PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 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 Newton-Raphson method is applicable to the solution of
(i) Algebraic equations only
(ii) Transcendental equations only
(iii) Both algebraic and transcendental Equations
(iv) None of these

2 The process of computing intermediate values of a function from a given set pf the values of 'x' and 'y'
(i) Differentiation (ii) Integration
(iii) Interpolation (iv) None of these

3 Which of the following formula is used when the interpolation is required near the middle values of the table?
(i) Bessels's formula (ii) Stirlings formula
(iii) Both Bessels's and Stirlings formule (iv) Euler's Formula

4 Numerical integration comprises a broad family of algorithms for calculating the numerical value of a _____.
(i) Definite integral (ii) Indefinite integral
(iii) Simple integral (iv) Compound integral

5 Which is not a method of solving the Ordinary Differential Equations?
(i) Euler's method (ii) Runge-Kutta method
(iii) Milne's Predictor-Corrector Method (iv) Stirlings Method

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a Find the root between 0 and 1 of the equation $x^3 = 6x - 4$, correct to 5 decimal places, using Newton-Raphson method.

OR

b Solve $x^3 = 2x + 5$ for the positive root by iteration method.

7 a Using Newton's forward formula, find the value of y when x=142 from the following:

x:	140	150	160	170	180
y:	3.685	4.854	6.302	8.076	10.225

OR

b Find the missing value of the table given below. What assumption have you made to find it?

Year:	1917	1918	1919	1920	1921
Export (in tons):	443	384	--	397	467

8 a Given the following table, find y(35), by using Stirling's formula.

x:	20	30	40	50
y:	512	439	346	243

OR

b Apply Bessel's formula to obtain the value of y(45). Given that

x:	40	44	48	52
y:	51.08	63.24	70.88	79.84

Cont...

9 a Dividing the range into 6 equal parts, evaluate $\int_0^6 \frac{1}{1+x}dx$ by Trapezoidal rule.

OR

b Find the age corresponding to the annuity value 13.6 given the table

Age	:	30	35	40	45	50
Annuity value	:	15.9	14.9	14.1	13.3	12.5

10 a Solve $\frac{dy}{dx} = x^2 - y$, $y(0)=1$ numerically using Taylor series, upto x=0.1, 0.2, 0.3, 0.4.

OR

b Explain the Second Order Runge-Kutta method of solving a system of differential equations.

SECTION - C (30 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5 x 6= 30)

11 a Find the positive root of $x^3 - 4x + 1 = 0$ by Regula Falsi method.

OR

b By Horner's method, find the positive root, between 1 and 2, which satisfies $x^3 - 3x + 1 = 0$ to 3 decimal places.

12 a Using Newton's divided difference formula, find the values of f(2) and f(8) given the following table:

x	:	4	5	7	10	11	13
f(x)	:	48	100	294	900	1210	2028

OR

b Given the values

x:	14	17	31	35
y:	68.7	64.0	44.0	39.1

use Lagrange's formula to find the value of y corresponding to x = 27.

13 a Using Gauss backward interpolation formula, find the population for the year 1936 given that

year	:	1901	1911	1921	1931	1941	1951
Population ('000)	:	12	15	20	27	39	52

OR

b From the following table, find f(34) using Everett's formula.

x	:	20	25	30	35	40
f(x)	:	11.4699	12.7834	13.7648	14.4982	15.0463

14 a From the following table of values of x and y, find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for x =50.

x:	50	51	52	53	54	55	56
y:	3.6840	3.7084	3.7325	3.7563	3.7798	3.8030	3.8259

OR

b Evaluate $\int_0^6 \frac{dx}{1+x^2}$ after dividing the range into 6 equal parts, using (i) Simpson's $1/3^{rd}$ rule and (ii) Simpson's $3/8^{th}$ rule.

15 a Solve the equation dy/dx = - y; y(0) = 1, using Euler's method and tabulate the solution at x= 0, 0.01, 0.02, 0.03, 0.04.

OR

b Obtain the values of y at x = 0.1, 0.2 taking h = 0.1 by second order Runge-Kutta method, given the differential equation dy/dx = x - 2y; y(0) = 1.

Z-Z-Z END