PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 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 (10 x 2 = 20)

1 Give the geometrical interpretation of Regula Falsi method.

2 Discuss the conditions under which sequence of approximations coverage in iteration method.

3 Compare Gauss Elimination and Gauss Seidal Iteration methods.

4 Explain the substitution procedures used in Gauss Elimination method.

5 Prove that $\Delta = \delta E^{1/2}$.

6 Discuss the merits and demerits of Lagrange's interpolation formula.

7 Explain Richardson's deferred approach to the limit in finding numerical integration.

8 Derive Newton's backward difference formula to compute derivatives using operational equality $E=e^{hD}$.

9 Specify the equations of second order range-Kutta algorithm.

10 Write the demerit of Taylor's method of solution.

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 method of false position.

OR

b Show that the iterative formula for finding the reciprocal of N is $x_{n+1} = x_n(2-Nx_n)$ and hence find the value of $\frac{1}{31}$.

12 a Find by Gaussian elimination, the inverse of matrix $\begin{pmatrix} 4 & 1 & 2 \\ 2 & 3 & -1 \\ 1 & -2 & 2 \end{pmatrix}$.

OR

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

13 a Prove that

(i) $\Delta = 1/2\ \delta^2 + \delta\sqrt{1+\delta^2/4}$ (ii) $\mu\ \delta = 1/2\ \Delta E^{-1} + 1/2\Delta$..

OR

Cont ...

13 b Find the value of ϕ if $F(\phi) = 0.3887$

ϕ :	21°	23°	25°
$F(\phi)$:	0.3706	0.4068	0.4433

14 a Find $\frac{dy}{dx}$ at x = 1.25 from the table

x	1.00	1.05	1.10	1.15	1.20	1.25	1.30
y	1.00000	1.02470	1.04881	1.07238	1.09544	1.11803	1.14017

OR

b Find approximate value of $\int_0^{\pi}$ sin x d x dy trapezoidal rule(Divide the range into 10 equal parts).

15 a Prove that the solution for the equation $\frac{dy}{dz} = y, y(0)=1$ yields $y_m = (1+h+1/2h^2)^m$ using second order runge Kutta method.

OR

b Solve the equation $\frac{dy}{dx} = 1 - y$ with initial condition x = 0, y = 0 using Euler's algorithm and find solutions at x = 0.1, 0.2, 0.3, 0.4.

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 three decimal places by using the bisection method.

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

18 The following are data from the steam table

Temp ^oC	140	150	160	170	180
Pressure kgf/cm^2	3.685	4.854	6.302	8.076	10.225

Using Newton's formula, find the pressure of the steam for a temperature of 142^o.

19 Explain the principle of Simpson's rule and establish a formula for finding numerical integral using Simpson's one third rule.

20 Apply Taylor series method to find the value of y(1.1), y(1.2) and y(1.3) correct to three decimal places given that $y^1 = xy^{1/2}$, y(1) = 1. Get the solution of differential equations and compare the results.

Z-Z-Z END