

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
MSc(SS) DEGREE EXAMINATION DECEMBER 2024
(Second Semester)

Branch- SOFTWARE SYSTEMS(Five Years 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 probability of getting two tails when two coins are tossed is a) 1/2 b) 1/3 c) 1/4 d) 1/6	K2	CO1
	2	In 30 balls, a batsman hits the boundary 6 times. What will be the probability that he did not hit the boundaries? a) 1/5 b) 2/5 c) 3/5 d) 4/5	K2	CO1
2	3	Let X be the number of books in library, then X is called ----- random variable. a) discrete b) continuous c) neither discrete nor continuous d) None	K1	CO2
	4	Mean and variance are equal in ----- distribution. a) Binomial b) Poisson c) Normal d) None	K2	CO2
3	5	The length of the interval (2 , 8) is a) 4 b) 6 c) 10 d) 16	K1	CO2
	6	In hypothesis testing ,which of the following is refers to type I error a) Accept H_0 , when H_0 is true b) Reject H_0 , when H_0 is true c) Reject H_0 , when H_0 is false d) Accept H_0 , when H_0 is false	K2	CO3
4	7	The 95% confidence limits for estimation of the population mean μ are a) $\bar{x} - 1.96SE(\bar{x})$ b) $\bar{x} - 2.58SE(\bar{x})$ c) $\bar{x} \pm 1.96SE(\bar{x})$ d) $\bar{x} \pm 2.58SE(\bar{x})$	K1	CO4
	8	In a χ^2 - goodness of fit , the validity of test holds only when the sum of a) observed frequency= expected frequency b) observed frequency< expected frequency c) observed frequency> expected frequency d) observed frequency $\neq$ expected frequency	K2	CO2
5	9	In the regression equation $Y = 12+5X$, the intercept is a) 5 b) -5 c) 12 d) -12	K1	CO5
	10	In the principles of least squares, residual error will be a) minimum b) maximum c) positive d) negative	K2	CO4

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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.	State and prove total probability theorem.	K2	CO2													
	(OR)																
	11.b.	There are 2 red , 3 green and 4 black balls of identical size in an urn. 3 balls are drawn at random , find the probability that (i) they are of different colours (ii) 2 are green and 1 is black and (iii) 2 are red and one is green															
2	12.a.	Write a note on : (i) Probability mass function (ii) Probability density function (iii) Distribution function (iv) Expectation	K2	CO2													
	(OR)																
	12.b.	Define normal distribution. State its characteristics.															
3	13.a.	Distinguish between the point estimation and interval estimation. In what way, an interval estimate is better than a point estimate?	K3	CO3													
	(OR)																
	13.b.	Intelligence test on two groups of boys and girls gave the following results: <table><tr><td></td><td>Mean</td><td>S.D</td><td>N</td></tr><tr><td>Girls</td><td>75</td><td>15</td><td>150</td></tr><tr><td>Boys</td><td>70</td><td>20</td><td>250</td></tr></table> Is there a significance difference (1% l.o.s) in the mean score obtained by boys and girls?				Mean	S.D	N	Girls	75	15	150	Boys	70	20	250	
	Mean	S.D	N														
Girls	75	15	150														
Boys	70	20	250														
4	14.a.	How can t-test be applied for the significance of the difference between two sample means?	K3	CO4													
	(OR)																
	14.b.	A sample of 200 people with a particular disease was selected. Out of these , 100 were given a drug and the others were not given any drug. The results are as follows: <table><tr><td></td><td>Drug</td><td>No Drug</td><td>Total</td></tr><tr><td>Cured</td><td>65</td><td>55</td><td>120</td></tr><tr><td>Not cured</td><td>35</td><td>45</td><td>80</td></tr><tr><td>Total</td><td>100</td><td>100</td><td>200</td></tr></table> Test whether the drug is effective or not (5% level of significance)				Drug	No Drug	Total	Cured	65	55	120	Not cured	35	45	80	Total
	Drug	No Drug	Total														
Cured	65	55	120														
Not cured	35	45	80														
Total	100	100	200														
5	15.a.	Define regression. State its properties.	K3	CO5													
	(OR)																
	15.b.	For the following data, find out the two regression equations. Also estimate the production when the capacity utilization is 70%. <table><tr><td></td><td>Average</td><td>S.D</td></tr><tr><td>Production(in lakh units)</td><td>35.6</td><td>10.5</td></tr><tr><td>Capacity utilization (in %)</td><td>84.8</td><td>8.5</td></tr></table> Correlation coefficient is $r = 0.62$				Average	S.D	Production(in lakh units)	35.6	10.5	Capacity utilization (in %)	84.8	8.5				
	Average	S.D															
Production(in lakh units)	35.6	10.5															
Capacity utilization (in %)	84.8	8.5															

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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	In a post office , three clerks are assigned to process incoming mail. The first clerk, B1, processes 40 % , the second clerk, B2, processes 35% and the third clerk, B3, processes 25% of the mail. The first clerk has an error rate of 0.04 , the second has an error rate of 0.06 and the third has an rate of 0.03. A mail selected at random from a day's output is found to have an error. The post master wishes to know the probability that the mail was processed by the first, second or third clerk respectively.	K2	CO1																				
2	17	The incidence of a certain disease is such that on the average 20% of workers suffer from it. If 10 workers are selected at random , find the probability that i) exactly 2 workers suffer from the disease ii) not more than 2 workers suffer from the disease.	K2	CO1																				
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 random samples drawn from normal populations are: <table border="1"><tr><td>60</td><td>65</td><td>71</td><td>74</td><td>76</td><td>82</td><td>85</td><td>87</td><td></td><td></td></tr><tr><td>61</td><td>66</td><td>67</td><td>85</td><td>78</td><td>63</td><td>85</td><td>86</td><td>88</td><td>91</td></tr></table> Test whether the two samples have the same variance at 5% level	60	65	71	74	76	82	85	87			61	66	67	85	78	63	85	86	88	91	K2	CO4
60	65	71	74	76	82	85	87																	
61	66	67	85	78	63	85	86	88	91															
5	20	Find the linear regression by the method of least squares. <table border="1"><tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>y</td><td>2</td><td>5</td><td>3</td><td>8</td><td>7</td></tr></table>	x	1	2	3	4	5	y	2	5	3	8	7	K4	CO5								
x	1	2	3	4	5																			
y	2	5	3	8	7																			

Z-Z-Z END