

**SECOND YEAR B.Sc. DEGREE EXAMINATION, APRIL/MAY 2005**

Part III—Statistics (Subsidiary) to Geography Main

Paper II—STATISTICAL INFERENCE

Time : Three Hours

Maximum : 50 Marks

*Note more than 10 marks will be awarded in each Unit.***Unit I**

1. A binomial random variable  $X$  has mean 3 and variance 2. Find (i)  $P(X = 0)$  and (ii)  $P(X \leq 1)$ .  
(4 marks)
2. Define Poisson distribution. Show that its mean and variance are equal. (6 marks)
3. Describe various properties of normal distribution. (4 marks)
4. Briefly describe how you fit binomial distribution to a given data set. (4 marks)
5. State conditions under which Poisson distribution can be derived as a limiting case of binomial distribution.  
(2 marks)

**Unit II**

6. Define student  $t$ -statistic. What is its distribution. (4 marks)
7. Explain *two* applications of  $F$  distribution. (3 marks)
8. Describe how you derive  $F$ -distribution from two Chi-square variates. (3 marks)
9. Briefly describe any two applications of Chi-square distribution. (4 marks)
10. State central limit theorem in its simplest form. Describe the application of this result in statistical analysis.  
(6 marks)

**Unit III**

11. Distinguish between point estimate and interval estimate. (2 marks)
12. What are the desirable properties of a good point estimator ? Explain. (4 marks)
13. Describe the maximum likelihood method of estimation. If  $T$  is a maximum likelihood estimator of  $\theta$ , which of the desirable properties of a good point estimator are satisfied by  $T$  ?  
(6 marks)
14. What is the interval estimate of the mean  $\mu$  in  $N(\mu, 1)$  ? (4 marks)
15. Obtain the maximum likelihood estimator of the parameter in the Poisson distribution.  
(4 marks)

## Unit IV

16. Define the following terms :

- (a) Type I error.  
(b) Type II error.

(3 marks)

17. Describe best critical region. Explain how you determine best critical region for testing a simple null hypothesis against a simple alternate.

(5 marks)

18. Explain the Chi-square test for independence.

(2 marks)

19. In an experiment on immunization of cattle from tuberculosis the following results were obtained :—

	<i>Affected</i>	<i>Not affected</i>	<i>Total</i>
Innoculated	12	28	40
Not inoculated	13	7	20
Total	25	35	60

Examine the effect of vaccine in controlling the disease.

(4 marks)

20. How do you test equality of two population means when the sample size is small ?

(4 marks)

21. Describe sign test.

(2 marks)

## Unit V

22. What you mean by correlation ? How do you check presence or absence of correlation for a given data using scatter diagram ?

(5 marks)

23. Describe regression lines. Why there are two regression lines ?

(4 marks)

24. What is Spearman's rank correlation ? The rankings of ten students in two subjects A and B are as follows :—

A	:	3	5	8	4	7	10	2	1	6	9
B	:	6	4	9	8	1	2	3	10	5	7

Find the Spearman's rank correlation.

(6 marks)

25. What is the standard error of regression coefficients ?

(3 marks)

26. Explain Yule's coefficient of association.

(2 marks)