Q.P. Code :05598

[Time: $2\frac{1}{2}$ Hours]   [Marks:75]

Please check whether you have got the right question paper.

N.B: 1.   All questions are compulsory.
        2.   Figures to the right indicate marks.
        3.   Illustrations in-depth answers and diagrams will be appreciated.
        4.   Mixing of sub-questions is not allowed.
        5.   Log book to be provided by college.
        6.   Use of calculator is allowed

Q.1   Attempt all (each of 5 marks)   15
    A   Choose the best choice for the following questions: 05
    i)   If in a binomial distribution n = 1 them E(X) is
        1) q
        2) P
        3) O
        4) 1

    ii)   If you roll a pair of dice what is the probability that one of the dice is a 4?
        1) 4/36
        2) 13/36
        3) 21/36
        4) 15/36
    iii)   The acceptance of H1 when H0 is true is called a
        1) Type I error
        2) Type II error
        3) No error
        4) None
    iv)   The wilcoxon rank sum test is used for
        1) Independent samples
        2) Dependent sample
        3) Both
        4) None
    v)   A random variable X has E (X) = 2 and E (X^2)= 8 its variance is
        1) 4
        2) 6
        3) 8
        4) 2

    B   Fill in the blanks for the following questions   05
    i)   Binomial distribution has _____ parameters.
    ii)   If X ~ N (100,64), then standard deviation is:_____
    iii)   Sum of squares is abbreviated by SS then SS(B) is _____
    iv)   In the sign test if the data value is below the conjectured median, it is assigned a _____ sign
    v)   Three groups of data is given, so df=_____

1

[P.T.O]

C Answer the following questions 05
i) What is two tailed test?
Ii What does confidence interval mean?
Iii What are the types of ANOVA?
Iv What are parameters of the normal distribution?
V What are the signs used in sign test?

Q.2 Attempt the following (any three) 15
A Explain the following term:
i) Discrete random variable
ii) Standard deviation
iii) Expectation
iv) Variance

B Let X be a discrete random variable with the following probability distribution.

X	-3	6	9
P(X=x)	1/6	1/2	1/3

Find the mean and variance

C 20 wrist watches in a box of 100 are defective. If 10 watches are selected at random , find the probability that
i) 10 are defective
ii) 10 are good
iii) At least one watch is defective
iv) At most 3 are defective.

D Students of a class were given an aptitude test. Their marks were found to be normally distributed with mean 60 & standard deviation 5. What percentage of students scored?
i) More than 60 marks
ii) Less than 56 marks
iii) Between 45 & 65 marks.

E 256 visual artists were surveyed to find out their zodiac sign. The results were Aries (29),Taurus(24), Gemini (22), Cancer(19), Leo(21), Virgo(18), Libra(19), Scorpio(20), Sagittarius(23), Capricorn(18), Aquarius (20),Pisces(23). Test the hypothesis that zodiac signs are evenly distributed across visual artists. So calculate the value of chi-square test statistics for the following data.

F The acme chain company claims that their chains have an average breaking strength of 20000 pounds, with a standards deviation of 1750 pounds. Suppose a customer tests 14 randomly- selected chains. What is the probability that the average braking strength in the test will be no more than 19800 pounds?

Q.3 Attempt the following(any three) 15
A Differentiate between one –tailed test and two-tailed test.
B A random sample of the students in each row was taken.

Front	82,83,97,93,55,67,53
middle	83,78,68,61,77,54,69,51,63
Back	38,59,55,66,45,52,52,61,

The score for those students on the seconds exam was recorded.

Row	Front	Middle	Back
Sample size	7	9	8
Mean	75.71	67.11	53.50
St. Dev	17.63	10.95	8.96
Variance	310.90	119.86	80.29

Prepare the proper one-way ANOVA table for the same.

C State the Limitation of hypothesis testing

D A company is testing a new drug to see if it reduce the time to recover from fever. They decided to test it on three different race & both gender. The data is provided below

	Male	Female
Caucasian	54,49,59,39,55	25,29,47,26,28
African American	53,72,43,56,52	46,51,33,47,41
Hispanic	33,30,26,25,26	18,21,34,40,24

Find the mean, standard deviation for each race & gender. Also complete the two way ANOVA table.

Source	SS	df	MS	F
Row (race)	2328.2			
Column (gender)	907.5			
Interaction (race×gender)	452.6			
Error	1589.2			
total	5277.5			

E A batch of 100 resistors have an average resistance of 102 Ohms. Assuming a population standard deviation of 8 Ohms, test whether the population mean is 100 Ohms at a significance level $\alpha=0.05$

F Explain One-way & Two-way ANOVA?

Q. 4 Attempt the following **(Any THREE)** 15

A State the Disadvantages of Nonparametric Methods

B Explain the Duncan's Chi-square test.

C Explain post hoc analysis.

[P.T.O]

8913A891E5164E8F2A52972FFD971D5F

D A data shows hours of relief provided by two drug in 12 patients suffering from a sickness. Is there any evidence that one drug provides longer relief than the other?

Case	Drug A	Drug B
1	2.0	3.5
2	3.6	5.7
3	2.6	2.9
4	2.6	2.4
5	7.3	9.9
6	3.4	3.3
7	14.9	16.7
8	6.6	6.0
9	2.3	3.8
10	2.0	4.0
11	6.8	9.1
12	8.5	20.9

Perform wilcoxon rank sum test for the same. Do proper step by step procedure.

E Explain run test with a an example

F A shoe company has three groups of workers with different salaries :

Women	23k,41k,54k,66k,78k,
Men	45k,55k,60k,70k,72k,
Minorities	18k,30k,34k,40k,44k,

Formulate it using kruskal-wallis test.

Q.5 Attempt the following(any three)   15

A What is hypothesis testing? Explain the type of errors.

B Two random samples drawn from two normal populations are:

Sample I	20 16 26 27 22 23 18 24 19 25
Sample II	27 33 42 35 32 34 38 28 41 43 30 37

Obtain the estimates of the variance of the population and test at 5% level of significance whether the two populations have the same variance. Formulate using F-distribution.

C What is the procedure of Ranking the data in the non-parametric test?

D Calculate the chi-square test statistics for the following data.

Color	Red	green	yellow
Observed frequency	12	16	20
Expected frequency	16	8	25

E A soap manufacturing company was distributing a particular brand of soap through a large number of retail shops. Before a heavy advertisement campaign, the mean sales per week per shop was 140 dozens. After the campaign, a sample of 26 shops was taken and the mean sales was found to be 147 dozens with standard deviation 16. Can you consider the advertisement effective? Use T-test.