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Name...

Reg. No......................................

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2019

(CUCBCSS—UG)

Statistics

STS 5B 09—PRACTICAL—Paper I

Time : Three Hours

Maximum : 80 Marks

Use of Calculator and Statistical table is permitted.

Answer any **four** *questions.*

Each question carries 20 marks.

1. (A) A survey of 210 literates and 250 illiterates was conducted. The result of the survey is as follows :

	Smokers	Non-smokers
Literates	13	197
Illiterates	47	203

Test whether attributes smoking and literacy are independent.

(B) Two independent samples of 8 and 7 items respectively had the following values of the variables :—

Sample I	:	9	11	13	11	15	9	12	14
Sample II	:	10	12	10	14	9	8	10	

Do the estimates of population variance differ significantly ?

(10 + 10 = 20 marks)

2. (A) Chest circumference in cm of 6 normal children and 6 malnourished children aged one year are given below :

Normal group	:	42	46	50	38	50	52
Malnourished group	:	38	47	36	35	39	30

Test the significance of difference in chest circumference between these two groups.

(B) The systolic BP of six hypertensive patients were 179, 190, 183, 165, 180 and 175 mm of Hg. After administration of a particular drug for one week the pressures were 175, 180, 187, 150, 170 and 180 mm of Hg respectively. Test whether the drug significantly reduced the BP or not.

(12 + 8 = 20 marks)

Turn over

Ho; the drug significantly not reduced the BP .

mean 178.67   173.67

df =5

calculated t=1.5

tabled t at 5% level for one tail with 5 df= 2.015

3. (A) The mean heights in two large samples of 1000 and 2000 men are 67.5 inches and 68 inches respectively. Can the two samples be regarded as drawn from the population of standard deviation 2.5 inches ?

   (B) During testing in a sample of 300 chips 10 have been found to be defective. Can the manufacturer's claim that 2% of the chips are defective may be accepted ?

   (C) The daily collection of milk at a Milma plant has averaged 850 kilolitres for the last several years. An observer wants to know whether the average has changed in recent months. He randomly selects 40 days from the database and finds the average collection as 840 kilolitres with a standard deviation 18 kilolitres. Test appropriate hypothesis at $\alpha = 0.05$.

   (6 + 7 + 7 = 20 marks)

4. (A) The mean of a sample of size 25 from a normal population $N(\mu, 16)$ was found to be 72.3. Find 95% confidence interval for μ.

   (B) A random sample of size 8 from a normal population is found to have variance 8.7. Obtain 99% confidence interval for the population variance.

   (C) The average zinc concentration recovered from a sample of zinc measurements in 40 different locations is found to be 2.54 gm per millilitre, find the 95% confidence intervals for the mean zinc concentration in the river assuming the population S.D. to be 0.32 gm.

   (6 + 7 + 7 = 20 marks)

5. A population consists of 5 units with the values 13, 11, 14, 12 and 15 :

   (i)   Write down all possible samples of size 2 by SRSWR from the population.

   (ii) Verify that sample mean is an unbiased estimator of population mean.

   (iii) Calculate the variance of the sample mean.

   (iv) Compare the efficiency of sample mean under SRSWOR and SRSWR for estimating population mean.

   (5 + 5 + 7 + 3 = 20 marks)

6. (A) Is a correlation coefficient of 0.7 significant if obtained from a random sample of 10 pairs of Values from a normal population ?

   (B) Long-term database indicates that 5% of the components produced at a certain manufacturing facility are defective. A training programme for the workforce employed has been conducted with the aim to reduce the percentage of defective produced. After this if a random sample of 500 items consists of 16 defectives, can we conclude that training was effective ?

(C) One hundred ninety-two families (for each of which the possibility of an albino child being born is otherwise established) had the following :

No. of children	:	0	1	2	3
No. of Families	:	77	90	20	5

Fit the expected frequencies on the basis of a theoretical probability 0.25 of a child being born an albino and test the goodness of fit.

(4 + 6 + 10 = 20 marks)

(B) . Test

Ho; the drug significantly not reduced the BP .

mean 178.67   173.67

df =5

calculated t=1.5

tabled t at 5% level for one tail with 5 df= 2.015

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set -3.

Time; 3 Hours   Maximum : 80 Marks
            Use of Calculator and Statistical table is permitted.

Answer any FOUR questions.
    Each question carries 20 marks.

1. (A)   Test Ho: attributes smoking and literacy are independent.
        calculated chi-square=15.22
    tabled value at 5% level at 1 df=3.84
    we reject Ho, conclusion no relation.

    (B)   to test Ho: population variance same
    mean 11.75   10.43
    $n1s1^2/n1-1 = 4.78$ $n2s2^2/n2-1 = 3.95$
    f=1.21
    tabled f at 5% level [7,6] df=4.28
    accept H0. conclusion variance same

                        (10+10=20 marks)

2. Test Ho:difference in chest circumference between these two groups are
    same.
    mean   46.3,37.5
    variance 29.46, 31.5
    pooled variance 30.48 df=10   calculated t=2.77
    tabled t at 5% level with 10 df=1.81
    we reject ho. conclusion significant different.

    (B) . Test
  · Ho; the drug significantly not reduced the BP .
    mean 178.67   173.67
    df =5
    calculated t=1.5
    tabled t at 5% level for one tail with 5 df= 2.015

3. (A)   to test Ho: the two samples be regarded as drawn from the population with same mean and of standard deviation 2.5 inches.
Ho; m1=m2
z=67.5-68 / 25 sqrt[1/2000+1/1000] = -5.165
z follows N(0,1). tabled value at 5% level =1.96
we reject Ho. conclusion two samples from different population.

(B) Ho : such that 2% of the chips are defective .
Ho;p=0.02
z=1.65
z follows N(0,1). tabled value at 5% level =1.96
we accept Ho. conclusion 2% the chips of are defective.

(C) To test Ho: The daily collection of milk at a Milma plant has averaged 850 kilolitres. Ho: m=850
z=3.51
z follows N(0,1). tabled value at 5% level =1.96
we reject Ho. conclusion The daily collection of milk at a Milma plant has not averaged 850 kilolitres

(6+7+7=20 marks)

4. (A)
The CI is [mean(x) $-z\ \alpha/2\ \sigma/\sqrt{n}$, mean(x) $+z\ \alpha/2\ \sigma/\sqrt{n}$]
    [72.3 - 1.96 x 4/√25 , 72.3 - 1.96 x 4/√25]

(B) A CI is [$ns^2/\chi^2_{.005}$, $ns^2/\chi^2_{.995}$]
        [8*8.7/20.278,8*8.7/0.989]

(C) 95% CI is [2.54-1.96*0.32/sqrt[40] , 2.54-1.96*0.32/sqrt[40]]
        [2.44, 2.63].

(6+7+7=20 marks)

5. A population consists of 5 units with the values 13,11,14,12 and 15.
  (i)   15 set samples of size 2 each 1 mark
  (ii)   Mean of sample mean =202.5/15=13.5
  (iii) Population mean=13.5
        Population variance=$(13-13.5)^2+.....+(15-13.5)^2$ /6 = 2.92
        Variance of sample mean=1.168
  (iv)   efficiency of sample mean under SRSWOR and SRSWR for estimating population mean.[3 marks]
        (5+5+7+3 =20 marks)
6. (A) Test Ho:correlation coefficient of 0.7
t=r . sqrt(n-2 / 1- r^2)=2.77
tabled value of t distribution at 5% level with 8 df=2.31
so we reject Ho. Conclusion correlation coefficient