|  |  |
| --- | --- |
| **SESSION** | **NOVEMBER 2024** |
| **PROGRAM** | **BACHELOR OF COMPUTER APPLICATIONS (BCA)** |
| **SEMESTER** | **III** |
| **COURSE CODE & NAME** | **DCA2101 COMPUTER ORIENTED NUMERICAL METHODS** |
|  |  |
|  |  |

**SET-I**

### **Q1.**

**Show that: (a)** $δμ=\frac{1}{2}\left(Δ+∇\right)$ **(b)** $Δ-∇=Δ∇$

#### **Ans 1.**

**(a)** $δμ=\frac{1}{2}\left(Δ+∇\right)$

**Proof:**

1. Using the definitions of finite difference operators:
	* $Δf\left(x\right)=f\left(x+h\right)-f\left(x\right)$
	* $∇f\left(x\right)=f\left(x\right)-f\left(x-h\right)$
2. Midpoint operator $δμ=\frac{1}{2}\left(Δf\left(x\right)+∇f\left(x\right)\right)$
3. Substituting:

$$δμ=\frac{1}{2}\left[\left(f\left(x+h\right)-f\left(x\right)\right)+\left(f\left(x\right)-f\left(x-h\right)\right)\right]$$

Its Half solved only

Buy Complete assignment from us

**Price – 190/ assignment**

**MUJ Manipal University Complete SolvedAssignments session JULY-AUG 2024**

buy cheap assignment help online from us easily

we are here to help you with the best and cheap help

**Contact No – 8791514139 (WhatsApp)**

**OR**

**Mail us-** **bestassignment247@gmail.com**

**Our website -** [**www.assignmentsupport.in**](http://www.assignmentsupport.in)

### **Q2.**

**Find Lagrange’s interpolation polynomial fitting the points:**

$$y\left(1\right)=-3, y\left(3\right)=0, y\left(4\right)=30, y\left(6\right)=132$$

**Hence find** $y\left(5\right)$**.**

#### **Ans 2.**

**Step 1: Lagrange’s Interpolation Polynomial**

The Lagrange interpolation formula is:

$$P\left(x\right)=\sum\_{i=0}^{n}y\_{i}L\_{i}\left(x\right)$$

where $L\_{i}\left(x\right)$ is given by:

$$L\_{i}\left(x\right)=\prod\_{j=0,j\ne i}^{n}\frac{x-x\_{j}}{x\_{i}-x\_{j}}$$

###

### **Q.3.**

**Evaluate** $f\left(15\right)$**, given the following table of values:**

$$\begin{matrix}x&y=f\left(x\right)\\10&46\\20&66\\30&81\\40&93\\50&101\end{matrix}$$

#### **Ans 3.**

We use **Newton’s Divided Difference Interpolation** formula to evaluate $f\left(15\right)$.

**Step 1: Divided Difference Table**

1. Construct the divided difference table:
	* $f[x\_{i}]=y\_{i}$
	* $f[x\_{i},x\_{i+1}]=\frac{f[x\_{i+1}]-f[x\_{i}]}{x\_{i+1}-x\_{i}}$, and so on.

$$\begin{matrix}x&f[x]&f[x,x\_{i+1}]&f[x,x\_{i+1},x\_{i+2}]&f[x,x\_{i+1},x\_{i+2},x\_{i+3}]&f[x,x\_{i+1},x\_{i+2},x\_{i+3},x\_{i+4}]\\10&46&4.0&-0.1&0.004&-0.00008\\20&66&3.0&-0.1&0.004&\\30&81&2.4&-0.08&&\\40&93&2.0&&&\\50&101&&&&\end{matrix}$$

###

### **Q4.**

**Find the equation of the best-fitting straight line for the data:**

$$\begin{matrix}X&Y\\1&1\\3&2\\4&4\\6&4\\8&5\\9&7\\11&8\\14&9\end{matrix}$$

#### **Ans 4.**

We use the **method of least squares** to find the equation of the best-fitting straight line:

$$y=a+bx$$

**Step 1: Formulas**

1. Slope ($b$):

$$b=\frac{n∑XY-∑X∑Y}{n∑X^{2}-\left(∑X\right)^{2}}$$

1. Intercept ($a$):

$$a=\frac{∑Y}{n}-b\frac{∑X}{n}$$

###

### **Q 5.**

**For what values of** $λ$ **and** $μ$ **does the following system of equations have:**

1. **A unique solution**
2. **An infinite number of solutions**
3. **No solution**

**Given system:**

$$x+y+z=6$$

$$x+2y+3z=10$$

$$x+2y+λz=μ$$

####

#### **Ans 5.**

The general system of equations can be written in matrix form:

$$AX=B$$

where

$$A=\left[\begin{matrix}1&1&1\\1&2&3\\1&2&λ\end{matrix}\right], X=\left[\begin{matrix}x\\y\\z\end{matrix}\right], B=\left[\begin{matrix}6\\10\\μ\end{matrix}\right].$$

###

### **Q6.**

**Find the solution for** $x=0.2$ **using an interval length of** $h=0.1$ **with Euler’s method to solve:**

$$\frac{dy}{dx}=1-y, y\left(0\right)=0$$

#### **Ans 6.**

**Step 1: Euler’s Method Formula**

Euler’s method is given by:

$$y\_{n+1}=y\_{n}+h⋅f\left(x\_{n},y\_{n}\right)$$

where $f\left(x,y\right)=\frac{dy}{dx}$.

Given:

* $h=0.1$
* Initial condition: $x\_{0}=0,y\_{0}=0$