Page No. Tapunimunt - $\frac{1}{4}$ For $f = x^3 + y^2 + z^3$, evaluate tapta laplacian f (only expression) To calculate laplacian we use the below formula $ \frac{1}{2}f = \frac{3}{2}f + \frac{3}$		Date
Fan $f = x^3 + y^2 + z^3$, evaluate Laplace (an f (only expression) f = $x^3 + y^2 + z^2$ To calculate Laplace (an we use the below formula	Expt	No. Page No
For $f = x^3 + y^2 + z^3$, evaluate lapta laplacian f (only expression) $ f = x^3 + y^2 + z^2 $ To calculate laplacian we use the below formula		ENNIH insust - H
Self $f = x^3 + y^2 + z^2$ To calculate laplacian we use the below formule		
Self $f = x^3 + y^2 + z^2$ To calculate laplacian we use the below formule		$f = x^3 + y^2 + z^3$ evaluate lands lands on f (only any f)
To calculate laplacian we use the helow formula	A 100 PM	
To calculate laplacian we use the below formula $ \frac{\partial^{2} f}{\partial x^{2}} = \frac{\partial^{2} f}{\partial y^{3}} + \frac{\partial^{2} f}{\partial z^{2}} $ $ \frac{\partial^{2} f}{\partial x^{2}} = \frac{\partial}{\partial x} \left(\frac{\partial f}{\partial x} \right) = \frac{\partial}{\partial x} \left[\frac{\partial x^{2}}{\partial y} \right] = 6 \times 6$	soli	$f = \chi^3 + y^2 + z^3$
$\frac{\partial^{2} f}{\partial x^{2}} = \frac{\partial}{\partial x} \left(\frac{\partial f}{\partial x} \right) = \frac{\partial}{\partial x} \left[\frac{\partial x^{2}}{\partial x} \right] = 6x$ $\frac{\partial^{2} f}{\partial y^{2}} = \frac{\partial}{\partial y} \left(\frac{\partial f}{\partial y} \right) = \frac{\partial}{\partial y} \left[\frac{\partial y^{2}}{\partial y} \right] = 2$ $\frac{\partial^{2} f}{\partial z^{2}} = \frac{\partial}{\partial z} \left(\frac{\partial f}{\partial z^{2}} \right) = \frac{\partial}{\partial y} \left[\frac{\partial z^{2}}{\partial z^{2}} \right] = 6z$ $\therefore \nabla^{2} f = 6x + 2 + 6z$		To calculate laplacian we use the below formula
$\frac{\partial^{2} f}{\partial x^{2}} = \frac{\partial}{\partial x} \left(\frac{\partial f}{\partial x} \right) = \frac{\partial}{\partial x} \left[\frac{\partial x^{2}}{\partial x} \right] = 6x$ $\frac{\partial^{2} f}{\partial y^{2}} = \frac{\partial}{\partial y} \left(\frac{\partial f}{\partial y} \right) = \frac{\partial}{\partial y} \left[\frac{\partial y^{2}}{\partial y} \right] = 2$ $\frac{\partial^{2} f}{\partial z^{2}} = \frac{\partial}{\partial z} \left(\frac{\partial f}{\partial z^{2}} \right) = \frac{\partial}{\partial y} \left[\frac{\partial z^{2}}{\partial z^{2}} \right] = 6z$ $\therefore \nabla^{2} f = 6x + 2 + 6z$		$\nabla^2 f = \partial^2 f + \partial^2 f + \partial^2 f$
$\frac{\partial^2 f}{\partial y^2} = \frac{\partial}{\partial y} \left(\frac{\partial f}{\partial y} \right) = \frac{\partial}{\partial y} \left[2y^* \right] = 2$ $\frac{\partial^2 f}{\partial z^2} = \frac{\partial}{\partial z} \left(\frac{\partial f}{\partial z} \right) = \frac{\partial}{\partial y} \left[3z^2 \right] = 6z$ $\therefore \nabla^2 f = 6x + 2 + 6z$		$\partial x^2 \partial y^1 \partial z^2$
$\frac{\partial^2 f}{\partial y^2} = \frac{\partial}{\partial y} \left(\frac{\partial f}{\partial y} \right) = \frac{\partial}{\partial y} \left[2y^* \right] = 2$ $\frac{\partial^2 f}{\partial z^2} = \frac{\partial}{\partial z} \left(\frac{\partial f}{\partial z} \right) = \frac{\partial}{\partial y} \left[3z^2 \right] = 6z$ $\therefore \nabla^2 f = 6x + 2 + 6z$		20 2 (20) 2 [0 2] (
$\frac{\partial^{2} f}{\partial z^{2}} = \frac{\partial}{\partial z} \left(\frac{\partial f}{\partial z} \right) - \frac{\partial}{\partial y} \left[\frac{3z^{2}}{z^{2}} \right] = 6z$ $\therefore \nabla^{2} f = 6x + 2 + 6z$	_	$\frac{\partial^2 F}{\partial x^2} = \frac{\partial}{\partial x} \left(\frac{\partial F}{\partial x} \right) = \frac{\partial}{\partial x} \left[\frac{\partial F}{\partial x} \right] = \frac{\partial}{\partial x}$
$\frac{\partial^{2} f}{\partial z^{2}} = \frac{\partial}{\partial z} \left(\frac{\partial f}{\partial z} \right) - \frac{\partial}{\partial y} \left[\frac{3z^{2}}{z^{2}} \right] = 6z$ $\therefore \nabla^{2} f = 6x + 2 + 6z$		$\frac{\partial^2 f}{\partial x^2} = \frac{\partial}{\partial y} \left[\frac{\partial f}{\partial y} \right] = \frac{\partial}{\partial y} \left[\frac{\partial y}{\partial y} \right] = \frac{\partial}{\partial y} \left[\partial$
$\therefore \nabla^2 f = 6 \chi + 2 + 6 \chi$		$\frac{\partial y^2}{\partial y^2} = \frac{\partial y}{\partial y} = \frac{\partial y}{\partial y$
		$\frac{\partial^2 F}{\partial z^2} = \frac{\partial}{\partial z} \left(\frac{\partial F}{\partial z} \right) = \frac{\partial}{\partial y} \left(\partial$
Teacher's Signature		$\therefore \nabla^2 f = 6x + 2 + 62$
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		Teacher's Signature

```
Code:

from sympy impart \times

n,y,z= Symbols (f,n,y,z')

f= n\times\times3+y\times2+z\times\times3

f= diff (f,x,z)

f_2= diff (f,y,z)

f_3= diff (f,z,z)

Lap-f= f_1+ f_2+ f_3
```

Required laplaceau = 6 x x + 6 x z + 2

ment (" Required laplacian = ", Lap-F)

Date				
No				
for f= x3y2+xyz3, evaluate laplacian F at point(1,1,2)				
$f = \chi^3 y^2 + \chi y z^3$				
To calculate laplacéan F, we use the below formula				
$\Delta_5 t = \beta_5 t + \beta_5 t + \beta_5 t$				
$\frac{\partial^2 f}{\partial x^2} = \frac{\partial}{\partial x} \left(\frac{\partial f}{\partial x} \right) = \frac{\partial}{\partial x} \left(\frac{\partial x^2 y^2 + y^2}{\partial x^2} \right) = 6xy^2$				
$\frac{\partial^2 F}{\partial y^2} = \frac{\partial}{\partial y} \left(\frac{\partial F}{\partial y} \right) = \frac{\partial}{\partial y} \left(\frac{\partial x^3 y}{\partial y} + 2x^3 \right) = 2x^3$				
The state of the s				
$\frac{\partial^2 f}{\partial z^2} = \frac{\partial}{\partial z} \left(\frac{\partial f}{\partial z} \right) = \frac{\partial}{\partial z} \left(\frac{\partial ny}{\partial z^2} \right) = 6nyz$				
$\nabla^2 f = 6xy^2 + 2x^3 + 6xy^2$				
at point (1, 1, 2)				
$\nabla^2 f = 6(1)(1)^2 + 2(1)^3 + 6(1)(1)(2)$ $= 6 + 2 + 12$				
= 20				
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```
Code:
```

Form sympy import *

N, y, z = Symbols (\n y z')

F = (n * * 3) * (y * * 2) + n * y * 2 * * 3

F = diff (F, n, 2)

F = diff (F, n, 2)

F = diff (F, 2, 2)

lap-f = f, + f, + F3
puint ("Required laplacian=", lap-f)

point = {n:1, y:1, 2:2} lapat-point = lap-f. subs(point) puint (* Value at point (1,1,2) = ", lap-at-point)

Output:

Required Laplacoan = 3*xxyxx2+2*xxx3+6*xxyx2

Value at point (1,1,2) = 20

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3)	find the matrix of linear transformation T: R2 -> R2 defined by T(n,y) = (2x+3y, 4x-5y) with respect to the standard basis
	$T: \mathbb{R}^2 \to \mathbb{R}^2$ dulend by $T(-)$ (0. 2. (1. 5.)
Sol:	T: R2 -> R2 defined by T(x,y) = (2x+3y, 4x-5y)
	Standan basis of R2 is
	e1=(1,0), e,=(0,1)
	Applying T to each basis
	$T(e_1) = T(1,0) = [2(1)+3(0), 4(1) = 5(0)]$ $= [2,4]$
	= [2,4]
	$T(e_2) = T(0,1) = [2(0)+3(1), 4(0)+5(1)]$
	= [3,-5]
	To form the transformation materix, [T] = [(al 1 (al2] = [T(e)) T(e2)]
	[T] = [(al1 (al2] = [T(e)) T(e2)]
	·· [T] = 2 3
	4 -5
	The state of the s
	Teacher's Signature

```
from sympy impart x
    impart sympy as sym
     emport numpy as up
     K, y, n = Symbols ("K, y, x")
     dy T(n):
          1- new = 0
           x,y = n(0), n(1)
                                          4xx-5xy])
           2-new = np. away (C2XX+3Xy,
           return simplify (x-new)
    u1= np. amay ([1,0])
    42=up. array ([0,1])
     V1 = np. array ([1,0])
     V2 = np. array ([0,1])
     eq0 = np. annay ([V, (0] * x, 12[0] * y])
     eq 1= np. array ([V, [1] *x, V2 [1] *y])
     ment (eg 0, eg 1)
     ao = np. away([T(u) [0], T(u)[0])
     a1 = np. amay ([T(U1)[1], T(U2)[1]])
     puint (a0[o] *x+a0(1) *y, and, a1(o) *x+a1(1) xy)
    puint (1 The matrix of linear trensformation is A,
                                                  Malu ([a0, a1])
Output:
     [no] [oy]
    2*x+3*y and 4 *x-5 *y
The matrix of linear transformation is A
                                              Matri x ([[2,3], [4,5]
```

	Date
Exp	t. No Page No
4.	Find the linear transportation for the matrix ([-1,0], [2,0], [1,3]) with respect to the basis $B1 = \{(1,0), (2,-1)\}$ and $B2 = \{(1,2,0), (0,-1,0), (t1,-1,1)\}$.
selv	Given, $A = \begin{bmatrix} -1 & 0 \\ 2 & 0 \end{bmatrix}$ $u_1 = \begin{bmatrix} 1 & 0 \end{bmatrix}$ $u_2 = \begin{bmatrix} 2 & -1 \end{bmatrix}$
	$V_1 = [1, 2, 0]$ $V_2 = [0, -1, 0]$ $V_3 = [1, -1, 1]$
	Now, we multiply first column of A with x_1 , x_2 and x_3 . $T(x_1) = -1 \cdot [1, 2, 0] + 2[0, -1, 0] + 1 \cdot [1, -1, 1]$ $= [-1, -2, 0] + [0, -2, 0] + [1, -1, 1]$ $= [0, -5, 1]$
	Semilarly $T(u_2) = 0 \cdot [1, 2, 0] + 0 [0, -1, 0] + 3 [1, -1, 1]$ $= [3, -3, 3]$
	column of u, and u.

9= x. u,[0] + y.[u,[0]] = x+2y

q= x. u,[1] + y. (1,[1] = 0 - y

Multiplying $T(u_1) \cdot p$ and $T(u_2)q$, we get $T(u_1) \cdot p = [0, -5x - 10y, x + 2y]$ $T(u_2) \cdot q = [-3y, 3y, -3y]$

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	Date
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Adding the above results,	
Adding the above results, T(u).p+T(u).q=[0	마양지역 보다 그렇게 하는 내용 마양이 되었다. 그 나는 사람들은 이 이 사람들이 되었다면 하는데 되었다면 하는데 되었다면 하는데 되었다면 하는데 되었다면 하다 되었다면 하는데
=[-3y,-5x-7y,x	- y]
so, the linear transformation	T is = [-3y, -5x-7y, x-y]
	Teacher's Signature

code:

Import numpy as np

a, b, x, y = Symbols ('a, b, x, y')

A = Matrix ([[-1,0], [2,0], [1,3]])

U1: np. array ([1,0])

U2: np. array ([2,-1])

V1: np. array ([1,2,0])

V2: np. array ([0,-1,0])

V3: np. array ([1,-1,1])

To=np. array ([A[0,0] * V1, A[1,0] * V2, A[2,0] * V3]) T1=np. array ([A[0,1] * V1, A[1,1] * V2, A[2,1] * V3])

SumTo = To[0]+To[1]+To[2] sumTi = Ti[0]+Ti[1]+Ti[2] pulut (sumTo, sumTi)

eq= np. amay [[u,[0] +x + u2[0] +y, u1[1] * x+u2[1] * y])
p, q = eq [0], eq [1]

puine (p, 'and', q)

t= sumTo*p + sumT1 × 9

publit ("the linear transformation T is T(2,y)="t)

Output:

[0 -5 1] [3-3 3]

2+2×y and -y

The linear transformation T & T (x,y)-

[-3*y -5*x-7*y 21-y]

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1, 8 , 15 , 18- j = 0- GWI