

Reg. No. : .....

Name : .....

**IV Semester B.Sc. Hon's (Mathematics) Degree CBCSS – Regular/  
Supplementary/Improvement Examination, April 2022  
(2016 Admission Onwards)  
BHM 404 : ADVANCED STATISTICAL TECHNIQUES**

Time : 3 Hours

Max. Marks : 60

**SECTION – A**

Answer **any 4** questions out of 5 questions. Each question carries 1 mark.

1. Write the relation between mean and variance of a  $\chi^2$  distribution.
2. Write three small sample tests.
3. Write the relation between correlation coefficient and regression coefficient.
4. Write the expression for rank correlation coefficient.
5. How to fit a straight line  $y = ax + b$  ? (4×1=4)

**SECTION – B**

Answer **any 6** questions out of 9 questions. Each question carries 2 marks.

6. Write any 4 conditions for using a  $\chi^2$  test.
7. Explain how to calculate expected frequency in a 2×2 contingency table.
8. What is t distribution ? When do we use that ?
9. What is the interval estimate of population mean ?
10. Write short note on paired t test.
11. Write a short note on curve fitting.
12. How to fit an exponential function ?
13. Explain different types of correlation.
14. Define regression equation and curve of regression. (6×2=12)

P.T.O.

**SECTION – C**

Answer **any 8** questions out of 12 questions. Each question carries 4 marks.

15. Among 64 off springs of a certain cross between guinea pigs 32 were red, 10 were black and 22 were white. According to the genetic model, these numbers should be in the ratio 9:3:4. Are the data consistent at 5% level ?
16. Prove that for a  $\chi^2$  distribution with n degrees of freedom  $\mu_{r+1} = 2r(\mu_r + n\mu_{r-1})$ .
17. Show that the  $\chi^2$  distribution ends to a normal distribution when n tends to infinity.
18. A sample of 26 bulbs gives a mean life of 990 hours with an SD of 20 hours. The manufacturer claims that the mean life of the bulbs is 1000 hours. Is the sample not up to standard ?
19. Explain students t test for difference of means.
20. Explain F distribution, its uses and assumptions.
21. Explain the method of least squares.
22. Find a formula for a line of the form  $y = a + bx + cx^2$  which will fit the following data.

x	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
y	3.1950	3.2299	3.2532	3.2611	3.2516	3.2282	3.1807	3.1266	3.059	2.975

23. How to fit a parabola ?
24. Find the coefficient of correlation between the heights of fathers and sons from the following data.

Height of father	64	65	66	67	68	69	70
Height of son	66	67	68	69	70	71	72

25. Compute the rank correlation coefficient for the following data.

x	68	64	75	50	64	80	75	40	55	64
y	62	58	68	45	81	60	68	48	50	70

26. How to compute angle between two lines of regression ? (8×4=32)

**SECTION – D**

Answer **any two** questions out of 4 questions. It carries 6 marks.

27. Two batches each of 12 animals are taken to test the effectiveness of an inoculation. One batch was inoculated and the other batch was not inoculated. The frequencies of dead and surviving animals are given below in both cases. Can the inoculation be regarded as effective against the disease ?

	dead	survived	Total
Inoculated	2	10	12
Not inoculated	8	4	12
Total	10	14	

$\chi^2_{0.05} = 3.841$ .

28. A random blood sample for test of fasting sugar for 10 boys gave the following data in mg/dl.

70, 120, 110, 101, 88, 83, 95, 107, 100, 98

Does this support the assumption of population mean of 100 mg/dl ? Find a reasonable range in which most of the mean fasting sugar of 10 boys lie.

29. Fit a parabola  $y = ax^2 + bx + c$  to the given data.

x	10	12	15	23	20
y	14	17	23	25	21

30. Marks obtained by 11 students in statistics papers are given below.

**Paper 1 :** 60 65 68 70 75 85 80 45 55 56 58

**Paper 2 :** 62 64 65 70 74 90 82 56 50 48 60

Calculate the coefficient of correlation for the above data. Also find the equation of line of regression. (2×6=12)