$\int_c ds = \cdots \ldots \ldots ?, where\ C\ is\ the\ curve\ x = 3\cos t, y = 3\sin t, 0 \le t \le \pi$

(a) 3π (b) π (c) 2π (d) 3π/2

The closed line integral $\int_C Mdx + Ndy$ over the curve C is independent of the path if ?

(a) $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$ (b) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ (c) $\frac{\partial N}{\partial x} = -\frac{\partial M}{\partial y}$ (d) $\frac{\partial M}{\partial x} = -\frac{\partial N}{\partial y}$

If V represent the force field then the work done by V along any simple closed path is ... ?

(a) 0 (b) V (c) 2V (d) none of these

$\oint_C (x + xy^2)dx + (y + x^2y)dy$

$= \cdots \ldots \ldots ..?\ where\ C\ is\ the\ boundary\ of\ the\ region\ bounded\ by\ x = y, x = y^2$

(a) 0 (b) 21 (c) 12 (d) 123

$\oint_C (4xy + x^2)dx + (3y + 2x^2)dy$

$= \cdots \ldots \ldots ..?\ where\ C\ is\ the\ boundary\ of\ the\ region\ bounded\ by\ x^2 = y, x = y^2$

(a) 0 (b) 101 (c) 112 (d) 123

$\int_c r \times dr = \cdots \ldots \ldots ?, where\ C\ is\ the\ circle\ x^2 + y^2 = a^2, z = 0\ and\ r = xi + yj + zk$

(a) 0 (b) 1 (c) -1 (d) 3

The area bounded by the closed curve $x = a\cos t, y = b\sin t, x \ge 0, y \ge 0\ is$

(a) $\frac{\pi ab}{4}$ (b) πab (c) $\frac{\pi ab}{2}$ (d) $\frac{\pi ab}{3}$

The area bounded by the closed curve $x = 4\cos t, y = 4\sin t, 0 \le t \le 2\pi\ \ is$

(a) 16π (b) 4π (c) $3\pi/2$ (d) $\pi/3$

The surface area of the surface $z^2 = x^2 + y^2$, $0 \leq z \leq 4$ *is* ?

(a) $16\sqrt{2}\,\pi$ (b) $\sqrt{2}\,\pi$ (c) $4\sqrt{2}\,\pi$ (d) $16\,\pi$

$$\iint_S (yzdydz + zxdzdx + xydxdy)$$

$$= \ ?: S \text{ is the surface of the cube with edge of length one unit}$$

(a) 0 (b) 4π (c) $\pi/2$ (d) $2\pi/3$

$$\iint_S (xdydz + ydzdx + zdxdy) = \ ?: S \text{ is the surface } x^2 + y^2 + z^2 = 16$$

(a) 256π (b) 144π (c) 0 (d) 32π

If S is the boundary of a closed region D and n is outward unit normal vector drawn to surface S and $= xi + yj + zk$ then $\iint_S (r.n)dA = ?$ (V is the volume of the region)

(a) 3V (b) 2V (c) V (d) V/2

$$\iint_S (r.n)dA = ? \ \ S \text{ is the surface } x^2 + y^2 + z^2 = 9$$

(a) 108π (b) 144π (c) 0 (d) 32π

$$\iint_S (curl\, V.n)dA = ? \ \ \text{where } S \text{ is the surface } 0 \leq x \leq 4, 0 \leq y \leq 2,$$

$$0 \leq z \leq 3 \text{ and } V = xyi + zxj - zk$$

(a) 0 (b) 12 (c) 324 (d) 128

The parametric representation of the paraboloid of revolution $x^2 + y^2 = z$ is

(a) $r(u,v) = u\cos v\, i + usinv\, j + u^2 k$ (b) $r(u,v) = a\cos u\, i + asinu\, j + u\, k$

(c) $r(u,v) = \mathrm{v}\cos u\, i + vsinu\, j + v\, k$ (d) $r(u,v) = v\cos u\, i + vsinu\, j + uk$

The parametric representation of the helix is ?

(a) $r(t) = a\cos t\, i + a\, sint\, j + ct\, k$ (b) $r(t) = a\cos t\, i + asint\, j + k$

(c) $r(t) = \cos t\, i + sinu\, t + k$ (d) $r(t) = a\cos t\, i + asint\, j + tk$

If r(t) denotes the position vector of a point P on the curve C, then the unit tangent vector to curve C at P

Is given by?

(a) $\frac{r^{/}(t)}{|r^{/}(t)|}$ (b) $\frac{r^{//}(t)}{|r^{/}(t)|}$ (c) $\frac{r^{//}(t)}{|r(t)|}$ (d) $\frac{r^{//}(t)}{|r^{//}(t)|}$

If V(t) is the vector function then $[\,V(t)\times V^{/}(t)]^{/}$ =?

(a) $V(t)\times V^{//}(t)$ (b) $V(t)\times V^{/}(t)$ (c) $V^{/}(t)\times V^{/}(t)$ (d) none

8 The length of the curve $r(t) = \cos t\, i + sint\, j + t\, k, 0 \le t \le 2\pi\ is$

(a) $2\sqrt{2}\pi$ (b) $\sqrt{2}\pi$ (c) $3\sqrt{2}\pi$ (d) $5\sqrt{2}\pi$

If $r(t) = x(t)i + y(t)j + z(t)k$,then the norm of r(t) is equal to

(a) $[x(t)^2 + y(t)^2 + z(t)^2\ ]^{1/2}$ (b) $[x(t)\ + y(t)\ + z(t)\ ]^{1/2}$

(c) $[x(t)^2 + y(t)^2 + z(t)^2\ ]^2$ (d) $[x(t)^2 + y(t)^2 + z(t)^2\ ]$

The length of the curve $r(t) = \cos t\, i + sint\, j + 3t\, k, 0 \le t \le 2\pi$

(a) $4\pi\sqrt{10}$ (b) $2\pi\sqrt{10}$ (c) $\pi\sqrt{10}$ (d) $3\pi\sqrt{10}$

If $r = xi + yj + zk, then\ the\ grad\left(\frac{1}{r}\right) = ?$

(a) $-\frac{\vec{r}}{r^3}$ (b) $\frac{\vec{r}}{r^3}$ (c) $-\frac{\vec{r}}{r}$ (d) $-2\frac{\vec{r}}{r^3}$

The vector normal to the surface $f(x,y,z) = c$ at the point P is given by ?

(a) $\nabla f(P)$ (b) $\nabla . f(P)$ (c) $\nabla\times f$ (d) none

The directional derivative of $f(x,y,z)$ in the direction of $\underset{b}{\rightarrow}$ is ?

(a) $\nabla f . \frac{\vec{b}}{|b|}$ (b) $\nabla f . b$ (c) $\nabla . f$ (d) none

The equation of tangent plane to the surface $x^2 - 3y^2 - z^2 = 2$ $at\ the\ point$ $(3,1,2) is$?

(a) $3x - 3y - 2z = 2$ (b) $3x - 3y + 2z = 2$ (c) $3x + 3y - 2z = 2$ (d) $3x + 3y + 2z = 2$

If V is a differentiable vector field then $\nabla.(\nabla \times f) = ?$

(a) 0 (b) f (c) -f (d) 2f

If V is a differentiable vector field then $\mathrm{curl}(\mathrm{div}(\mathrm{V})) = ?$

(a) 0 (b) 1 (c) -1 (d) not defined

A force field F is said to be conservative if ?

(a) $\nabla \times F \neq 0$ (b) $\nabla \times F = 0$ (c) $\nabla . F = 0$ (d) None

If $f(x,y,z)$ satisfy the Laplace equation $\nabla^2 f = 0, then\ \nabla f(x,y,z)\ is\ a?$

(a) solenoidal (b) Irrotational (c) Both a & b (d) none

If **a** is a constant vector and $\boldsymbol{r} = xi + yj + zk$ then which of the following is true?

(a) $\nabla.(a.r) = a$ (b)) $\nabla.(a \times r) = 0$ (c) $\nabla \times (a \times r) = 2a$ (d) All of these