PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION MAY 2018
(Second Semester)

Branch – MATHEMATICS WITH COMPUTER APPLICATIONS

NUMERICAL METHODS

Time : Three Hours   Maximum : 75 Marks

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

1   Define algebraic equation with an example.

2   What is the condition for the convergence of the iteration method?

3   What are the two types of solution of linear system in direct method?

4   Define diagonally dominant.

5   State the Newton's backward interpolation formula.

6   Write stirling's formula.

7   State the Newton's forward difference formula to compute the first derivative.

8   Define numerical integration.

9   State Picards method formula.

10   State Milne's predictor corrector method formula.

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

11 a   Determine the root of $xe^x - 3 = 0$ correct to three decimal places, using the method of false positions.

OR

   b   Use Newton–Raphson method to obtain a root of the equation $x = \cos x$ to 3 decimal places.

12 a   Solve the following equations by Gauss-elimination method.
$x + y + 2z = 4$; $3x + y - 3z = -4$; $2x - 3y - 5z = -5$.

OR

   b   Solve the following system of equations by Gauss Jacobi method.
$10x - 5y - 2z = 3$; $4x - 10y + 3z = -3$; $x + 6y + 10z = -3$.

13 a   Apply Gauss's forward interpolation formula to obtain $y(x)$ at $x = 3.5$ from the following data.

x :	2	3	4	5
y :	2.626	3.454	4.784	6.986

OR

   b   In the table below, estimate the missing value

x :	0	1	2	3	4
y :	1	3	9	-	81

14 a Find the first derivative of y at x = 15 from the table below:

x :	15	17	19	21	23	25
y :	3.873	4.123	4.359	4.583	4.796	5.000

OR

b Evaluate $\int_{0}^{1}\dfrac{x^2}{1+x^3}dx$ using Simpson's 1/3 rule, by dividing the range into 6 equal parts, correct to 3 decimal places.

15 a Using Euler's method , find y(0.2) and y(0.4) from $\dfrac{dy}{dx} = x + y$, y(0) = 1 with h = 0.2.

OR

b Given y ' = 1 + y^2, y(0) = 0, y(0.2) = 0.203, y(0.4) = 0.423, y(0.6) = 0.684. Estimate y(0.8) using Adam's Predictor formula.

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

16 Find a root of the equation $x^3 - 4x - 9 = 0$ correct to four decimal places by using the bisection method.

17 Solve the following system of equations by Gauss Seidel method. Correct to 3 decimal places.
27x + 6y – z = 85; 6x + 15y + 2z = 72; x + y + 54z = 110.

18 Find tan (0.26) from the following values of tan x for $0.10 \le x \le 0.30$ using Newton – Gregory backward formula.

x :	0.10	0.15	0.20	0.25	0.30
tan x :	0.1003	0.1511	0.2027	0.2553	0.3093

19 Evaluate $\int_{4}^{5.2}\log_e x\, dx$ by using (i) Trapezoidal rule (ii) Simpson's 1/3 rule and (iii) Simpson's 3/8 rule given that

x :	4	4.2	4.4	4.6	4.8	5.0	5.2
$\log_e x$:	1.386	1.435	1.482	1.526	1.569	1.609	1.649

20 Apply Runge – Kutta method of fourth order to find an approximate value of y for x = 0.2 in step of 0.1, if $\dfrac{dy}{dx} = x + y^2, y(0) = 1$. Correct to four decimal places.

Z-Z-Z   END