POKHARA UNIVERSITY

Level: Bachelor Semester –Fall Year : 2018
Programme: BCIS Full Marks: 100
Course: Numerical Methods Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Section "A" 10×2

Very Short Answer Questions

Attempt all the questions.

1. What are blunders?
2. Write the limitations of using Newton-Rapshon method.
3. Define term Rate of Convergence?
4. What is meant by ill-conditioning?
5. Define pivoting? Differentiate partialand complete pivoting
6. What is curve fitting? What is the need for such an exercise?
7. Write the formula of Lagrange Interpolation.
8. Differentiate between trapezoidal and simpsons rule .
9. What is a differential equation?
10. What is poisson's equation? Write laplacian five point equation.

Section "B" 6×10

Descriptive Answer Questions

Attempt any ***six*** questions

11. Find the root of the equation x cosx -1=0 using bracketing method and correct up to three decimal places.
12. Using power method, find the largest Eigen value and corresponding Eigen vector of the following matrix.

$$A=\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

13. Find linear interpolation polynomial for (0,1) and (1,3). Given the points below, obtain a cubic polynomial using Lagrange formula:

x	0	1	2	3
F(x)	1	-1	-1	0

14. Evaluate $\int_0^{\pi} \sqrt{(1+3\cos^2 x)}\, dx$ using trapezoidal rule, Simpson's $\frac{1}{3}$*rule* and Simpson's $\frac{3}{8}$*rule*. Also state which method yields better result.
15. Solve the equations $y'=x^2+y^2$ with x=0.25 and x=0.5 given that y(0)=1
    a) Using Euler's Method (h=0.25)
    b) By using Rungekutta method 4th order (h=0.25)
16. Consider a steel plate of size 15cm×15cm. If two of the sides are held at 100^0C and the order two sides are held at 0^0C, what are the steady state temperature at interior points assuming a grid size of 5cm×5cm.
17. Solve the following system using Doolittle method.

$$x_1 + x_2 + x_3 = 1$$
$$3x_1 + 7x_2 - 3x_3 = 5$$
$$x_1 - 2x_2 - 5x_3 = 10$$

Section "C" 2×10

Case Analysis

18. Explain bisection method with help of appropriate algorithm and assumptions. What are the importance of Numerical methods in solving scientific problems?
19. What is least square regression? Fit the following set of data to estimate the coefficient 'a' and 'b' for the function $y=e^{(ax+b)}$

x	-3	-1.5	-1	0	1.0	2.5	4.0
y	5.77	2.77	2.22	1.33	0.77	0.33	0.11