AIML

PRN:		Course Code :	AMT1501

Third Year **B. Tech** End Semester Examination Winter 2023

Advanced Statistics

Day and Date: Wednesday, 29/11/2023 Max Marks: **100**

Time : 10.30 am to 1.30 PM Duration: **03** hrs

Instructions: 1) All questions are compulsory.
2) Use of non-programmable calculator is allowed
3) Use of statistical tables is allowed & it is made available in exam room.

		Marks	Bloom's Level	CO
Q.1	**Attempt the following**			
a)	Calculate arithmetic mean, geometric mean, harmonic mean, standard deviation, mode and median for the data	08	L3	CO1

x	2	3	4	5	6	7	8
f	2	4	6	2	3	2	1

b)	Calculate the coefficients skewness and kurtosis ($\gamma_1, \gamma_2, \beta_1$ & β_2) for the following data	08	L3	CO1

x:	2	3	4	5	6
f:	1	3	7	2	1

OR

b)	Calculate first central moments for the following data	08	L3	CO1

x	0–10	10–20	20–30	30–40
f	1	3	4	2

Q.2	**Attempt the following**			
a)	Explain space complexity and model complexity.	08	L2	CO2
b)	List out key functions and expressions of statistics with short explanation.	08	L2	CO2

OR

b)	Solve the following equations by matrix method $x + y + z = 3,\ x + 2y + 3z = 4,\ x + 4y + 9z = 6$.	08	L3	CO2

Q.3	**Attempt any two from the following**			
a)	Write a brief note on Freeman-Tukey transform.	08	L3	CO3
b)	Write a brief note on Square root transform and hence plot the graph of $z = 2\sqrt{x + \frac{3}{8}}$ within [0,4].	08	L3	CO3

ESE

SANGLI (UNDANWAT UNIVERSITY, KOLHAPUR) SGU Library Copy LIBRARY

c) Plot a rough graph of the following data — 08 — L3 — CO3

i) $z = \sqrt{x}; [0,10]$

ii)

x	−4	−3	−2	−1	0	1	2	3	4
y	11	9	7	5	3	1	−1	−3	−5

Q.4 **Attempt any two from the following**

a) The following figures shows the distribution of digits in numbers chosen at random from a telephone directory — 08 — L2 — CO4

digits	0	1	2	3	4	5	6	7	8	9
f	1026	1107	997	966	1075	933	1107	972	964	853

Test whether the digits may be taken to occur equally frequently in the directory.

b) A typist in a company commits the following number of mistakes per page in typing 432 pages. — 08 — L3 — CO4

Mistake / page	0	1	2	3	4	5
pages	223	142	48	15	4	0

Does this information verify that the mistakes are distributed according to the Poisson law?

c) Check whether the given data set is taken from normal distribution with mean 7.22 and standard deviation 3.86, where data is 11.7216, 10.4286, 8.0204, 7.5778, 1.4298, 4.1154 using Anderson-Darling test. — 08 — L2 — CO4

Q.5 **Attempt any Two of the following**

a) It is claimed that a random sample of 100 tyres with a mean life of 15269 kms is drawn from a population of tyres which has a mean life of 15200 kms and a standard deviation of 1248 kms. Test the validity of the claim at 5% and 1% level of significance. — 09 — L4 — CO4

b) In order to make a survey of the buying habits, two markets A and B are chosen at random from two different parts of city. 400 women shoppers are chosen at random in market A. Their average daily expenditure on food is found to be Rs. 250 with a standard deviation of Rs. 40. The figures are 220 and 55 respectively in the market B where also 400 women shoppers are chosen at random. Test at 1% and 5% level of significance whether the food average daily food expenditures of the two populations of shoppers are equal. — 09 — L3 — CO4

FSE

c) A dice was thrown 9000 times and of these 3220 yielded at 3 or 4. Can the die be regarded as unbiased? Check the claim at 1% and 5% level of significance. 09 L5 CO4

Q.6 **Attempt any Two of the following**

a) The mean weekly sales of the chocolate bar in candy stores were 146.3 bars per store. After an advertising campaign the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2. Was the advertising campaign successful?Check the claim at5% level of significance. 09 L3 CO4

b) A group of 5 patients treated with medicine A with their weights 42, 39, 48, 60, 41 kg's. Second group of 7 patients from the same hospital treated with medicine B and their weighs are 38, 42, 56, 64, 68, 69, 62 kg's. Do you agree with the claim that medicine B increases weight significantly at5% level of significance? 09 L3 CO4

c) Two independent random samples are drawn from normal populations with the same variance. The sample results are as follows: 09 L4 CO4

	Sample 1	Sample 2
Sample numbers	4	5
Sample mean	12	10
Sample S. D.	4	3

Can we claim that two samples are drawn from two populations with same mean? Check the claim at 5% level of significance.

ESE