

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)BSc DEGREE EXAMINATION DECEMBER 2019
(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 What do you understand by random sampling?
- 2 Write down the normal equations for $Y=a+bx$.
- 3 What is meant by unbiased estimators?
- 4 Write down the characteristic of good estimators.
- 5 Mention any two names for the method of estimation.
- 6 Define the method of maximum likelihood.
- 7 What is meant by the statistical hypothesis?
- 8 Define power of a test.
- 9 Write down the assumptions of t-test.
- 10 Define Chi-square distribution.

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 sampling.
OR
b Derive the normal equations for fitting the following curves.
(i) $Y=ax^b$ and (ii) $Y=ab^x$.
- 12 a Sample variance is not an unbiased estimator of the population variance, but an asymptotically unbiased estimator of σ^2 .
OR
b The sample mean is a consistent estimator of the population mean μ .
- 13 a Let x_1, x_2, \dots, x_n denote random sample of size n from a uniform population with p.d.f.
 $f(x, \theta) = 1; \theta - \frac{1}{2} \leq x \leq \theta + \frac{1}{2}, -\infty < \theta < \infty$. Obtain the M.L.E. for θ .
OR
b Write down the properties of M.L.E.
- 14 a Explain type I error and type II error.
OR
b Write a short note on critical region.
- 15 a A correlation coefficient 0.7 is observed from a sample of 28 pairs of observation. Obtain the 95% confidence interval for ρ .
OR
b Write down the applications of chi-square test.

Cont...

SECTION - C (30 Marks)Answer any **THREE** Questions**ALL** Questions Carry **EQUAL** Marks (3 x 10 = 30)

- 16 Fit an exponential curve of the form
- $y=ab^x$
- to the following data.

x	1	2	3	4	5	6	7	8
y	1.0	1.2	1.8	2.5	3.6	4.7	6.6	9.1

- 17 State and prove Crammer Rao Inequality.

- 18 In random sampling from normal population
- $N(\mu, \sigma^2)$
- , find the maximum likelihood estimators for

(i) μ when σ^2 is known,(ii) σ^2 when μ is known, and(iii) the simultaneous estimation of μ and σ^2 .

- 19 Five coins are tossed 256 times. The number of heads observed is given below. Examine if the coins are unbiased, by employing chi 0 square goodness of fit.

No. of heads	0	1	2	3	4	5
Frequency	5	35	75	84	45	12

- 20 Two samples are drawn from two normal populations. From the following data test whether the population variances are the same at 5% level.

Sample I	60	65	71	74	76	82	85	87		
Sample II	61	66	67	85	78	63	85	86	88	91

Z-Z-Z

END