14MAU12

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2018
(Fourth Semester)

Branch – **MATHEMATICS**

MATHEMATICAL STATISTICS - II

Time : Three Hours Maximum : 75 Marks

SECTION-A (20 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 2 = 20)

1 Define stratified random sampling.

2 Write the normal equation, for fitting a exponential curve.

3 Define consistency.

4 State Rao Blackwell theorem.

5 State the invariance property of MLE.

6 What are the methods of estimation?

7 Define simple and composite hypothesis.

8 Define level of significance.

9 Define contingency Table.

10 What are the applications of chi-square test?

SECTION - B (25 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a Explain the method of selecting a simple random sample.

OR

b Derive the normal equations for fitting a quadratic polynomial.

12 a Prove that in sampling from a $N(\mu, \sigma^2)$ population , the sample mean is a consistent estimator of μ.

OR

b Let $x_1, x_2, \ldots X_n$ be a random sample from $N(\mu, \sigma^2)$ population. Find sufficient estimators for μ and σ^2.

13 a Find the maximum likelihood estimate for the parameter λ of a poisson distribution on the basis of a sample size n.

OR

b Explain the method of moments of estimating the parameter.

14 a Explain in details two types of errors.

OR

b If $x \geq 0$ is the critical region for testing $H_0 : \theta = 2$ against the alternative $\theta = 1$, on the basis of the single observation from the population $f(x, \theta) = \theta \exp(-\theta x)$, $0 < x < \infty$, obtain the values of type I and type II errors.

Cont ...

15 a Find the least value of 'r' in a sample of 18 pairs of observation from a bi-variate normal population, significant at 5% level of significance.

OR

b Explain the chi-square test for goodness of fit.

SECTION - C (30 Marks)

Answer any **THREE** Questions

ALL Questions Carry **EQUAL** Marks (3 x 10 = 30)

16 The sales of a company for the last eight years are given below.

Year:	1980	1981	1982	1983	1984	1985	1986	1987
Sales ('000) :	52	45	98	92	110	185	175	220

Estimate sales for 1988 using an equation of the form $y = ab^x$.

17 State and prove crammer Rao inequality.

18 Given one observation from a population with pdf:

$f(x, \theta) = \frac{2}{\theta^2}(\theta - x);\ 0 \le x < \theta$, obtain $100(1-\alpha)\%$ confidence interval for θ.

19 In random sampling from $N(\mu, \sigma^2)$, find the MLE for (i) μ when σ^2 is known (ii) σ^2 when μ is known.

20 The heights of six randomly chosen sailors are (in inches) : 63, 65, 68, 69, 71 and 72. Those of 10 randomly chosen soldiers are 61, 62, 65, 66, 69, 69, 70, 71, 72 and 73. Discuss the light that these data throw on the suggestion that sailors are on the average taller then soldiers.

Z-Z-Z END