**Kathmandu BernHardt College**

**Bafal, Kathmandu**

**Pre-Board Examination -2069**

**Subject: Numerical Methods (204) Set-‘A’ FM: 60**

**Level: BSC CSIT 3rd Sem. Time: 3hrs PM: 24**

*Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks.*

**Attempt all questions**

1. Define the types of error in numerical calculation**.**  Find root of equation sin x = 1/x, that lies between x = 1 and x = 1.5 using bisection method. Carry out computation upto 7th stage. (4+4)
2. Show that when n = 2, Lagrangian interpolation formula reduces to the linear interpolation formula. Estimate the value of f(1.35) using Newton’s interpolating polynomial for the following table: (4+4)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | 1.2 | 1.3 | 1.4 | 1.5 |
| f(x) | 1.063 | 1.091 | 1.119 | 1.145 |

1. What is regression analysis? Derive normal equations for evaluating the parameters a and b to fit data to saturation growth model of the form y = ax/b+x. (2+4)
2. Evaluate using trapezoid rule with n=10. Also evaluate the same integral using Gaussian 3 point formula and compare the result. (3+3)

Write the algorithm for Gauss Jordan method. Use Gauss elimination with partial pivoting to solve the following sets of equations: (4+4)

x1 + x2 - 2x3 = 3

4x1 - 2x2 + x3 = 5

3x1 - x2 + 3x3 = 8

Explain the Picard’s proves of successive approximation. Obtain a solution up to the fifth approximation of the equation = 𝒚+𝒙 such that 𝒚=𝟏 when 𝒙=𝟎 using Picard’s process of successive approximation. (4+4)

1. Write the algorithm and computer program for fitting a linear equation of the form y

= a + bx. (4+4)

1. Derive a difference equation to represent a Laplace’s equation. Solve the following Poisson’s equation

With F(x,y) = xy and f =0 on boundary. The domain is a square with corners at (0,0) and (4,4). Use h = 1. (4 +4)

**GOOD LUCK**

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**Subject: Numerical Methods (204) Set-‘B’ FM: 60**

**Level: BSC CSIT 3rd Sem. Time: 3hrs PM: 24**

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**Attempt all questions**

1. Derive the formula for Secant method. Find a real root of following equation using Secant method.

f(x)=sin x - x+5 using x1 =0 , x2 = [4+5]

1. What is interpolation and extrapolation? Find the value of f(x) at x=3 for the following data by using Lagrange interpolating polynomial formula. [2+4]

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| X | -1 | -2 | 2 | 4 |
| f(x) | -1 | -9 | 11 | 69 |

1. (a). Fit a straight line to the following set of data. [4]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| X | 1 | 2 | 3 | 4 | 5 |
| Y | 3 | 4 | 5 | 6 | 8 |

(b). Compute the integral [4]

 by using Simpson’s 1/3 rule for n=4

1. In which situation system of linear equations are in ill-conditioned? Solve the following system of linear equations by using Gauss-Seidel iterative method. [2+4]



1. What is initial value problem? How it is differ from boundary value problem? Solve the following equation by using Picard’s method. [2+1+4]

dy/dx= with y(0)=0 and estimate y(0.4).

Hint: Solve up to 2nd iteration.

1. What is ordinary differential equation? Given the following differential equation,

dy/dx=with y(1)=2 estimate y(1.6) by using. [1+3+4]

1. Euler’s Method b. Heun’s method with h=0.
2. Write a algorithm and complete C-program to find the root of given equation by using Secant method. [4+4]

f(x)= x2-4x-10 (use x1=4 and x2=2)

1. Derive a difference equation to represent a Laplace’s equation. Solve the following Poisson’s equation. [4 +4]

With F(x,y) = xy and f =0 on boundary. The domain is a square with corners at (0,0) and (4,4). Use h = 1.

**GOOD LUCK**