

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

T-1, EXAMINATION- 2022

B. Tech. III Semester (CE)

COURSE CODE (CREDITS): 18B11MA311 (03)

MAX. MARKS: 15

COURSE NAME: NUMERICAL METHODS

COURSE INSTRUCTORS: Dr. MANDEEP SINGH

MAX. TIME: 1:00 Hrs.

*Note: All questions are compulsory. Marks are indicated against each question in square brackets. Scientific calculator is allowed.*

**Quest.(1)** Using *bisection method*, find an approximate root of the equation  $x^3 - 3x = 0$  that lies between 1 and 1.5, Carry out the computations upto 3rd stage. If the actual value of the root (upto five decimal places) is 1.44225, then find out the absolute and relative errors also. (CO-1) [3]

**Quest.(2)** Perform three iterations of the *Newton-Raphson method* to find a root (measured in radians) of the equation  $3x - \cos x - 1 = 0$ , which is close to 0.5. (CO-1) [3]

**Quest.(3)** Find the root of the equation  $x^3 - 5x - 7 = 0$ , which lies between 2 and 3 by the *Regula-Falsi method*. Execute at least two iterations. (CO-1) [3]

**Quest.(4)** Solve the following system of equations by using *Gauss elimination method* (CO-2) [3]

$$2x_1 + 4x_2 + x_3 = 3$$

$$3x_1 + 2x_2 - 2x_3 = -2$$

$$x_1 - x_2 + x_3 = 6$$

**Quest.(5)** Using the *LU decomposition method*, solve the following system of equations (choose  $u_{ii} = 1, i = 1, 2, 3$ ) (CO-2) [3]

$$x - y + 5z = 5$$

$$2x - 3y + z = 0$$

$$x + 3y + 7z = 11$$