PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION MAY 2019
(Fourth Semester)

Branch – **MATHEMATICS**

NUMERICAL METHODS

Time : Three Hours $\qquad$ Maximum : 75 Marks

SECTION-A (20 Marks)
Answer **ALL** questions

ALL questions carry **EQUAL** marks $\qquad$ (10 x 2 = 20)

1 Write the formula for finding the roots of the equations by false position method.

2 What is the order and rate of convergence for Newton-Raphson method?

3 Solve by Gauss-Elimination method.
   $y + x = 2, \ 2x + 3y = 5$.

4 Check whether the system of equations.
   $6x + 5y + 2z = 72, \ x + y + 54z = 110, \ 27x + 6y - z = 85$ diagonally dominant or not?

5 Prove that $\Delta^2 y_2 = \nabla^2 y_4$.

6 Write down Newton's forward difference formula to compute the derivatives.

7 What is the advantage of central difference interpolation formula?

8 Write down the formula for trapezoidal rule.

9 Write down the Taylor's series to solve the differential equation $\dfrac{dy}{dx} = f(x, y)$.

10 State the second order formula for R.K. method.

SECTION - B (25 Marks)
Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a Find by Newton-Raphson method, the real root of $3x - \cos x - 1 = 0$.

OR

   b Write the algorithm for the method of iteration.

12 a Solve by Gauss elimination method
      $2x + y + 4z = 12, \ 8x - 3y + 2z = 20, \ 4x + 11y - z = 33$

OR

   b Explain briefly Gauss-Seidal method to solve by simultaneous linear equations.

13 a Prove that $4hD = \log(1 + \Delta) = -\log(1 - \nabla)$.

OR

   b Given the data

x	0	1	2	5
f(x)	2	3	12	147

Find the cubic function of x.

14 a   Using the following data

x	0	2	3	4	7	9
F(x)	4	26	58	112	466	922

Find $f^1(x)$.

OR

   b   Evaluate $\int_{-3}^{3} x^4 dx$ using trapezoidal rule.

15 a   Using Taylor's series method find y at x = 1.1 given $\frac{dy}{dx} = x + y$, $y(1) = 0$.

OR

   b   Solve the equation $\frac{dy}{dx} = 1 - y$ with initial conditions x = 0, y = 0 using Euler's method.

SECTION - C (30 Marks)
Answer any THREE Questions
ALL Questions Carry EQUAL Marks (3 x 10 = 30)

16   Find the root of $xe^x - 3 = 0$ correct to three decimal places using the method of false position.

17   Solve the following equations by the method of triangularisation.
     2x + y + 4z = 12
     8x – 3y + 2z = 0
     4x + 11y – z = 33

18   Given the values

x :	14	17	31	35
f(x) :	68.7	64.0	44.0	39.1

Find f(x) corresponding to x = 27.

19   Dividing the range into 10 equal parts, find the approximate value of $\int_{0}^{\pi} \sin n \, dx$ by (a) Trapezoidal rule (b) Simpson's rule.

20   Apply the fourth order Runge – Kutta method, to find an approximate value of y when x = 0.2 given that $y^1 = x+y$, y(0) = 1.

Z-Z-Z   **END**