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| **SESSION** | **April 2025** |
| **PROGRAM** | **Bachelor of CoMPUTER APPLICATIONS (BCA)** |
| **SEMESTER** | **III** |
| **course CODE & NAME** | **DCA2101 Computer Oriented Numerical Methods** |
|  |  |
|  |  |

**Set-I**

**Q1. Show that**

**(a)**

**(b)**

**Ans1.**

### **(a) δμ = ½(∆ + ∇)**

### **Definitions of Finite Differences:**

Let be a function defined at equally spaced points with interval . Then:

* **Forward Difference Operator (∆):**
* **Backward Difference Operator (∇):**

Its Half solved only

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**Q2. Solve the system of equations using Gauss Jacobi’s Method:**

**3x + 20y – z = –18, 2x– 3y + 20z = 25, 20x + y – 2z = 17.**

**Ans 2.**

### **Given Equations:**

**3x + 20y – z = –18** 2. **2x – 3y + 20z = 25** 3. **20x + y – 2z = 17**

### **Step 1: Rearranging equations to isolate each variable**

We rewrite each equation to express **x, y, z** in terms of the other variables:

#### Equation (1):

#### Equation (2):

**Q3. Fit straight line of the form , to the following data by method of moment**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **2** | **3** | **4** | **5** |
|  | **27** | **40** | **55** | **68** |

**Ans 3.**

To fit a straight line of the form:

using the method of moments, we’ll follow a process that matches the first and second moments of the actual data with the corresponding moments of the fitted line.

### **Step 1: Given Data**

| x | y |
| --- | --- |
| 2 | 27 |
| 3 | 40 |
| 4 | 55 |
| 5 | 68 |

Let **n = 4** (number of observations)

### **Step 2: Calculate Required Summations**

**Set-II**

**Q4. Apply Gauss forward formula to obtain the value of f(x) at x = 3.5 from the table:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **1.5** | **2.5** | **3.5** | **4.5** |
|  | **8.963** | **24.364** | **66.340** | **180.034** |

**Ans 4.**

To apply the Gauss Forward Interpolation Formula, we first construct the forward difference table and then apply the formula to find .

### **Given Table:**

| x | f(x) |
| --- | --- |
| 1.5 | 8.963 |
| 2.5 | 24.364 |
| 3.5 | 66.340 |
| 4.5 | 180.034 |

Let’s denote:

**Q5. Evaluate using the**

1. **Simpson’s 3/8 Rule**
2. **Simpson’s 1/3 Rule**
3. **Trapezoidal Rule**

**Ans 5.**

To evaluate the integral

using Simpson’s 3/8 Rule, Simpson’s 1/3 Rule, and the Trapezoidal Rule, we need to follow numerical integration steps with a chosen number of sub-intervals n.

### Step 1: Function and Interval

Let:

**Q6. Find the solution for taking interval length 0.1 using Euler’s method to solve: given .**

**Ans 6.**

To solve the differential equation

using **Euler’s method** with **step size**  and find the solution at , follow the steps below:

### **Given:**

* Differential equation:
* Initial condition:
* Step size: