

JK Lakshmipat University Jaipur
INSTITUTE OF ENGINEERING AND TECHNOLOGY
End Term Examination, December 2021
Numerical and Scientific Computing
B. Tech., Semester V

Roll No.....

Course Code : AS2202

Time: 2 hours

Max. Marks: 30

Instructions to students:

Do not write anything other than your roll number on question paper.

Assume suitable data wherever required and mention it clearly.

Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

- Q.1 We are going out to launch a rocket, and let $y(t)$ is the altitude (meters from the surface) of the rocket at time t . We know the gravity $g=9.8m/s^2$. If we want to have the rocket at 50 m off the ground after 5 seconds after launching, what should be the velocity at launching? (we ignore the drag of the air resistance). 5
- Q.2 Use the RK4 method with $h = 0.1$ to obtain an approximation to $y(1.5)$ for the solution of $y' = 2xy$, $y(1) = 1$. 5

- Q.3 Solve heat equation numerically (using finite difference method) with Dirichlet boundary conditions 10

$$u_t = u_{xx}$$

$$u(0,t) = u(1,t) = 0 \text{ (boundary condition) } t > 0$$

$$u(x,0) = u_0(x) \text{ (Initial condition)}$$

- Q.4 Give a physical interpretation of the solution of the wave equation? Find the analytical solution of the initial value problem 10

$$u_{tt} = 4 u_{xx} \quad -\infty < x < \infty, t > 0$$

$$u(x,0) = \sin x$$

$$u_t(x,0) = 1$$