2018

M.Sc.

2nd Semester Examination

APPLIED MATHEMATICS WITH OCEANOLOGY AND COMPUTER PROGRAMMING

PAPER—MTM-202

Subject Code—21

Full Marks : 50

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

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

Illustrate the answers wherever necessary.

(*Numerical Analysis*)

Answer Q. No. *1* and any *two* from the rest.

1. Answer any *four* questions : 4×2

(a) Compare Lagrange's interpolation and cubic spline interpolation methods.

(b) What do you mean by partial and complete pivoting methods to find the inverse of a matrix ? What is the advantage to use such methods ?

(c) What do you mean by Newton-Cotes open type quadrature formulae ? Explain.

(d) Describe minimax polynomial.

(e) What do you mean by single step and multi-step methods to solve an ODE ? Give examples of such methods. What is the main drawback of multi-step method ?

(f) What do you mean by ill-conditioned system of equations ? Explain with an example.

(g) Explain Gauss-Seidal iteration method to solve a pair of non-linear equations.

2. (a) Describe Lagrange's bivariate interpolation method. Hence find the value of f(0.25, 0.75), from the data f(0, 0) = 1, f(1, 0) = 1.732051, f(0,1) = 1.414214, f(1,1) = 2. 8

(b) Describe finite difference method to solve a second order BVP. 8

3. (a) Describe a method to solve a system of tri-diagonal equations. Solve the following tri-diagonal system of equations : $x_1 + x_2 = 3$, $x_1 + 2x_2 + x_3 = 6$, $3x_2 + 2x_3 = 12$. 9

(b) Describe successive over relaxation method to solve a system of linear equations. Explain the role of relaxation factor. Compare this method with Gauss-Seidal iteration method. 7

4. (a) Let us consider the wave equation

$$u_{tt} = c^2 u_{xx},\ t > 0,\ 0 < x < 1$$

Where initial conditions $v(x, 0) = f(x)$ and

$$u_t)_{(x,\,0)} = g(x),\ 0 < x < 1$$

and boundary conditions

$$u(0, t) = \phi(t) \text{ and } u(1, t) = \Psi(t), t \geq 0$$

Describe a finite difference method to solve the above problem. 7

(b) Describe Bairstow method to find all roots of a polynomial equation. 9

[Internal Assessment —10 Marks]

———