PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2017
(Third Semester)

Branch – **MATHEMATICS**

MATHEMATICAL STATISTICS - I

Time : Three Hours Maximum : 75 Marks

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

1 Define Independent Events.
2 From a pack of 52 cards, one card is drawn at random. Find the probability of getting a queen.
3 Define Distribution Function.
4 Define Discrete Random Variable.
5 Define Moment Generating Function.
6 Write the Multiplication theorem of Expectation.
7 Define Normal distribution.
8 Find the Binomial distribution for which the mean is 4 and variance is 3.
9 Define Chi-square (χ^2) distribution.
10 What is Regression?

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

11 a State and prove the Addition Theorem of Probability.

OR

b A box contains 6 red, 4 white and 5 black balls. A person draws 4 balls from the box at random. Find the probability that among the balls drawn there is atleast one ball of each colour.

12 a A random variable 'X' has the following probability function :

x :	0	1	2	3	4	5	6	7	8
p(x) :	a	3a	5a	7a	9a	11a	13a	15a	17a

(i) Determine the value of a.
(ii) Find $p(x < 3)$, $p(x \geq 3)$, $p(0 < x < 5)$.

OR

b A continuous random 'X' has a variable with p.d.f : $f(x) = 6x(1-x), 0 \leq x \leq 1$:
(i) Check that f(x) is a p.d.f and
(ii) Determine a number such that $P(x < b) = P(X > b)$.

13 a i) What are the properties of Variance?
ii) Define covariance.

OR

b Explain the Marginal distribution function.

14 a Derive the Additive property of Binomial distribution.

OR

b Obtain the M.G.F of Poisson distribution.

15 a Explain the properties of Correlation.

OR

b What are the properties of 't' – distribution?

Cont...

SECTION - C (30 Marks)

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

16 State and prove Baye's theorem.

17 Let 'X' be a continuous random variable

$$f(x) = \begin{cases} ax & 0 \le x \le 1 \\ a & 1 \le x \le 2 \\ -ax + 3a & 2 \le x \le 3 \\ 0 & \text{else where} \end{cases}$$

(i) Determine the constant 'a' (ii) Compute $P(X \le 1.5)$

18 Let the random variable 'X' assumes the value 'r' with the probability law $P(X = r) = q^{r-1}P$; $r = 1, 2, 3$. Find the M.G.F of X and hence its mean and variance.

19 Explain the chief characteristics of Normal Distribution.

20 Obtain the equations of two lines of regression for the following data. Also obtain the estimate of X for y = 70.

X :	65	66	67	67	68	69	70	72
Y :	67	68	65	68	72	72	69	71

Z-Z-Z END