

MTH 622

Mega File

Solved by

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If $\vec{V}$ is a constant vector, then $\nabla \cdot \vec{V} =$ _____.

Select the correct option

☐	1
☒	0
☐	-1
☐	Any constant other than zero

A curl has _____ divergence.

Select the correct option



zero



non zero

Question # 29 of 30 (Start time: 08:22:42 AM, 08 July 2020)

For $\varphi = x$ the integration $\int_0^1 \int_0^1 \varphi \hat{k} dx dy$ gives

Select the correct option



$$\frac{1}{4} \hat{k}$$



$$\frac{1}{2} \hat{k}$$

The set of all values of scalar point function φ in R together forms a__

Select the correct option

	scalar field
	scalar vector
	scalar function
	vector function

$\nabla^2 \phi$ exists in a region R if

Select the correct option

☐	first order partial derivatives are continuous in R
☒	second order partial derivatives are continuous in R

$\oint_C \vec{A} \cdot d\vec{r}$ for $\vec{A} = \hat{j}$ becomes

Select the correct option

	$\oint_C dy$
	$\oint_C dy \hat{j}$

Question # 23 of 30 (**Start time: 08:17:57 AM, 08 July 2020**)

Both double and triple integrals can be used to calculate

Select the correct option

☐	area under the curve
☐	length of curve
☒	volume of the given object
☐	None of these

The unit normal to the surface $x = 0$ is

Select the correct option

☐	$\pm \hat{j}$
☒	$\pm \hat{i}$
☐	$\pm \hat{k}$
☐	does not exist

Inertial frame of reference is always in state of motion.

Select the correct option

true



false



The unit vector $\hat{j}$ is normal to the surface

Select the correct option

☐	$x = 0$
☒	$y = 0$
☐	$z = 0$
☐	none of these

Question # 29 of 30 (Start time: 01:14:44 PM, 08 July 2020)

If the angle between force and displacement is $\frac{\pi}{2}$ then the work done will be.

Select the correct option

maximum



zero



Question # 26 of 30 (Start time: 01:09:30 PM, 08 July 2020)

If k is curvature of a space curve then radius of curvature is

Select the correct option

☐ $\sqrt{k}$

☒ $\frac{1}{k}$

$\oint_C d\vec{r} \times \vec{B}$ for $\vec{B} = k\vec{k}$ becomes

Select the correct option

	$\oint_C (dy\hat{i} - dx\hat{j})$
	$\oint_C (dz\hat{i} - dx\hat{k})$

The relation between cylindrical and cartesian coordinates is

Select the correct option

	$x = \rho \cos \theta, y = \rho \sin \theta, z = z$
	$x = \rho \sin \theta, y = \rho \cos \theta, z = z$

The relation between spherical and cartesian coordinates is

Select the correct option



$$x = r \sin \theta \cos \phi, y = r \sin \theta \sin \phi, z = r \sin \theta$$



$$x = r \sin \theta \cos \phi, y = r \sin \theta \sin \phi, z = r \cos \theta$$

If $\nabla\varphi = 4\hat{j} - 3\hat{k}$, then $|\nabla\varphi| =$ _____

Select the correct option



2



5



-5



$\sqrt{7}$

If the vector $\vec{V} = 2x\vec{i} + az\vec{k}$ is solenoidal, then the value of constant a is

Select the correct option

☐	2
☐	0
☒	-2
☐	1

Evaluate $\int_C (1 - \sin y)dx + xdy$ along the line segment joining $(0, 0)$ to $(0, 1)$

Select the correct option

1



0



$d\vec{r} = dx\hat{i} + dy\hat{j} + dz\hat{k}$ is called as the differential _____ vector.

Select the correct option

☒	Displacement
☐	Normal
☐	Unit
☐	Velocity

If $\vec{v} = x\vec{i}$, then the vector field $\vec{v}$ is

Select the correct option



solenoidal



non solenoidal

$$\int_0^1 \int_0^1 \int_0^1 \nabla \cdot \vec{i} \, dx dy dz =$$

Select the correct option



-1



0



1



3

Evaluate $\int \varphi d\vec{r}$ for $\varphi = e^x$

Select the correct option



$$e^x yz(\hat{i} + \hat{j} + \hat{k})$$



$$e^x \hat{i} + e^x y \hat{j} + e^x z \hat{k}$$

The surface integral of a vector field is called as the _____ of vector field through the surface.

Select the correct option



Gradient



Flux



Divergence



Curl

Question # 22 of 30 (Start time: 11:22:22 AM, 08 July 2020)

From Green's theorem the area bounded by a simple closed curve C is $\frac{1}{2} \oint_C xdy - ydx$.

Select the correct option

true



false



For $\varphi = xy$, the integral $\int \int \int_R \vec{\nabla} \varphi dV$, becomes

Select the correct option

[Reload Math Equations](#)


$$\int \int \int_R (x\hat{j} + y\hat{k}) dV$$


$$\int \int \int_R (y\hat{j} + z\hat{k}) dV$$

[Click to Save Answer & Move to Next Question](#)

If $\vec{A} = 2\hat{i} + \hat{k}$ and $\nabla\phi = 3\hat{i} + \hat{j}$ then $\vec{A} \times \nabla\phi =$ _____.

Select the correct option



$$-\hat{i} + 3\hat{j} + 2\hat{k}$$



$$-\hat{i} - 3\hat{j} + 2\hat{k}$$



$$-\hat{i} - 3\hat{j} - 2\hat{k}$$



$$-\hat{i} + 3\hat{j} - 2\hat{k}$$

Question # 1 of 30 (Start time: 12:20:23 PM, 08 July 2020)

Total Marks:

If $\vec{v}$ is a twice differentiable function, then its Laplacian is defined as

Select the correct option

[Reload Math Equations](#)

☐	$\Delta \vec{v}$
☐	$\nabla^2 \vec{v}$
☐	$\nabla \cdot \nabla \vec{v}$
	All of above

[Click to Save Answer & Move to Next Question](#)

Divergence of gradient of a vector function is equivalent to

Select the correct option



Laplacian operation



Curl operation



Double gradient operation



Null vector

If R be the projection of the surface S on the xz -plane, then $\iint_S \vec{A} \cdot \vec{n} dS =$

Select the correct option

[Reload Math Equations](#)



$$\iint_R \vec{A} \cdot \vec{n} \frac{dydz}{|\vec{n} \cdot \vec{j}|}$$



$$\iint_R \vec{A} \cdot \vec{n} \frac{dx dz}{|\vec{n} \cdot \vec{i}|}$$



$$\iint_R \vec{A} \cdot \vec{n} \frac{dz dx}{|\vec{n} \cdot \vec{j}|}$$



$$\iint_R \vec{A} \cdot \vec{n} \frac{dx dy}{|\vec{n} \cdot \vec{k}|}$$

_____ is the example of scalar field.

Select the correct option



Velocity



Displacement



Acceleration



Pressure

If $\vec{F}$ is a _____ vector field then $\int_C \vec{F} \cdot d\vec{r}$ is independent of path.

Select the correct option

 Reload Math Equations



scalar



conservative



irrotational



None of these

If $\nabla\varphi = -\hat{i} + 2\hat{j} - \hat{k}$, then $|\nabla\varphi| =$ _____

Select the correct option

 Reload Math Equations



2



3



$\sqrt{6}$

Greens theorem applies only to _____ vector fields

Select the correct option



one dimensional



two dimensional



three dimensional



None of these

If $\hat{n}$ is the unit normal to the surface S and ψ is a scalar point function having continuous partial derivatives then $\vec{\nabla} \psi \cdot \hat{n} = \frac{\partial \psi}{\partial n}$ implies

Select the correct option

 Reload Math Equations


$$\vec{\nabla} \psi \cdot d\vec{S} = \frac{\partial \psi}{\partial n} dS$$

☐
$$\vec{\nabla} \psi \cdot d\vec{S} = \frac{\partial \psi}{\partial n} \hat{n}$$

A curve which does not intersect itself anywhere is known as simple

Select the correct option



Curve



Path



Closed curve



None of above

$$\nabla \varphi \cdot \hat{k} = \underline{\hspace{2cm}}$$

Select the correct option



$$\frac{\partial \varphi}{\partial x}$$



$$\frac{\partial \varphi}{\partial y}$$



$$\frac{\partial \varphi}{\partial z}$$



$$\frac{\partial \varphi}{\partial z} \hat{k}$$

Question # 30 of 30 (Start time: 01:15:48 PM, 08 July 2020)

Total Marks: 1

The divergence operator when applied to the quantity of a vector field gives a _____ field.

Select the correct option

☒ Vector☐ Scalar

The radial component of velocity for a particle moving in circular path is

Select the correct option



constant



radius itself



variable



zero



The _____ of the gradient of ϕ is zero.

Select the correct option

 Divergence

☐ Curl

☐ Gradient

☐ Scalar field

Gradient of a scalar function represents a _____ vector to the surface.

Select the correct option



Tangent



Secant



Normal



Unit

If $\vec{A}$ is irrotational and $\nabla \times \vec{A} = (c-1)\vec{i} + (a-4)\vec{j} + (b-2)\vec{k}$. Then the value of a must be

Select the correct option



2



0



1



4

Inertia is directly related with mass of the body.

Select the correct option

 true

☐ false

Question # 26 of 30 (Start time: 08:20:38 AM, 08 July 2020)

Stokes' theorem is a special case of Green's theorem when applied to a region in the xy -plane.

Select the correct option

☒ true

☐ false

A particle moves in a plane in such a way that at any time t its distance from the origin is $r = 2t + 3t^2$ and its angle with positive x-axis is $\theta = \sqrt{t}$. Find the radial and transverse components of velocity.

Select the correct option

 Refresh Math Equation

☒ $2 + 6t$ and $(\sqrt{t} + \frac{3}{2}t^{\frac{1}{2}})$

☐ $2 + 6t$ and $\frac{1}{2\sqrt{t}}$

Gauss's divergence theorem is also called Green's theorem in space.

Select the correct option



true



false

$$\nabla \varphi \cdot \hat{j} = \underline{\hspace{2cm}}.$$

Correct option

$$\frac{\partial \varphi}{\partial x}$$



$$\frac{\partial \varphi}{\partial y}$$

$$\frac{\partial \varphi}{\partial z}$$

$$\frac{\partial \varphi}{\partial y} \hat{j}$$

$\hat{j} \times \vec{\nabla} \varphi$ for $\varphi = x$ becomes

Select the correct option



$$\hat{k}$$



$$-\hat{k}$$

Question # 6 of 30 (Start time: 10:32:43 AM, 08 July 2020)

The unit normal to the surface $x + y - 2 = 0$ is

Select the correct option

☐	$\frac{1}{\sqrt{2}}(\hat{k} + \hat{j})$
☐	$\frac{1}{\sqrt{2}}(\hat{i} + \hat{k})$
☒	$\frac{1}{\sqrt{2}}(\hat{i} + \hat{j})$
☐	does not exist

If $\nabla \cdot \vec{V} = 0$ everywhere in some region of R , then $\vec{V}$ is called _____ point function in the region.

Select the correct option



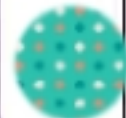
zero vector



unit vector



co-initial vector



solenoid vector

The Stoke's theorem can be used to find which of the following?

Select the correct option



Surface area enclosed by a function in the given region



Volume enclosed by a function in the given region



Linear distance



Curl of the function

If φ and ψ are scalar point functions then $\nabla \left(\frac{\varphi}{\psi} \right) =$

Select the correct option

☐

$$\frac{\psi \nabla \varphi - \varphi \nabla \psi}{\psi^2}, \psi \neq 0$$

☐

$$\frac{\psi \nabla \varphi + \varphi \nabla \psi}{\psi^2}, \psi \neq 0$$



$$\frac{\psi \nabla \varphi - \varphi \nabla \psi}{\psi^2}, \psi \neq 0$$

☐

$$\frac{\psi \nabla \varphi + \varphi \nabla \psi}{\psi^2}, \psi \neq 0$$

Question # 18 of 30 (Start time: 10:46:25 AM, 08 July 2020)

The second vector form of Green's theorem is also called

Select the correct option



Normal form of Green's theorem



tangential form of Green's theorem

$$\int_C K \vec{A} \cdot d\vec{r} = \underline{\hspace{2cm}}$$

Select the correct option

	$K \int_C \vec{A} \cdot d\vec{r}$
☐	$\vec{A} \int_C K \cdot d\vec{r}$
☐	$\int_C \vec{A} (K \cdot d\vec{r})$
☐	$\int_C (\vec{A} \cdot d\vec{r}) K$

Question # 22 of 30 (Start time: 10:49:21 AM, 08 July 2020)

If $\vec{V}$ is a constant vector, then $\nabla \cdot \vec{V} =$ _____.

Select the correct option

☐	1
☒	0
☐	-1
☐	Any constant other than zero

Evaluate $\int_0^1 \int_0^1 \int_0^1 \vec{\nabla} \cdot \hat{j} \, dx dy dz =$

Select the correct option

☐	1
☐	-1
☒	0
☐	3

If $\vec{A} = \hat{i}$ then $\int_0^1 \int_0^1 \int_0^1 \vec{A} \, dx \, dy \, dz =$

Select the correct option

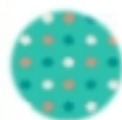
☐	$-\hat{i}$
☒	$\hat{i}$
☐	$3\hat{i}$
☐	$-3\hat{i}$

Evaluate $\int \varphi d\vec{r}$ for $\varphi = x$

Select the correct option



$$\frac{x^2}{2} yz (\hat{i} + \hat{j} + \hat{k})$$



$$\frac{x^2}{2} \hat{i} + xy\hat{j} + xz\hat{k}$$

Question # 24 of 30 (Start time: 10:50:36 AM, 08 July 2020)

The infinitesimal rotation of a vector field is described by the _____

Select the correct option

☐	Divergence
☐	Gradient
☒	Curl
☐	Scalar

The unit normal to the surface $yz - 1 = 0$ is

Select the correct option

☐	$\frac{1}{\sqrt{y^2 + z^2}}(y\hat{i} + z\hat{k})$
☐	$\frac{1}{\sqrt{y^2 + z^2}}(y\hat{j} + z\hat{k})$
☒	$\frac{1}{\sqrt{y^2 + z^2}}(z\hat{j} + y\hat{k})$
☐	does not exist

Question # 9 of 30 (Start time: 09:05:18 AM, 08 July 2020)

The Green's theorem in plane can be written in tangential form as

Select the correct option

☐	$\oint_C \vec{B} \cdot \hat{n} dS = \iint_S \vec{\nabla} \cdot \vec{A} dR$
☒	$\oint_C \vec{A} \cdot d\vec{r} = \iint_R (\vec{\nabla} \times \vec{A}) \cdot \hat{k} dR$

Which of the following surface integrals property is NOT true?

Select the correct option

☐	$\iint_S K \vec{A} \cdot d\vec{S} = K \iint_S \vec{A} \cdot d\vec{S}$
☐	$\iint_S (\vec{A} + \vec{B}) \cdot d\vec{S} = \iint_S \vec{A} \cdot d\vec{S} + \iint_S \vec{B} \cdot d\vec{S}$
☐	$\iint_S \vec{A} \cdot d\vec{S} = \iint_{S_1} \vec{A} \cdot d\vec{S} + \iint_{S_2} \vec{A} \cdot d\vec{S}$
☒	$\iint_S \vec{A} \cdot d\vec{S} = \iint_S \vec{A} \cdot d\vec{S} + \iint_S \vec{A} \cdot d\vec{S}$

$\oint_C \vec{A} \cdot d\vec{r}$ for $\vec{A} = \hat{k}$ becomes

Select the correct option

<input data-bbox="48 735 102 791" type="radio"/>	$\oint_C dz \hat{k}$
<input checked="" data-bbox="34 1127 130 1239" type="radio"/>	$\oint_C dz$

Question # 4 of 30 (Start time: 10:29:54 AM, 08 July 2020)

When a particle moves along a straight path, then the particle has

Select the correct option

☐	tangential acceleration only
☐	centripetal acceleration only
☐	both tangential and centripetal acceleration
	none of these

The parametric equations of a circle of radius 9 are

Select the correct option

☐	$x = \sqrt{9} \cos t$ $y = \sqrt{9} \sin t$
☒	$x = 9 \cos t$ $y = 9 \sin t$
☐	$x = 3 \sin t$ $y = 3 \cos t$
☐	$x = 9 \cos t$ $y = 9 \cos t$

Question # 30 of 30 (Start time: 08:53:16 AM, 08 July 2020)

Evaluate $\int_c (e^{x+y+z}) dz$ along the line segment joining $(0, 0, 0)$ to $(0, 0, 1)$.

Select the correct option

☐	$e - 1$
☒	$e + 1$

Question # 29 of 30 (Start time: 08:52:10 AM, 08 July 2020)

The normal component of acceleration is zero when motion of particle is

Select the correct option

☐	curvilinear
☐	rotational
☒	rectilinear
☐	translation

$\oint_C d\vec{r} \times \vec{B}$ for $\vec{B} = x\hat{i}$ becomes

Select the correct option

	$\oint_C (x dz \hat{j} - x dy \hat{k})$
	$\oint_C (x dz \hat{i} + x dy \hat{k})$

Question # 18 of 30 (Start time: 08:42:41 AM, 08 July 2020)

The Green's theorem in plane can be written in normal form as

Select the correct option


$$\oint_C \vec{A} \cdot d\vec{r} = \iint_R (\vec{\nabla} \times \vec{A}) \cdot \hat{k} dR$$


$$\oint_C \vec{B} \cdot \hat{n} dS = \iint_S \vec{\nabla} \cdot \vec{B} dR$$

Question # 15 of 30 (**Start time: 08:39:55 AM, 08 July 2020**)

If del operator is applied on a scalar function ϕ then $\nabla\phi$ is a

Select the correct option

☒	Scalar field
☐	Vector field

Question # 5 of 30 (Start time: 08:30:02 AM, 08 July 2020)

If $\vec{F}$ is a conservative vector field then $\int_C \vec{F} \cdot d\vec{r}$ is _____ of path.

Select the correct option



dependent



independent

Question # 9 of 30 (**Start time: 08:35:03 AM, 08 July 2020**)

Divergence is _____ operator.

Select the correct option

☒	scalar
☐	vector
☐	directional
☐	None of these

Question # 8 of 30 (Start time: 08:33:35 AM, 08 July 2020)

Evaluate $\int_c (\cos^2 x \sin y) dy$ along the line segment joining $(0, 0)$ to $(0, \pi)$.

Select the correct option

2



-2



Question # 25 of 30 (Start time: 10:21:14 AM, 08 July 2020)

According to Newton's second law of motion the net force applied on a body is equal to the rate of change of momentum of body.

Select the correct option

☒ true

☐ false

Question # 2 of 30 (Start time: 10:59:15 AM, 08 July 2020)

The Laplacian of ϕ is also called as

Select the correct option

☐	Gradient of divergence of ϕ
☒	Divergence of gradient of ϕ
☐	Curl of ϕ
☐	Divergence of curl of ϕ

If $\vec{r}$ is a position vector, then $\nabla \cdot \left[\vec{r} \nabla \left(\frac{1}{r} \right) \right] =$

Select the correct option

	$\frac{1}{r^2}$
	$\frac{1}{r}$
	$r \frac{1}{r}$
	$r \frac{1}{r^2}$

A field which is not irrotational is sometimes called a _____ field

Select the correct option

☒ Vortex

☐ Non rotational

☐ Solenoid

☐ Tangential

The value of $d\vec{r} = dx\hat{i} + dy\hat{j} + dz\hat{k}$ for the curve $x = t^2$, $y = 2t - 1$ and $z = 3t^2$ is

Select the correct option

Reload

☐

$$d\vec{r} = (2t + 2 + 6t)dt$$

☒

$$d\vec{r} = (2t\hat{i} + 2\hat{j} + 6t\hat{k})dt$$

☐

$$d\vec{r} = t\hat{i} + 2\hat{j} + 6t\hat{k}$$

☐

$$d\vec{r} = (t^2\hat{i} + 2t\hat{j} + 3t^2\hat{k})dt$$

Question # 11 of 30 (Start time: 11:09:49 AM, 08 July 2020)

Gauss's divergence theorem is also called Green's theorem in space.

▶ Select the correct option



true



false

If $\vec{A} = a\vec{i}$ then $\int_0^a \int_0^a \int_0^a \vec{A} \, dx \, dy \, dz =$

Select the correct option

☐	$4a\vec{i}$
☐	$\frac{a^4}{4}\vec{i}$
☒	$a^4\vec{i}$
☐	$-4a\vec{i}$

Kinetic energy of a body is due to its motion and cannot be transferred into other forms of energies.

Select the correct option



true



false

$\hat{i} \times \vec{\nabla} \varphi$ for $\varphi = x$ becomes

Select the correct option

☒	$\vec{0}$
☐	$\hat{j}$

Question # 12 of 30 (Start time: 10:07:55 AM, 08 July 2020)

The Green's theorem can be related to which of the following theorems mathematically

Select the correct option

☐	Gauss divergence theorem
☒	Stoke's theorem
☐	Euler's theorem
☐	Leibnitz's theorem

Question # 9 of 30 (Start time: 10:05:47 AM, 08 July 2020)

The tangential form of Green's theorem in plane is also called Stokes theorem in the plane.

Select the correct option

true



false



The necessary and sufficient condition for a vector field $\vec{V}$ to be conservative is that $\vec{V}$ is

Select the correct option



Rotational



Irrotational



Solenoid



Vortex

Question # 24 of 30 (Start time: 10:20:26 AM, 08 July 2020)

The rate of change of tangential velocity of an object traveling in a circular orbit or path is known as

Select the correct option



Normal acceleration



Tangential acceleration



Rectangular acceleration



None of these

If $\vec{T}$ is a unit vector to a space curve C and S is the arc length then $\frac{d\vec{T}}{ds}$ is

Select the correct option

☐	parallel to $\vec{T}$
☒	perpendicular to $\vec{T}$

Divergence theorem states that if R is the region bounded by a closed surface S , $\hat{n}$ is outward drawn unit normal to S and $\vec{A}$ is a vector p derivatives then $\int \int_S \vec{A} \cdot \hat{n} dS = ?$ where

•
•

Select the correct option

☐

$$\int \int \int_R \vec{\nabla} \cdot \vec{A} dV$$



$$\int \int \int_R \vec{\nabla} \cdot \vec{A} dV$$

$\oint_C \vec{A} \cdot d\vec{r}$ for $\vec{A} = 2\hat{i}$ becomes

Select the correct option



$$2 \oint_C \hat{i} dx$$



$$2 \oint_C dx$$

Question # 29 of 30 (Start time: 09:24:57 AM, 08 July 2020)

The volume element dV in Cylindrical polar coordinates is

Select the correct option



$$dV = \rho d\rho d\phi$$



$$dV = \rho d\rho d\phi dz$$

$$\nabla \varphi \cdot \hat{j} = \underline{\hspace{2cm}}.$$

$$\frac{\partial \varphi}{\partial x}$$

$$\frac{\partial \varphi}{\partial y}$$

$$\frac{\partial \varphi}{\partial z}$$

$$\frac{\partial \varphi}{\partial y} \hat{j}$$



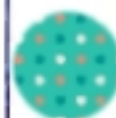
If the angle between force and displacement is greater than $\frac{\pi}{2}$ then the work done will be

-
.

Select the correct option

☐

positive



negative

Question # 12 of 30 (Start time: 03:01:26 PM, 08 July 2020)

An ellipse is a simple closed curve.

Select the correct option

true



false



If a simple closed curve lying in a region R , can be continuously shrunk to a point then R is

-
-

Select the correct option

	multiply connected region
	simply connected region