least squares method.	K4	CO5