

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 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 What is mean by census method? -
- 2 What do you mean by curve fitting?
- 3 What are the properties of good estimator?
- 4 Define efficient estimator.
- 5 Write any two properties of method of moments.
- 6 Write any two assumptions of MLE.
- 7 Define Power of a Test.
- 8 Name the types of hypothesis.
- 9 Define chi-square test.
- 10 Write any two applications of F-test.

SECTION - B (25 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5x5 = 25)

- 11 a Explain Simple Random Sampling.

OR

b

X	2	3	5	8	10
Y	5	6	10	18	21

- 12 a If T is an unbiased estimator for θ , show that T^2 is biased estimator for θ^2

OR

- b Show that the sample mean \bar{x} is an unbiased estimator of θ for the distribution $f(x, \theta) = \theta(1-\theta)^{x-1}$ $x=1,2,3,\dots$

- 13 a Find the MLE of θ for the density function $f(x, \theta) = \theta(1-\theta)^{x-1}$

OR

- b Estimate the parameter μ and σ^2 in normal population by using the method of moments.

- 14 a Define the following: Statistical hypothesis. Sample space, Critical Region

OR

- b Give the function $f(x, \theta) = \frac{1}{\theta}, 0 < x < \theta$ and that you are testing $H_0: \theta = 1.5$ against $H_1: \theta = 2.5$ by means of single observed value of x . What would be size of type I. If you choose the interval $0.8 < x$ as the critical region.

- 15 a For a random sample of size 10 from a normal population the mean is 12.1 and the SD of 3.2. Is it reasonable to suppose that the population the mean is 14.5? test at 5% level.

OR

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

- 16 Fit a curve of the form
- $y=ab^x$
- for the following

Year	2006	2007	2008	2009	2010	2011	2012
Sales	32	47	65	92	132	190	275

- 17 Prove that the sample variance s^2 is not an unbiased estimator of the population variance a^2 .
- 18 In random sampling from Normal population $N(\mu, a^2)$, find the MLE of μ and a^2 is known.
- 19 Intelligence test on two groups of boys and girls gave the following results

	Mean	SD	Sample size
Girls	75	15	150
Boys	70	20	250

Is there a significant difference in the mean scores obtained by boys and girls? Test at 5% level.

- 20 1000 students at college level were graded to their IQ and their economic condition of their home. Use chi-square to find out there is any association between economic condition at home and IQ

Economic Condition	IQ		Total
	High	Low	
Rich	460	140	600
Poor	240	160	400
Total	700	300	1000

(Chi-square table value for 1 df at 5% level of significance is 3.84).

Z-Z-Z

END