**JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT**

**T-II, EXAMINATION- 2022**

**B. Tech. III Semester (CE)**

COURSE CODE (CREDITS): 18B11MA311 (03) MAX. MARKS: 25

COURSE NAME: NUMERICAL METHODS

COURSE INSTRUCTORS: MDS MAX. TIME: 90 Minutes.

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

Quest.(1) Estimate the production for 2004 and 2006 from the following data:

| *Year* | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|
| *Production* | 200 | 200 | 260 | ------- | 350 | ----- | 430 |

(CO- 3) [3]

Quest.(2) Use three iterations to solve the following system of equations starting with initial solution as $\left(\frac{9}{5}, \frac{4}{5}, -\frac{6}{5}\right)$ by Gauss-Seidel method: (CO-2) [4]

$$\begin{bmatrix} 5 & -1 & 0 \\ -1 & 5 & 1 \\ 0 & 1 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 9 \\ 4 \\ -6 \end{bmatrix}$$

Quest.(3) From the following table, construct the difference table:

| $x$ | 2.0 | 2.1 | 2.2 | 2.3 |
|---|---|---|---|---|
| $y(x)$ | 11.000 | 12.201 | 13.648 | 15.167 |

Hence, estimate the value of $y(2.05)$. (CO-3) [3]

Quest.(4) Construct the divided difference table for the data

| $x$ | 0 | 1 | 2 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| $f(x)$ | 1 | 14 | 15 | 5 | 6 | 19 |

Hence, find the interpolating polynomial and an approximation to the value of $f(3)$.

(CO-3) [4]

Quest. (5) A switching path between parallel rail road tracks is to be cubic polynomial joining positions (0,0) and (4,2) and tangents to the lines $y = 0$ and $y = 2$. Using Hermite's method, find the polynomial, given : (CO-4) [4]

| $x$ | $y(x)$ | $y'(x)$ |
|---|---|---|
| 0 | 0 | 0 |
| 4 | 2 | 0 |

Quest. (6) Find a real root of the equation $5x^3 - 20x + 3 = 0$, lying on the interval $[0, 1]$ correct to four decimal places using iteration method. (CO-1) [3]

Quest (7) Apply Gauss-Jordan method to solve the equations (CO-2) [4]

$$x + y + z = 9$$
$$2x - 3y + 4z = 13$$
$$3x + 4y + 5z = 40$$