Question No : 1 of 26 Marks: 1 (Budgeted Time 1 Min)

Which of the following is geometrical representation of set of real numbers?

Answer (Please select your correct option)

- Co-ordinate line
- xy-plane

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- Sphere
- Circular cylinder

Question No : 2 of 26 Marks: 1 (Budgeted Time 1 Min)

There is one-to-one correspondence between the set of points on a co-ordinate line and ----------

Answer (Please select your correct option)

- Set of real numbers

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- Set of integers
- Set of natural numbers
- Set of rational numbers

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Question No : 3 of 26 Marks: 1 (Budgeted Time 1 Min)

An ordered triple corresponds to ---------- in a three dimensional space.

Answer (Please select your correct option)

- A unique point
- A point in each octant

- Three points
- Infinite number of points

Question No : 4 of 26 Marks: 1 (Budgeted Time 1 Min)

If the positive directions of x and y axes are known then ---------- the positive direction of z-axis.

Answer (Please select your correct option)

- Horizontal rightward direction is
- Horizontal leftward direction is
- Left hand rule tells
- Right hand rule tells

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Question No : 5 of 26 Marks: 1 (Budgeted Time 1 Min)

If a function is not defined at some point, then its limit ---------- exist at that point.

Answer (Please select your correct option)

- Always
- Never
- May

Question No : 6 of 26 Marks: 1 (Budgeted Time 1 Min)

A composition of continuous functions . . . . . .

Answer (Please select your correct option)

- is always continuous

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- may or may not be continuous
- is discontinuous
- is piece-wise continuous

Question No : 7 of 26 Marks: 1 (Budgeted Time 1 Min)

According to the Euler's theorem, the order of partial differentiation can be changed, provided the function and all of its partial derivatives are. . . . . .

Answer (Please select your correct option)

- Piece-wise continuous
- Continuous
- Discontinuous

Question No : 8 of 26 Marks: 1 (Budgeted Time 1 Min)

If $x = f(r,s)$ and $r = g(t)$, $s = h(t)$, then derivative of x with respect to t is written as. . . . . .

Answer (Please select your correct option)

- $\frac{\partial x}{\partial t}$
- (x,t)
- $\frac{\partial^2 x}{\partial t^2}$
- $\frac{dx}{dt}$

correct

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Question No : 9 of 26 Marks: 1 (Budgeted Time 1 Min)

A vector in a plane is always represented by a . . . . . .

Answer (Please select your correct option)

- Line
- Curve
- Line segment

- None of these.

Question No : 10 of 26 Marks: 1 (Budgeted Time 1 Min)

If two vectors $\vec{a}$ and $\vec{b}$ have the relation $\vec{a} = \lambda\vec{b}$ where λ is a none-zero scalar then $\vec{a}$ and $\vec{b}$ are . . . . . to each other.

Answer (Please select your correct option)

- Orthogonal
- Non-parallel
- Parallel
- None of these

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Question No : 11 of 26 Marks: 1 (Budgeted Time 1 Min)

The function decreases most rapidly in the direction of . . . . . .

Answer (Please select your correct option)

- $-\nabla f$
- $-|\nabla f|$
- $\nabla f \times \hat{u}$
- $|\nabla f|$

Question No : 12 of 26 Marks: 1 (Budgeted Time 1 Min)

Tthe direction of gradient at any point on the surface is . . . . . to the tangent plane at that point.

Answer (Please select your correct option)

- parallel
- perpendicular

- opposite direction
- None of these.

Question No : 13 of 26 Marks: 1 (Budgeted Time 1 Min)

$2x^2 + y^2 = 4$ is the . . . . . form of equation of a curve.

Answer (Please select your correct option)

- Parametric
- Implicit

- Symmetric
- Explicit

Question No : 14 of 26 Marks: 1 (Budgeted Time 1 Min)

If $f(x,y)$ has a relative extremum at a point (x_0,y_0) and both the first partial derivatives of f exist at this point, then . . . . . .

Answer (Please select your correct option)

- $f_x(x_0,y_0) = 0$ and $f_y(x_0,y_0) \neq 0$
- $f_x(x_0,y_0) \leq 0$ and $f_y(x_0,y_0) \leq 0$
- $f_x(x_0,y_0) \geq 0$ and $f_y(x_0,y_0) \geq 0$
- $f_x(x_0,y_0) = 0$ and $f_y(x_0,y_0) = 0$

correct

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Question No : 15 of 26 Marks: 1 (Budgeted Time 1 Min)

For a function $f(x)$, if $f'(x)$ is equal to some non-zero constant, then $f(x)$ will have . . . . . .

Answer (Please select your correct option)

- At least one critical point

- No critical point
- Non-zero critical points
- None of these

Question No : 16 of 26 Marks: 1 (Budgeted Time 1 Min)

Let x, y, z be the length, width and height of an open rectangular box. The surface area of the box will be . . . . . .

Answer (Please select your correct option)

- $A = xy + 2yz + 2xz$
- $A = yz + 4$
- $A = xz + yz + zx$
- $A = xyz$

Question No : 17 of 26 Marks: 1 (Budgeted Time 1 Min)

Double integral of a function $f(x,y)$ represents . . . . . of the region between the surface defined by the function and the plane which contains its domain.

Answer (Please select your correct option)

- Perimeter
- Volume
- Area
- Circumference

Question No : 18 of 26 Marks: 1 (Budgeted Time 1 Min)

For the double integral $\int_c^d \int_a^b f(x,y)dxdy$, order of integration does not matter provided that $f(x,y)$ is . . . . . .

Answer (Please select your correct option)

- Bounded
- Discontinuous
- Defined
- Continuous

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Question No : 19 of 26 Marks: 1 (Budgeted Time 1 Min)

If $R = \{(x, y) : 0 \le x \le 2 and -1 \le y \le 1\}$, then $\iint_R (x + 2y^2) dA =$ . . . . . .

Answer (Please select your correct option)

- $\int_{-1}^{1} \int_{0}^{2} (x + 2y^2) dy dx$
- $\int_{0}^{2} \int_{1}^{-1} (x + 2y^2) dx dy$
- $\int_{-1}^{1} \int_{0}^{2} (x + 2y^2) dx dy$
- $\int_{1}^{2} \int_{-1}^{0} (x + 2y^2) dx dy$

Question No : 20 of 26 Marks: 1 (Budgeted Time 1 Min)

If $R = \{(x, y) : 0 \le x \le 4 \text{ and } 0 \le y \le 9\}$, then $\iint_R (3x - 4x\sqrt{xy})dA =$ . . . . . .

Answer (Please select your correct option)

- $\int_0^9 \int_0^4 (3x - 4x\sqrt{xy})dydx$
- $\int_0^4 \int_4^9 (3x - 4x\sqrt{xy})dxdy$
- $\int_4^9 \int_4^0 (3x - 4x\sqrt{xy})dxdy$
- $\int_0^4 \int_0^9 (3x - 4x\sqrt{xy})dydx$

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Question No : 21 of 26 Marks: 2 (Budgeted Time 4 Min)

Given that $f_{xx} = -6x,\ f_{yy} = -6y,\ f_{xy} = 3$ for some $f(x,y)$. Check whether $f(x,y)$ has relative maximum, relative minimum or a saddle point at P $(1,1)$.

Answer (Please click here to Add Answer)

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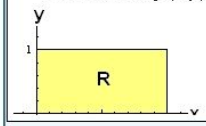
Question No : 22 of 26 Marks: 2 (Budgeted Time 4 Min)

Let the function $f(x,y)$ is continuous in the region R, where R is a rectangle as shown below.



Answer (Please click here to Add Answer)

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Question No : 23 of 26 Marks: 3 (Budgeted Time 6 Min)

Let $y = 3x^2 - 5$. If x changes from 2 to 2.1, find the approximate change in the value of y using differential dy.

Answer (Please click here to Add Answer)

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Question No : 24 of 26 Marks: 3 (Budgeted Time 6 Min)

If the order of integration for the integral $\int_0^1 \int_y^1 e^{x^2} dx dy$ is changed. Find the change in the limits of new integral.

Answer (Please click here to Add Answer)

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Question No : 25 of 26 Marks: 5 (Budgeted Time 10 Min)

Find equation of normal line (in parametric form) to the surface $f(x, y, z) = xy + 2yz - xz^2 + 10$ at the point $(-5, 5, 1)$.

Answer (Please click here to Add Answer)

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Question No : 26 of 26 Marks: 5 (Budgeted Time 10 Min)

Evaluate $\int_1^4 \int_0^2 (6x^2 + 4xy^3)dx\,dy$

Answer (Please click here to Add Answer)

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