*POSSESION OF MOBILES IN EXAM IS UFM PRACTICE.*

Name _____ Enrollment No._____

**Jaypee Institute of Information Technology, Noida**

**T1 Examination, 2022**

**B.Tech. 5th Semester**

**Course Title: Basic Numerical Methods** | **Maximum Time: 01 Hr.**

**Course Code: 17BINMA531** | **Maximum Marks: 20**

After perusing above mentioned course, the student will be able to:

CO1: explain the concepts of approximation and errors in computation

CO2: construct numerical methods for algebraic and transcendental equations and their convergence

CO3: outline the methods of interpolation using finite differences and divided difference formulae

CO4: make use of numerical differentiation and integration

CO5: solve the system of linear equations using direct and iterative methods

CO6: solve ordinary differential equations using direct numerical methods

**Note: Non programmable calculators are allowed**

1. Round off the following numbers to the THREE significant figures and also calculate the **percentage error** rounded off for THREE significant digits in each case- **3M [CO1]**

   a. 864561 b. 943562 c. 0.098477

2. If $u = x^2e^{2y}\cos z$, then find the maximum relative error at $x = 2, y = z = 0$; the error in $x$ is 0.01 in $y$ is 0.2 and in $z$ is 0.1. **3M [CO1]**

3. Perform FIVE iterations of fixed point iteration method to find a root of the equation $f(x) = x^2 - x - 1$, in the interval $(1.5, 3.5)$. Round off the calculations at FOURTH decimal places in each iteration. **3M [CO2]**

4. a) Perform two iterations of Newton-Raphson method to find the root of the equation, $f(x) = 3\sin x - 2x + 5$; take initial guess $x_0 = 2$. Round off the calculations at FOURTH decimal places in each iteration. **3M [CO2]**

   b) Perform two iterations of Regula-Falsi method to find the square root of $3/4$ taking initial interval as $(0, 1)$. Round off the calculations at FOURTH decimal places in each iteration.

6. Estimate the population increase during the period 1985-1991 using Newton's backward interpolation. The population for that town is given in the following table **4M [CO3]**

| Year | 1951 | 1961 | 1971 | 1981 | 1991 |
|---|---|---|---|---|---|
| Population ($\times 10^6$) | 46 | 66 | 81 | 93 | 101 |

7. Use Gauss forward interpolation to find the value of $y$ at 23 , with the help of following table **4M [CO3]**

| $x$ | 12 | 22 | 32 | 42 | 52 |
|---|---|---|---|---|---|
| $y$ | 2.4914 | 5.5452 | 10.4708 | 18.8144 | 25.2458 |

Round off the calculations at FOURTH decimal places.

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