

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)  
BSc DEGREE EXAMINATION MAY 2017  
(Fourth Semester)

Branch- MATHEMATICS'  
NUMERICAL METHODS

Time : Three Hours

Maximum: 75 Marks

SECTION-A (20 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (10x2 = 20)

State the fundamental theorem to locate the root of an equation  $f(x) = 0$ .

What is the demerit of the bisection method?

What is the condition for convergence of Gauss Jacobi method of iteration?

State indirect methods of solving system of equation.

Show that  $(1 + A)(1 - V) = 1$  with the usual notation.

Write down Lagrange's formula .

Write down the formula for Simpson's on third rule.

State Simpson's 3/8 rule.

Write down the Euler formula to solve the differential equation

$$\frac{dy}{dx} = f(x,y).$$

10 State R-K method of second order formula.

SECTION - B (25 Marks)

Answer ALL Questions

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

11 a Write the algorithm of the bisection method to solve  $f(x) = 0$ .

OR

Using Newton Raphson method, establish the formula  $x^{\wedge} = \frac{x_n + \frac{f(x_n)}{f'(x_n)}}{2}$  to calculate the square root of N. Hence find the square root of 5 correct to four places of decimals.

12 a Explain briefly Gauss elimination method to solve simultaneous equation.

OR

b Solve by Gauss Seidel method of iteration the equations  
 $27x + 6y - z = 85$ ;  $6x + 15y + 2z = 72$ ;  $x + y + 54z = 110$ .

a Prove that  $A^7 y_2 = V^3 y_5$ .

OR

b Given the values

x:	14	17	31	35
f(x):	68.7	64	44	39.1

Find the value of f(x) corresponding to  $x = 27$ .

Cont...

- 14 a Dividing the range into 10 equal parts, find the approximate value of  $\int_0^{\pi} \sin x \, dx$  by Trapezoidal rule,

OR

- b Use Romberg's method to compute  $\int_1^4 \frac{dx}{x^2}$  correct to 4 decimal places with  $h = 0.5$  and  $0.25$ .

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

OR

- b Using Euler's method solve numerically the equation  $y' = x + y$ ,  $y(0) = 1$ . Find the value of  $y$  at  $x = 0.2, 0.4$ .

SECTION - C (30 Marks)

Answer any THREE Questions

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

- 16 Find the real root of the equation  $x^3 - 2x - 5 = 0$  which lies between 2 and 3 correct to five places of decimals using regula falsi method.
- 17 Solve by Gauss Jacobi method of iteration the equations  $10x + 2y + z = 9$ ,  $x + 10y - z = -22$ ,  $-2x + 3y + 10z = 22$ .
- 18 Interpolate by means of Gauss's backward formula the sales of a concern for the year 1966 given that
- |                   |      |      |      |      |      |      |
|-------------------|------|------|------|------|------|------|
| Year:             | 1931 | 1941 | 1951 | 1961 | 1971 | 1981 |
| Sales (in Lakhs): | 12   | 15   | 20   | 27   | 39   | 52   |

From the following table of values of  $x$  and  $y$ , find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  for  $x = 1.05$

$x$ :	1.00	1.05	1.10	1.15	1.20	1.25	1.30
$y$ :	1	1.0247	1.0488	1.0723	1.0954	1.1180	1.1401

- 20 Using Taylor series method find  $y$  at  $x = 0.1, 0.2, 0.3$  given  $\frac{dy}{dx} = x - y$ ,  $y(0) = 1$  (correct to four decimal places).

**Z-Z-Z**

END