PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2019
(Third Semester)

Branch – **MATHEMATICS WITH COMPUTER APPLICATIONS**

MATHEMATICAL STATISTICS

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1 The numerical evaluation a of chance factor of an experiment is called
(i) Probability (ii) Trial (iii) Sample space (iv) event

2 A∪B can be denoted by A+B if A and B are _____.
(i) Events (ii) Joint (iii) Disjoint (iv) Exclusive events

3 Sampling based upon equal probability is called:
(i) Probability sampling (ii) Systematic sampling
(iii) Simple random sampling (iv) Circular sampling

4 When an investigator wants a sample containing m units which possess a rare attribute, the appropriate sampling procedure is:
(i) Probability sampling (ii) Systematic sampling
(iii) Stratified random sampling (iv) Circular sampling

5 If X1 and X2 are random variables then max[*X1, X2*] are also _____.
(i) Random variables (ii) Not a random variables
(iii) Discrete random variables (iv) Continuous random variables

6 A real valued function defined on a discrete ___ is called discrete random variable.
(i) Domain (ii) sample space (iii) Events (iv) disjoint events.

7 The mean of the binomial distribution
(i) n (ii) np (iii) q (iv) npq

8 The mean and variance of the Poisson distribution is
(i) Different (ii) Imaginary (iii) Same (iv) none of the above

9 The degrees of freedom for student's 't' distribution is
(i) n (ii) n-1 (iii) n-2 (iv) (n-1)(n-2)

10 The mean of the F-distribution is
(i) $\frac{\nu_2}{\nu_2+2}$ (ii) $\frac{\nu_2}{\nu_2-2}$ (iii) $\frac{\nu_1}{\nu_2-2}$ (iv) $\frac{\nu_2}{\nu_1-2}$

SECTION - B (35 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 7 = 35)

11 a Probability of the complementary event of $\bar{A}$ of A, then prove that $P(\bar{A})=1-P(A)$

OR

b The probability that a student passes a physics test is 2/3 and the probability that he passes both physics test and an English test is 14/15. The probability that he passes at least one test is 4/5. What is the probability that he passes the English test?

12 a Describe the Simple Random Sampling technique.

OR

12 Cont...

b Below are given the annual consumption in thousand tones in a town.

Year	1985	1986	1987	1988	1989	1990	1991
Consumption (in '000 tones)	70	75	90	91	95	98	100

Fit a straight line trend by the method of least square

13 a A continuous random variable X has a p.d.f $f(x)=3x^2, 0\le x\le 1$ find 'a' such that $p(X \le a) = p(X > a)$

OR

b A Random variable 'X' has the following Probability function.

Values of X	0	1	2	3	4
P(X)	K	3K	5K	7K	9K

(i) Determine the value of 'K' (ii) Find $P(X<3)$.

14 a Explain the characteristics of Normal distribution.

OR

b The mean of the Poisson distribution is 2.25. Find the other constants of the distribution.

15 a The mean weakly sales of soap bars in departmental store was 146.3 bars per store. After an advertising campaign the mean weakly sales in 22 stores for a typical weak increased to 153.7 and showed a standard deviation of 17.2. Was the advertising campaign successful?

OR

b Two types of drugs were used on 5 and 7 patients for reducing their weight. Drug A was imported and drug B indigenous. The decrease in the weight after using the drugs for six months was as follows:

Drug A 10 12 13 11 14

Drug B 8 9 12 14 15 10 9

Is there a significant difference in the efficacy of the two drug? If not which the drug should you buy?

SECTION - C (30 Marks)

Answer any **THREE** Questions

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

16 From a city population, the probability of selecting (i) a male or a smoker is 7/10. (ii) a male smoker is 2/5 and (iii) a male, if a smoker is already selected is 2/3. Find the probability of selecting (a) non-smoker (b) a male, and (c) a smoker, if a male is first selected.

17 You are given the population figures of India as follows:

Census year (x):	1911	1921	1931	1941	1951	1961	1971
Population in cores:	25.0	25.1	27.9	31.9	36.1	43.9	54.7

Fit an exponential trend $y = ab^x$ to the above data by the method of least squares.

18 A Random variable 'X' has the following Probability function

Values of X	0	1	2	3	4	5	6	7	8
P(X)	a	3a	5a	7a	9a	11a	13a	15a	17a

Determine the value of 'a' (ii) Find $P(X<3)$, $P(X\ge3)P(0<X<5)$.

19 Obtain the mean and variance of Poisson distribution.

20 In a test given to two groups of students drawn from two normal populations, the marks obtained were obtained as follows.

Group A: 18 20 36 50 49 36 34 49 41

Group B: 29 28 26 35 30 44 46

Examine at 5% level whether the two population have the same