

**SECTION -C (30 Marks)**

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

11. a An urn contains 6 white, 4 red and 9 black balls. If 3 balls drawn at random. Find the probability that (i) two of the balls drawn are white, (ii) one in each colour, (iii) none is red, (iv) at least one white.

OR

- b State and prove addition theorem of probability.

12. a What is random variable. Distinguish discrete and continuous random variable.

OR

- b let X be a continuous random variable with p.d.f.

$$f(x) = \begin{cases} ax; & 0 \leq x \leq 1 \\ a; & 1 \leq x \leq 2 \\ -ax + 3a; & 2 \leq x \leq 3 \\ 0; & \text{otherwise} \end{cases}$$

Determine the constant 'a' and compute  $P(X \leq 1.5)$ .

13. a Elucidate marginal distribution function and conditional distribution function.

OR

- b For the following bivariate probability distribution of X and Y, find: (i).  $P(X \leq 1, Y = 2)$ , (ii).  $P(X \leq 1)$ , (iii).  $P(Y \leq 3)$  and  $P(X < 3, Y \leq 4)$ .

Y X	1	2	3	4	5	6
0	0	0	$\frac{1}{32}$	$\frac{2}{32}$	$\frac{2}{32}$	$\frac{3}{32}$
1	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
2	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{64}$	0	$\frac{2}{64}$

14. a State and prove Bernoulli's weak law of large numbers.

OR

- b State and prove Chebychev's inequality.

15. a Evaluate two dimensional transformation of random variables and give its difference from one - dimension.

OR

- b let X and Y be two random variables each taking three values -1,0, and 1, and their joint probability distribution.

Y X	-1	0	1	Total
-1	0	.1	.1	.2
0	.2	.2	.2	.6
1	0	.1	.1	.2
Total	.2	.4	.4	1.0

- (i) Show that X and Y have different expectations.  
(ii) Prove that X and Y are uncorrelated.  
(iii) Find Var (X) and Var (Y).  
(iv) Given that Y=0, what is the conditional probability distribution of X.  
(v) Find  $V(Y/X = -1)$

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)  
BSc DEGREE EXAMINATION DECEMBER 2022  
(Second Semester)

Branch - STATISTICS

NUMERICAL METHODS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

1. Numerical techniques more commonly involve \_\_\_\_\_  
(i) Elimination method (ii) Reduction method  
(iii) Iterative method (iv) Direct method
2. The Newton -Raphson method is also called as \_\_\_\_\_  
(i) Secant method (ii) Chord method  
(iii) Diameter method (iv) Tangent method
3. The Gauss Jordan method reduces a original matrix into a \_\_\_\_\_  
(i) Identity matrix (ii) Skew Hermitian matrix  
(iii) Non-symmetric matrix (iv) None of these.
4. The trapezoidal formula can be applied only if \_\_\_\_\_  
(i) It composes prism and wedges (ii) It composes triangles and parallelograms  
(iii) It composes prism and parallelograms (iv) It composes triangles and wedges
5. The second-order Runge-Kutta method uses \_\_\_\_\_ as a predictor.  
(i) backward order method (ii) forward Euler method  
(iii) midpoint rule (iv) multipoint method

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

6. (a) Define Trancendental equation.  
(OR)  
(b) Describe the procedure for Newton - Raphson method.
7. (a) State the fundamental theorem of finite differences.  
(OR)  
(b) Define Lagrange's inverse interpolation.
8. (a) Define Bessel's formulae.  
(OR)  
(b) Mention the concept of inverse interpolation.
9. (a) Define Quadratic formula.  
(OR)  
(b) State applications of Sterling's approximation.

Cont...