8
24/9/24
BRM
all

TIME:3 Hrs MARKS:75

N.B:-Scientific calculator is allowed.

Q.No **Choose the appropriate option** **20 Marks**

1. _____ is a branch of statistics that deals with methods of collection, organization and presentation of data.
   a. Inferential Statistics
   b: Descriptive statistics
   c. Biological Statistics
   d. Comparative statistics

2. _____ is the Mean of weights of the given five tablets
   Weight of Tablets (mg): 168, 173, 153, 164, 158
   a) 163
   b) 173.2
   c) 168.2
   d) 163.2

3. _____ is the most commonly used measure of dispersion
   a) Standard Deviation
   b) Range
   c) Mean
   d) Coefficient of Range

4. Which of following coefficient of correlation would indicate the strongest relationship between anxiety and ability to concentrate?
   a) 0.30
   b) -0.30
   c) -0.60
   d) -1.30

5. Correlation analysis between two variables, x and y, only is called_____
   a) Partial correlation
   b) Multiple Correlation
   c) Spurious Correlation
   d) Simple correlation

6. . _____ is the set of procedures used to predict the values of a dependent variable based on the values of one or more independent variables.
   a) Regression Analysis
   b) Correlation analysis
   c) ANOVA
   d) Descriptive statistics

Y1132V666634Y1132V666634Y1132V666634Y1132V666634

Scanned with OKEN Scanner

7. If 'm' is the mean of a Poisson Distribution, the standard deviation is given by _____
   a) $\sqrt{m}$
   b) m^2
   c) m
   d) $\frac{m}{2}$

8. The probability of Type 1 error is referred as _____
   a. 1-α
   b.β
   c. α
   d. 1-β

9. t-test is a significance test that compares the _____
   a. Means of two independent groups
   b. Medians of two dependent groups
   c. Modes of two independent variables
   d. Standard deviation of three independent variables

10. In a study, subjects are randomly assigned to one of three groups: control, experimental A, or experimental B. After treatment, the results for the three groups are compared. The appropriate statistical test for this comparison is _____
    a) Analysis of Variance
    b) Coefficient of Correlation
    c) Regression analysis
    d) t-test

11. _____ statistic can be used to check the significance of the Kruskal-Wallis test
    a. Chi Square
    b. t
    c. F
    d. U

12. The Kruskal Wallis is non-parametric test alternative to ----------
    a) Factorial Design
    b) One-way ANOVA
    c) Two-way ANOVA
    d) t-test

13. When a researcher starts with the dependent variable and move backwards, it is call as _____
    a) Predictive Research
    b) Retrospective Research
    c) Descriptive Research
    d) Exploratory Research

14. Total angle in a Pie chart is _____

Y1132V666634Y1132V666634Y1132V666634Y1132V666634

Scanned with OKEN Scanner

a. 360^0
b. 270^0
c. 180^0
d. 300^0

15. Which of the following is an observational design
    a) Factorial design
    b) Cross over design
    c) Randomized block design
    d) Cohort study

16. Factorial designs allow us to study both _____ effects of the independent variables on the dependent variables.
    a) Main and Interaction
    b) dependent and independent
    c) symbiotic and dichotomous
    d) rank order and correlational

17. Mean drug content of powder in a capsule product is observed to be 105 mg with standard deviation of 8 mg. What is the percentage of capsules with the content of the drug below 105 mg. Assume that the drug content of capsule is normally distributed.
    a) 20
    b) 40
    c) 50
    d) 60

18. _____ is designed essentially for the six sigma professionals to give effective solution for statistical analysis in most of the six sigma projects
    a) R-Online
    b) Excel
    c) SPSS
    d) Minitab

19. Out of the following, what sample size would be associated with Phase I of a clinical trial
    a) 300 – 3000
    b) Less than 20
    c) 20 – 80
    d) More than 3000

20. _____ design is to collect, verify, synthesize evidence to establish facts that defend or refute the hypothesis
    a) Historical Research
    b) Ex post facto research
    c) Quasi Experimental
    d) Prospective Research

Y1132Y666634Y1132Y666634Y1132Y666634Y1132Y666634

Scanned with OKEN Scanner

Q.II **Answer the following (Any two)** 20

IA The weight of the tablets (in mg) is given below. 5
110,108,126,132,149,136,125,112,138,155,125,138,136,130,120,148,140,125,119,11
1,154,147,165,137,145,132,159,137,142,135,125,126.
Classify the data, construct frequency distribution table with class interval 10 and calculate the mean.

1B A drug was estimated by 4 analyst and the observed drug contents are given below. Test whether there is a significant difference between the percent drug contents observed by the four analysts. 5

Percent (%) Drug Content			
Analyst I	Analyst II	Analyst III	Analyst IV
98	97	98	99
99	96	97	96
100	98	99	97

2A The disintegration time observed from six formulations each containing different disintegrants is given below. This difference in disintegration time is due to disintegrants is significant or not, verify using Friedman Test. Given the table value 5.99. 5

Disintegration Time (minutes)		
Disintegrant A	**Disintegrant B**	**Disintegrant C**
8	12	15
7	11	16
6	10	17
7	11	15
5	10	18
6	9	17

2B What is plagiarism? Explain ways of controlling plagiarism. 2.5

2 C Enlist different software used in statistical analysis. Give salient features of any one 2.5

3A Calculate the coefficient of correlation for compression force and dissolution rate of tablets from the following data and generate a linear regression equation and determine the dissolution rate when the compression force is 9. 5

Compression force	Dissolution Rate
4	0.502
6	0.368
8	0.274
10	0.169
12	0.126

Y1132V666634Y1132V666634Y1132V666634Y1132V666634

Scanned with OKEN Scanner

3B The average number of major lethal diseases in a city is 2 per year. What is the probability that at least 3 diseases will hit the city next year? 2.5

3 C A pharmaceutical lab states that a drug causes side effects in 30 of every 100 patients. To confirm this affirmation, another laboratory chooses 5 people at random who have consumed the drug. What is the probability of the following events? (a) None of the five patients experience side effects. (b) At least two have side effects. 2.5

Q.III **Attempt the following (any seven)** 35

1 A Calculate the standard deviation of the dispersed particle of a suspension for the following data: 2.5

Dispersed particle (mm)	Frequency
2-5	9
6-9	33
10-13	25
14-17	19
18-21	7
22-25	7

1 B The ammonia concentration in breath samples follow a normal distribution with a mean value of 491 ppb with a standard deviation of 119 ppb. What is the probability that on a random day, the subject's ammonia concentration is between 292 and 649 ppb? 2.5

2 A Enlist steps involved in Hypothesis testing 2.5

2 B Explain what is Central Composite Design. 2.5

3 What are 2 level factorial designs? Explain in detail with help of the design matrix and enlist any two advantages of factorial design 5

4 Two different formulations of a tablet of a new drug are to be compared with regard to the rate of dissolution. Ten tablets of each formulation are tested, and the percent dissolution after 15 minutes in the dissolution apparatus is observed. The results are tabulated in Table. The object of this experiment is to determine if the dissolution rates of the two formulations differ. Assume normal distribution. 5

Percent Dissolution after 15 minutes for two tablet formulation	
Formulation A	Formulation B
68	74
84	71
81	79
85	63
75	80
69	61
80	69
76	72
79	80
74	65

Y1132V666634Y1132V666634Y1132V666634Y1132V666634

Scanned with OKEN Scanner

5A With the help of neat diagrams explain Pie chart and histogram. 2.5

5B What are cohort studies? Give their types with examples. 2.5

6 Tablets of Drug X were prepared by three different techniques such as Direct compression wet granulation and dry granulation. The disintegration time observed from the tablets prepared by these three methods is given below. 5

Direct Compression: 8,7,6,7,9,10
Wet Granulation: 11,12,13,12,13,10
Dry Granulation :15, 14,16,15,17,18
Based on the above data, determine the significance of difference between the three different techniques using Kruskal-Wallis test.
Given the table value of chi-square is 5.991.

7 Write a note on confounding and blocking in two level factorial designs. 5

8 Discuss the contents of a scientific report. 5

9 Explain Response Surface Methodology in detail 5

t Distribution: Critical Values of *t*

		Significance level					
Degrees of freedom	*Two-tailed test:* / *One-tailed test:*	10% / 5%	5% / 2.5%	2% / 1%	1% / 0.5%	0.2% / 0.1%	0.1% / 0.05%
1		6.314	12.706	31.821	63.657	318.309	636.619
2		2.920	4.303	6.965	9.925	22.327	31.599
3		2.353	3.182	4.541	5.841	10.215	12.924
4		2.132	2.776	3.747	4.604	7.173	8.610
5		2.015	2.571	3.365	4.032	5.893	6.869
6		1.943	2.447	3.143	3.707	5.208	5.959
7		1.894	2.365	2.998	3.499	4.785	5.408
8		1.860	2.306	2.896	3.355	4.501	5.041
9		1.833	2.262	2.821	3.250	4.297	4.781
10		1.812	2.228	2.764	3.169	4.144	4.587
11		1.796	2.201	2.718	3.106	4.025	4.437
12		1.782	2.179	2.681	3.055	3.930	4.318
13		1.771	2.160	2.650	3.012	3.852	4.221
14		1.761	2.145	2.624	2.977	3.787	4.140
15		1.753	2.131	2.602	2.947	3.733	4.073
16		1.746	2.120	2.583	2.921	3.686	4.015
17		1.740	2.110	2.567	2.898	3.646	3.965
18		1.734	2.101	2.552	2.878	3.610	3.922
19		1.729	2.093	2.539	2.861	3.579	3.883
20		1.725	2.086	2.528	2.845	3.552	3.850
21		1.721	2.080	2.518	2.831	3.527	3.819
22		1.717	2.074	2.508	2.819	3.505	3.792

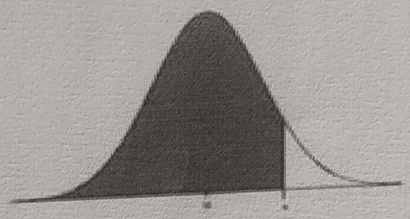
Y1132V666634Y1132V666634Y1132V666634Y1132V666634

Scanned with OKEN Scanner

F Distribution: Critical Values of *F* (5% significance level)

ν_2 \ ν_1	1	2	3	4	5	6	7	8	9	10	12	14	16
1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88	243.91	245.36	246.46
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.42	19.43
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.71	8.69
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.87	5.84
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.64	4.60
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.96	3.92
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.53	3.49
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.24	3.20
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.03	2.99
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.86	2.83
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.74	2.70
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.64	2.60
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.55	2.51
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.48	2.44
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.42	2.38
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.37	2.33
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.33	2.29
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.29	2.25
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.26	2.21
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.22	2.18

Table of Standard Normal Probabilities for Positive Z-scores



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990

Y1132V666634Y1132V666634Y1132V666634Y1132V666634

Scanned with OKEN Scanner