Question Bank
Probability and Statistics

Academic Year Semester: 2022 – 2023
ProgramName/Code:CS204,CS205,CS206,CS214,CS215,CS216,CS217,CS220, CS221,CS222,CS224,CS225,CG201,CG202,
Semester: 3   **Subject Code**:CST-245
Instructions:

(a) Attempt all questions.

(b) Scientific calculator is allowed.

Q. No.	Statement
1	From the given data of marks obtained by 100 students of a class, Find mean: Marks 30 40 50 60 70 80 No. of students 10 12 20 10 6 4
2	Two dice thrown simultaneously 5 times, If getting same no. on both dice is a success then find the probability of getting 3 successes.
3	Find Range and Quartile deviation for the series: 10, 9, 20, 15, 40, 3, 12
4	What do you understand by Large Sample and Small Sample?
5	Write short note on: t-test.
6	What do you understand by level of significance?
7	A coin was tossed 100 times and head turns up 54 times. Test the hypothesis that the coin is tossed. $[Z_\alpha = 1.96, \alpha = 5\%]$
8	Define Null Hypothesis ,Alternative Hypothesis.
9	A dice is thrown 150 times and the result of these throws are given below: No. appeared on die: 1 2 3 4 5 6 Frequency: 20 22 19 39 12 60 Test whether the dice is biased or not. $[\chi^2_{0.05}=11.09$ for 5 d.f]
10	A normal population has a mean of 2.8 and S.D. of 1.2. A sample of 200 members gave a mean 5.6. Is this difference significant? $[Z_\alpha = 1.96, \alpha = 5\%]$
11	The following table shows the ages of the students in a school. Age (in yrs) 0-10 10-20 20-30 30-40 40-50 50-60 No. of students 5 10 12 33 14 15 Find mode and mean of the given data.

12	Calculate the coefficient of correlation between the price of two products P1 and P2 by Spearman's rank correlation method
	Price of P1 (Rs) 15 88 95 70 55 80 81 50
	Price of P2(Rs) 130 124 150 115 110 140 142 120
13	The sum of mean and variance of a binomial distribution for n trials is 1.5. Find the distribution for n = 3,4.
14	Calculate Karl Pearson's coefficient of skewness:
	Income: 500-600 600-700 700-800 800-900 900-1000
	No. of empl. 18 16 25 15 30
15	A sample of 30 items has mean 35 units and S.D. 4 units. Test the hypothesis that it is a random sample from a normal population with mean 48 units.
	$[t_{5\%} = 2.05$ for 19 d.f.]
16	Find kurtosis for the following data
	Class interval 10-20 20-30 30-40 40-50 50-60
	Frequency 15 20 40 20 12
17	Find the binomial distribution for which mean is 5 and variance is 21\4.
18	The life time of electric bulbs for a random sample of 10 from a large consignment gave the following data:

Item	10	2	3	9	5	6	8	7	1	4
Life in '000 hrs	2.2	2.6	3.9	2.1	3.2	4.8	3.9	2.3	1.4	3.6

	Can we accept the hypothesis that the average life time of bulbs in 2000 hrs?
	$[t_{5\%} = 2.26$ for 9 d.f.]
19	Before an increase in excise duty on beverage B1, 1000 people out of a sample of 1200 were found to be consumers of B1 . After the increase in duty, 1000 people were consumers of B1 in a sample of 1400 persons. Find whether there is significant decrease in the consumption of B1 after the increase in duty.
	$[Z_\alpha = 1.645, \alpha = 0.05]$
20	A random sample of 10 boys had the following I.Q's:70, 120, 110, 101, 88, 83, 95, 98, 107, 100. Do these data support the assumption of a population mean I.Q. of 100? Find a reasonable range in which most of the mean I.Q. values of sample of 10 boys lie.
	$[t_{0.05,9} = 2.262]$
21	A group of boys and girls were given an intelligent test. The mean score and S.D. and numbers in each group are as follows:

	Mean	S.D	n
Boys	124	12	18
Gilrs	121	10	14

	Is the mean score of boys significantly differ from that of girls?
22	Calculate the coefficient of skewness based on quartiles and median from the following data:

Variable	frequency
0-10	14
10-20	18
20-30	28
30-40	40
40-50	24
50-60	17
60-70	9
70-80	6

23	The mean of sample sizes 100 and 200 are 20cm and 25 cm respectively. Can the sample be regarded as drawn from the same population of S.D. 1.5 cm ?
24	The income of a group of 10,000 persons was found to be normally distributed with mean Rs. 7500 pm and standard deviation of Rs. 500. Show that of this group about 95% had income exceeding Rs. 6680 and only 5% had income exceeding Rs. 8320. P $(0<Z<1.64)$ = 0.4495
25	Calculate the coefficient of skewness based on quartiles and median from the following data:

Variable	frequency
0-10	12
10-20	16
20-30	26
30-40	38
40-50	22
50-60	15
60-70	7
70-80	4

26	The mean of sample sizes 1000 and 2000 are 67.5cm and 68.0cm respectively. Can the sample be regarded as drawn from the same population of S.D. 2.5cm ?

27	Calculate the Karl-Pearson's coefficient of skewness from the following data :
	Marks (above) : 0 10 20 30 40 50 60 70 80
	No. of Students: 150 140 100 80 80 70 30 14 0

28	Following are the number of rooms in the houses of a particular locality. Find median of the data:
	No. of rooms: 3 4 5 6 7 8
	No of houses: 38 654 311 42 12 2

29	The following table gives the distribution of 100 accidents during seven days of the week in a given month. During a particular month there were 5 Fridays and Saturdays and only four each of other days. Calculate the average number of accidents per day.
	Days : Sun. Mon. Tue. Wed. Thur. Fri. Sat. Total
	Number of accidents : 20 22 10 9 11 8 20 = 100

30	Median and mode of the wage distribution are known to be Rs. 33.5 and 34 respectively. Find the missing values.

Wages (Rs.)	No. of Workers
0 – 10	4
10 – 20	16
20 – 30	?
30 – 40	?
40 – 50	?
50 – 60	6
60 – 70	4

31	Following are the number of rooms in the houses of a particular locality. Find median of the data:
	No. of rooms: 3 4 5 6 7 8
	No of houses: 38 654 311 42 12 2

32	Calculate Q1, Q3, D2, and P5, from following data:
	Marks : Below 10 10 – 20 20 – 40 40 – 60 60 – 80 above 80
	No. of Students: 8 10 22 25 10 5

33	For a distribution of 250 heights , calculations showed that the mean , standard deviation , β_1 and β_2 were 54 inches , 3 inches , 0 and 3 inches respectively. It was however , discovered on checking that the two items 64 and 50 in the original data were wrongly written in place of the correct values 62 and 52 inches respectively.Calculate the correct frequency constants.

34	State the merits, de-merits and characteristics of median ,mode, quartiles, standard deviation , mean deviation and quartile deviation

35 From the following distribution, find the median, mode, quartiles.

Marks	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
No. of students	4	6	10	10	55	22	18	5

37 Calculate Q1 and P5, from following data:

Marks :   Below 10   10 – 20   20 – 40   40 – 60   60 – 80   above 80
No. of Students: 8   10   22   25   10   5

38 Calculate Bowley's coefficient of skewness for the data given below:

Weight (in lbs.)	Number of students
Below 100	11
100-109	10
110-119	15
120-129	12
130-139	150
140-149	121
150-159	66
160-169	34
170-179	25
180-189	4
190-199	3
200 and above	10

39 In an experiment of pea breeding, the following frequencies of seeds were obtained:

Round and Yellow	Wrinkled and Yellow	Round and Green	Wrinkled and Green	Total
315	101	108	32	556

Theory predicts that the frequencies should be in 9:3:3:1. Examine the correspondence between theory and experiment. $[\chi^2_{0.05} = 7.815]$

40 Explain One Tailed and Two Tailed test.

41	What do you understand by χ^2-test.
42	Write a short note on f-test .
43	Explain random variable with example.
44	Define probability mass function.
45	Find the value of 'k' for a continuous random variable X whose probability density function is given by $f(x) = kx^2e^{-x}$; $-\infty < x < \infty$.
46	The mean weight of 500 male students in a certain college is 151 lbs and standard deviation is 15 lbs. Assuming the weights are normally distributed find how many students weigh: (a) Between 120 and 155 lbs. (b) More than 185 lbs.
47	Find the binomial distribution for which mean is 7 and variance is 28/5.
48	In an intelligence test administered to 1000 students the average score was 42 and standard deviation 24. Find the number of students exceeding a score of 50
49	The sum of mean and variance of a binomial distribution for 5 trials is 1.8. Find the distribution.
50	A dice is thrown 6 times, if getting an odd number is a success then find the probability of getting 4 success.
51	In an intelligence test administered to 1000 students the average score was 42 and standard deviation 24. Find the number of students lying between 30 and 54
52	The mean weight of 1000 male students in a certain college is 140 lbs and standard deviation is 21 lbs. Assuming the weights are normally distributed find how many students weigh: (a) Between 125and 150 lbs. (b) More than 167 lbs.

53	X is normally distributed and the mean on X is 12 and S.D is 4. Find out the Probability of the following: (i) $P\ (X \geq 20)$ (ii) $P(X \leq 20)$ (iii) $P\ (0 \leq X \leq 12)$. Given that: P(0<Z<2)= 0.4772, P(0<Z<3)= 0.4986
54	Find Bowley's coefficient of skewness for the following frequency distribution: | No. of children per family:	0	1	2	3	4	5	6
---	---	---	---	---	---	---	---
No. of families:	7	10	16	25	18	11	8	
55	Calculate Bowley's coefficient of skewness for the data given below: 	Weight (in lbs.)	Number of students
Below 100	1
100-109	14
110-119	66
120-129	122
130-139	145
140-149	121
150-159	65
160-169	34
170-179	12
180-189	5
190-199	2
200 and above	2	
56	Find kurtosis for the following data 	Class interval	0-10	10-20	20-30	30-40	40-50
---	---	---	---	---	---
Frequency	10	20	40	20	10	
57	Find quartile deviation for the series: 5, 9, 20, 35, 40, 3, 10
58	Define Type-I and Type-II errors.
59	Calculate Karl Pearson's coefficient of skewness from the data given below: 	Income:	400-500	500-600	600-700	700-800	800-900
---	---	---	---	---	---
No. of empl.	8	16	20	17	3	
60	In a random sample of size 500, the mean is found to be 20. In another independent sample of size 400, the mean is 15. Could the samples have been drawn from the same population with S.D. 4? $[Z_\alpha = 2.58, \alpha = 1\%]$