PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2017
(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 simple random sampling.
2   Write the normal equation, for fitting a st. line.
3   Define Crammer Rao Inequality.
4   Define Unbiasedness.
5   Define MLE.
6   What is minimum variance bound estimator?
7   What is null hypothesis?
8   Define critical regions.
9   Write any two assumption of t-test.
10   What is contingency table?

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

11 a   Explain the method of selecting a stratified random sample.
OR
   b   Derive the normal equation for fitting of exponential curves.

12 a   Prove that for Cauchy's distribution not sample mean but sample median is consistent estimator of the population mean.
OR
   b   Let $x_1, x_2,...x_n$ be a random sample from a uniform population on $[0, \theta]$. Find a sufficient estimator for θ.

13 a   Write the properties of maximum likelihood estimators.
OR
   b   Explain the method of minimum variance of estimating parameters.

14 a   Define (i) level of significance   (ii) power of the test.
OR
   b   Let p be the probability that a coin will fall head in a single toss in order to test $H_0 : P = \frac{1}{2}$ against $H_1 : P = \frac{3}{4}$. The coin tossed 5 times and H_0 is rejected of more than 3 heads are obtained. Find the probability of the type 1 error.

15 a   What are the applications of t-distribution?
OR
   b   A co-efficient of correlation of 0.2 is derived from a random sample of 625 pairs of observation. is this value of 'r' significant?

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 Rao Blackwell theorem.

18   Let $x_1, x_2,...x_n$ be a random sample from the uniform distribution with pdf :

$$f(x,\theta) = \frac{1}{\theta}, 0 < x < \infty, \theta > 0$$

Obtain the maximum likelihood estimator for θ.

19   Obtain 100 $(1 - \alpha)$% confidence limits for the parameter λ of the poisson distribution.

20   Below are given the gain in weights (in kgs) of pigs fed on two diets A and B :

Diet A :	25	32	30	34	24	14	32	24	30	31	35	25	-	-	-
Diet B :	44	34	22	10	47	31	40	30	32	35	18	21	35	29	22

Test, if the two diets differ significantly as regards their effect on increase in weights.

Z-Z-Z   END