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Register Number:

DATE:

**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BANGALORE-27**

**M.Sc. MATHEMATICS– IV SEMESTER**

**SEMESTER EXAMINATION: APRIL 2017**

**MT 0314 : Computational Fluid Dynamics**

Time- 2 ½ hrs Max Marks-70

**This paper contains TWO printed page**

**Answer any SEVEN of the following TEN questions. (7 X 10 = 70)**

1. Describe the type of sources of error in the numerical solutions of the heat equation. Give the mandatory condition for stability. Show that the round off error satisfies the difference equation for heat equation. 10
2. Describe the Von – Neumann stability analysis of the FTCS for heat equation. 10
3. Give the Lax method and describe the stability analysis for it. 10
4. Solve the initial boundary value problem



Using Lax – Wendroff method with ∆x = 1/8 and ∆t = 1/16. 10

1. Solve the initial boundary value problem



Using Lax Friedrich method with h = ∆x = ∆y = 1/3 and C = ½. 10

1. Solve the IBVP:-

 with C = ½ and ∆x=1/3. 10

1. Show that where *Ni* are the shape functions obtained for triangular element using quadratic Lagrange Polynomial. 10
2. Use the finite element method to solve the boundary value problem

 on the boundary with h = ½.

1. Explain Simple Method. 10
2. Using the method of weighted residual, find an approximate solution for the Poisson’s equation

 with *p* as a constant source for the entire rectangular domain Ω. The kinematic boundary conditions for the field variable *u* is given by *u=0* at *x = ±a* and *u=0 at y = ±b,* as shown in the figure.

 10 10

 2b

 2a