PRN:		Course Code :	AMT1501

Third Year **B. Tech** End Semester Examination Winter 2022

Advanced Statistics

Day and Date: Tuesday, 13-12-2022 Max Marks: **100**

Time : 10:30 AM - 1:30 PM Duration: **03** hrs

Instructions: 1. All questions are compulsory.
2. Use of non-programmable calculator is allowed.
3. Use of statistical table is allowed

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

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

b)	The following is the record of bricks laid each day by two bricklayers A and B. Calculate the coefficient of variation in each case and discuss the relative consistency of the two bricklayers.										08	L3	CO1
	A	700	675	725	625	650	700	650	700	600	625		
	B	550	600	575	550	650	600	550	525	625	600		

OR

b)	From the following data find first four central moments and comment on the skewness of the given data	08	L3	CO1

x	0-10	10-20	20-30	30-40
f	1	3	4	2

Q.2	**Attempt the following**			
a)	Find Eigen values and Eigen vector of the largest Eigen value for $A=\begin{bmatrix}3 & -1 & 1\\ -1 & 3 & -1\\ 1 & -1 & 3\end{bmatrix}$	08	L3	CO2
b)	Solve the following equations by matrix method $x+y+z=3,\ x+2y+3z=4,\ x+4y+9z=6$.	08	L3	CO2

OR

b)	Write a brief note on measures of complexities.	08	L1	CO2
Q.3	**Attempt any two from the following**			
a)	Explain square root transform. Hence plot rough graph sketches of within range [0,10] of $i) z=\sqrt{x}$ *and* $ii) z=2\sqrt{x+\frac{3}{8}}$	08	L3	CO3

b) Explain log and exponential transforms — 08 L2 CO3

c) Plot a rough graph of the following data — 08 L2 CO3

i)

x	−2	−1	0	1	2
y	−1	1	3	5	7

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 L3 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) In the accounting department of a bank, 100 accounts are selected at random and examined for errors. The following result has been obtained. — 08 L3 CO4

No. of errors	0	1	2	3	4	5	6
No. of accounts	35	40	19	2	0	2	2

Does this information verify that the errors are distributed according to Poisson probability 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 L3 CO4

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

a) 50 male students who showed above average participation in college athletics was 68.2 inches with a standard deviation of 2.5 inches while 50 male students who showed no interest in such participation had a mean height of 67.5 inches with a standard deviation of 2.8 inches. Test the hypothesis that male students who participate in college athletics are taller than other male students. — 09 L4 CO4

b) i. A dice was thrown 400 times and six resulted 80 times. Do the data justify the hypothesis of an unbiased dice at 5% level of significance? — 09 L2 CO4

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ii. In a large city A, 20% of a random sample of 900 school children had defective eyesight. In other large city B, 15% of a random sample of 1600 children had the same defect. Is this difference between the two proportions significant?

c) A group of 5 patients treated with medicine A weight 42,39,48,60, and 41 kgs. Second group of 7 patients from the same hospital treated with medicine B weight 38,42,56,64,68,69, and 62 kgs. Do you agree with the claim that medicine B increases weight significantly at5 % level of significance? 09 L5 CO4

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

a) i. A random sample of size 20 from a normal population gives the sample standard deviation 6. Test the hypothesis that the population standard deviation is 9. 09 L3 CO4

ii. Weights in kgm of 10 students are given as : 38, 40, 45, 53, 47, 43, 55, 48, 52, 49. Can we say that variance of distribution of weights of all students from which above sample of 10 students drawn, is equal to 20 square kg?

b) Two horses A and B were tested according to the time (in seconds) to run a particular track with the following results: 09 L3 CO4

Method I	20	16	26	27	23	22	
Method II	27	33	42	35	32	34	38

Test whether the two horses have the same running capacity.

c) Write a brief note on tests of homogeneity. 09 L2 CO4

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