PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc (SS) DEGREE EXAMINATION MAY 2024
(Second Semester)

Branch – SOFTWARE SYSTEM (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 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The range of probability lies between a) -1 and 0 b) 0 and 1 c) -1 and +1 d) 0 and ∞	K1	CO1
	2	If P(A) = 0.5 , P(B) = 0.4 , and A , B are independent, then the value of P(AUB) = a) 0.1 b) 0.2 c) 0.7 d) 0.9	K2	CO2
2	3	The life time of an electric bulb is X , then X is a ....random variable. a) discrete b) continuous c) neither discrete nor continuous d) None	K1	CO1
	4	The mean of binomial distribution when n=5 , p=0.6 and q=0.4 is a) 3 b) 2 c) 0.24 d) 1.2	K2	CO2
3	5	If you increase the confidence level 95% to 99% , the confidence interval a) decreases b) increases c) stays the same d) may increase or decrease	K1	CO1
	6	The hypothesis $\mu \leq 10$ is a a) simple hypothesis b) composite hypothesis c) alternate hypothesis d) difficult to tell	K2	CO1
4	7	A t- test is a significance test that assesses a) the means of two independent groups b) the standard deviation of two independent variables c) the variances of two dependent groups d) none	K1	CO1
	8	In a 2 X 2 contingency table, the degrees of freedom is a) 1 b) 2 c) 3 d) 4	K2	CO2
5	9	In the regression equation Y = 21-3X , the slope is a) 21 b) -21 c) 3 d) -3	K1	CO3
	10	In the principles of least squares, residual error will be a) maximum b) minimum c) neglible d) Picard's Method	K2	CO1

SECTION – B (35 Marks)
Answer ALL questions
ALL questions carry EQUAL Marks   (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Define with example: i) Random Experiment ii) Sample Space iii) Mutually Exclusive Events iv) Independent Events	K2	CO1
		(OR)		
	11.b.	A problem in statistics is given to five students A, B, C, D and E. Their chances of solving it are $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, and $\frac{1}{6}$. What is the probability that the problem will be solved?		

2	12.a.	Write a note on: (i) Discrete Random Variable with example ii) Continuous Random Variable with example iii) Joint probability distribution iv) Probability Mass function	K3	CO3
		(OR)		
	12.b.	Find the mean and variance of binomial distribution.		
3	13.a.	Explain briefly the criteria for good estimator.	K3	CO4
		(OR)		
	13.b.	You are working as a purchasing manager of a company. The following information has been supplied to you by two manufacturers of electric bulbs. <table><tr><td></td><td>Company A</td><td>Company B</td></tr><tr><td>Mean life(in hours)</td><td>1300</td><td>1248</td></tr><tr><td>SD (in hours)</td><td>82</td><td>93</td></tr><tr><td>Sample size</td><td>100</td><td>100</td></tr></table> Which company's bulb , are you going to purchase if you desire to take a risk of 5%?		
4	14.a.	What is χ^2-test? Under what conditions it is applicable? Mention its applications.	K4	CO4
		(OR)		
	14.b.	Describe ANOVA one-way classification.		
5	15.a.	Define regression. State its properties.	K4	CO4
		(OR)		
	15.b.	Explain the method of least squares for linear regression.		

SECTION -C (30 Marks)
Answer ANY THREE questions
ALL questions carry EQUAL Marks   (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	State and prove Baye's theorem.	K2	CO2
2	17	The joint probability distribution table of (X , Y) is given below: <table><tr><td>Y X</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>0</td><td>0</td><td>0</td><td>$\frac{1}{32}$</td><td>$\frac{2}{32}$</td><td>$\frac{2}{32}$</td><td>$\frac{3}{32}$</td></tr><tr><td>1</td><td>$\frac{1}{16}$</td><td>$\frac{1}{16}$</td><td>$\frac{1}{8}$</td><td>$\frac{1}{8}$</td><td>$\frac{1}{8}$</td><td>$\frac{1}{8}$</td></tr><tr><td>2</td><td>$\frac{1}{32}$</td><td>$\frac{1}{32}$</td><td>$\frac{1}{64}$</td><td>$\frac{1}{64}$</td><td>0</td><td>$\frac{2}{64}$</td></tr></table> Find : i) $P(X \le 1 , Y = 2)$ ii) $P(X \le 1)$ iii) $P(Y \le 3)$ and iv) $P(X < 3 , Y \le 4)$	K3	CO3
3	18	Out of 20000 customers ledger accounts, a sample of 600 accounts was taken to test the accuracy of posting and balancing where in 45 mistakes were found. Assign the limits within which the number of defective cases can be expected at 5% level.	K3	CO3
4	19	Two types of drugs were used on 5 and 7 patients for reducing their weight. Drug A was imported and drug B indigenous. The decrease in weight after using the drugs for six months was as follows: Drug A : 10 12 13 11 14 Drug B : 8 9 12 14 15 10 9 Is there a significant difference in the efficacy of the two drugs? (at 5% level).	K2	CO4
5	20	Fit a regression line y = a+bx by the method of least squares: **Income (Rs'000):** 41 65 50 57 96 110 30 79 65 **Expenditure (Rs'000):** 44 60 39 51 80 68 84 34 55 48	K4	CO5

Z-Z-Z   END