Max Marks: 1

**Correct Option** 

Max Marks: 1

**Correct Option** 

OVERALL ANALYSIS

Solution Report

All Correct Answers Wrong Answers Not Attempted Questions

Q.1)

The value of

$$\lim_{x \to 0} \frac{x^2 sin \frac{1}{x}}{sin x} =$$



Solution: (B) Solution B

$$\begin{split} &=\lim_{x\to 0}\frac{x^2sin\frac{1}{x}}{sinx}\\ &=\lim_{x\to 0}\frac{x}{sinx}\times xsin\frac{1}{x}\\ &=1\times 0\\ &\lim_{x\to 0}xsin\frac{1}{x}=0\ as\mid xsin\frac{1}{x}\mid\leq\mid x\mid \end{split}$$

None of these

1/2

Q.2)

The function

$$f(x) = \frac{x}{1 + |x|}$$

Solution: (A)

Is differentiable on R

Solution A.

f(x) can be rewritten as

$$f(x) = \left\{ \begin{array}{ll} \frac{x}{1+x} & if x \ge 0 \\ \frac{x}{1+x} & if x < 0 \end{array} \right.$$

Since x/(1+x) and x/(1-x) and x<0 have non zero polynomials in their denominators, they are differentiable in the respective domains. For x=0 we can check directly

$$f'(0+) = \lim_{h \to 0+} \frac{f(h) - f(0)}{h}$$

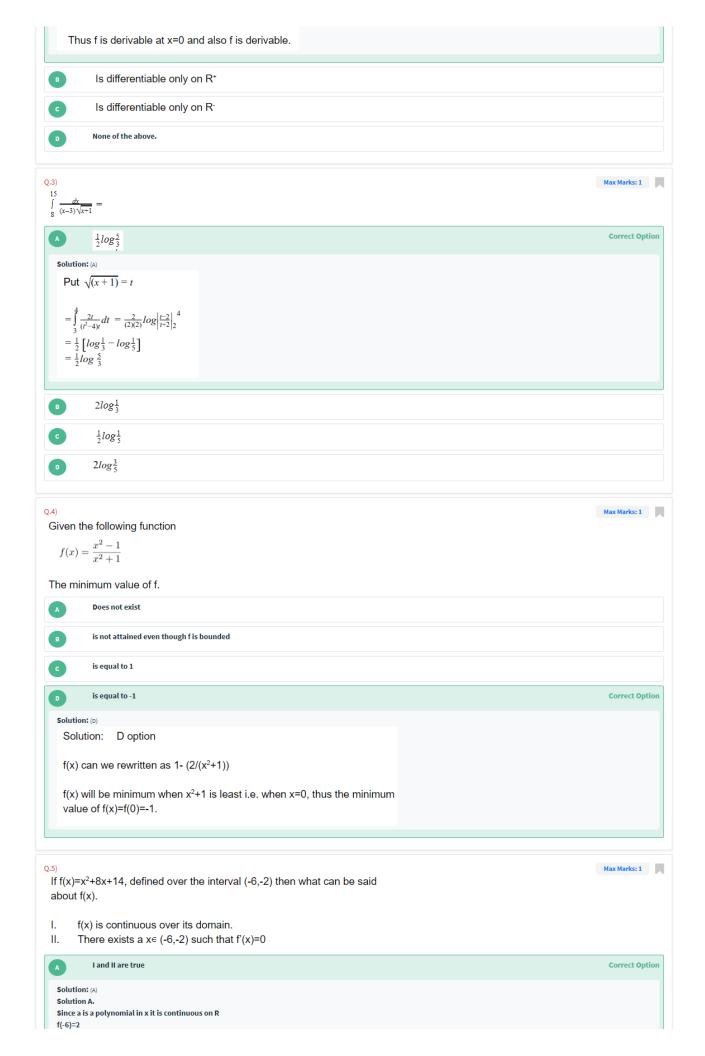
$$=\lim_{h\to 0+}\frac{\frac{h}{1+h}-0}{h-0}$$

$$=\lim_{h\to 0+}\frac{1}{1+h}=1$$

$$f'(0-) = \lim_{h \to 0-} \frac{f(h) - f(0)}{h}$$

$$=\lim_{h\to 0-}\frac{\frac{h}{1-h}-0}{h-0}$$

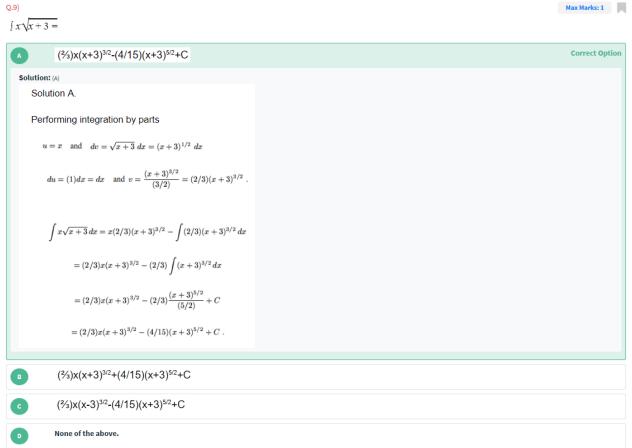
$$=\lim_{h\to 0-}\frac{1}{1-h}=1$$



В	I is only true		
<u> </u>	II is true		
	Neither I nor II is true		
	ACCIONATE CALC		
	number of points at which the function is discontinuous in the al $[0,\pi]$ is		Max Marks: 1
f(x)	$x) = \frac{1 + \cos 5x}{1 - \cos 4x}$		
		Correct Answer	
Cle Cos 4x= x=0	ion: (3) colution early this $f(x)$ is only discontinuous when 1-cos4x=0 as $4x$ =1 =0 or $2\pi$ or $4\pi$ 0, $\pi$ /2, $\pi$ . le no of values is 3.		
The f $f(x)$	function $x)=\frac{\cos x-\sin x}{\cos 2x}$ of defined at x= $\pi/4$ . The value of f( $\pi/4$ ) so that f(x) is continuous ywhere is		Max Marks: 1
The f $f(x)$	$a(x)=rac{cosx-sinx}{cos2x}$ of defined at x= $\pi$ /4. The value of f( $\pi$ /4) so that f(x) is continuous		Max Marks: 1
The f $f(x)$ is not every	$x) = \frac{\cos x - \sin x}{\cos 2x}$ of defined at x= $\pi/4$ . The value of f( $\pi/4$ ) so that f(x) is continuous sywhere is		Max Marks: 1
The f $f(x)$ is not every	$x) = \frac{\cos x - \sin x}{\cos 2x}$ of defined at x= $\pi/4$ . The value of f( $\pi/4$ ) so that f(x) is continuous sywhere is		Max Marks: 1
f(x)	$x) = \frac{\cos x - \sin x}{\cos 2x}$ of defined at x= $\pi/4$ . The value of f( $\pi/4$ ) so that f(x) is continuous sywhere is $\frac{1}{\sqrt{1-x^2}}$		Max Marks: 1  Correct Op
f(x)	$x) = \frac{\cos x - \sin x}{\cos 2x}$ of defined at x= $\pi/4$ . The value of f( $\pi/4$ ) so that f(x) is continuous sywhere is $1$ $-1$ $\sqrt{2}$ $1/\sqrt{2}$ $\frac{1}{\sqrt{2}}$ from: (D) solution option d		
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The f	at defined at $x=\pi/4$ . The value of $f(\pi/4)$ so that $f(x)$ is continuous sywhere is  1  1  1  1  1  1  1  1  1  1  1  1  1		
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n(n-1)/2

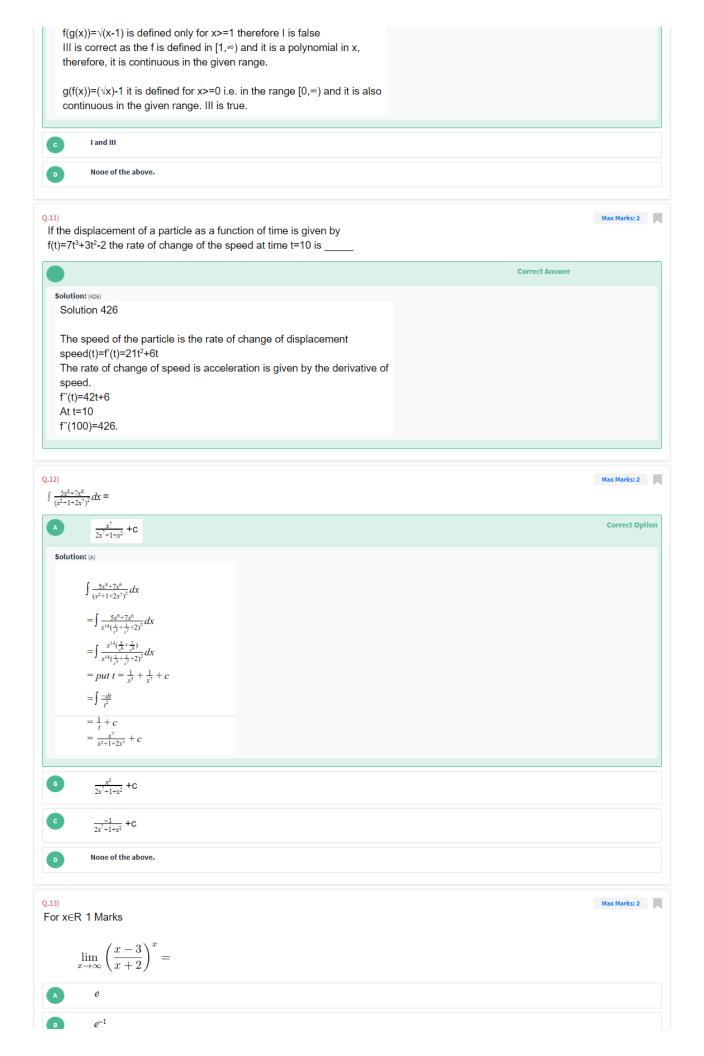




Q.10)
Let f and g be defined by  $f(x) = \sqrt{x}$  and g(x) = x - 1 Then which of the following are true.

1. f(g(x)) is continuous on  $[0,\infty)$ 11. g(f(x)) is continuous on  $[0,\infty)$ 11. f(g(x)) is continuous on  $[1,\infty)$ A land II

Solution: (8)
Solution B Option



Max Marks: 2

**Correct Answer** 

D

 $e^5$ 

Q.14)
Compute the area of the region enclosed by the graphs of the equations

x=y³ and x=y²+2y in the positive quadrant.\_\_\_\_ (upto 3 decimal places)

solution: (2.667)
Solution: 2.667

Begin by finding the points of intersection of the two graphs.

 $x=y^3$  $x=y^2+2y$ 

y³=y²+2y

y(y+1)(y-2)=0

y=0,-1,2

For y=0 x=0

For y=-1 x=1

For y=2 x=8

Now as we are concerned about the +ve quadrant we need from x=0 to 2

The area enclosed can be given by (area of the higher curve - area of the lower curve)

In the interval [0,2]

As both the equation are of the form x= some polynomial in y we can compute the area using y as the independent variable.

$$\int_0^{\,2} (Right \,-\, Left) \; dy$$

$$\int_0^2 ((y^2 + 2y) - y^3) \ dy$$

$$\left. \left( rac{y^3}{3} + y^2 - rac{y^4}{4} 
ight) 
ight|_0^2$$

 $\binom{8}{4}$   $\binom{1}{4}$   $\binom{1}{6}$ 

Q.15)

The following integral can be given by

 $\int \frac{1}{x^2 - 4} \, dx$ 

 $\frac{1}{4}ln\frac{|x+2|}{|x-2|} + C$ 



 $\frac{1}{4}ln\frac{|x-2|}{|x+2|} + C$ 

**Correct Option** 

Max Marks: 2

Solution: (B)

Solution B

$$= \int \frac{1}{(x+2)(x-2)} \, dx$$

Dividing into partial fractions.

$$= \int \left(\frac{A}{x+2} + \frac{B}{x-2}\right) dx$$

let 
$$x = -2$$
:  $A(-4) + B(0) = 1 \longrightarrow A = -\frac{1}{4}$ 

let 
$$x = 2$$
:  $A(0) + B(4) = 1 \longrightarrow B = \frac{1}{4}$ .)

$$= \int \left( \frac{-1/4}{x+2} + \frac{1/4}{x-2} \right) dx$$

$$= \int \left( -(1/4)\frac{1}{x+2} + (1/4)\frac{1}{x-2} \right) dx$$

$$= -\frac{1}{4} \ln |x+2| + \frac{1}{4} \ln |x-2| + C$$

$$= \frac{1}{4} \Big( \ln|x - 2| - \ln|x + 2| \Big) + C$$

$$= \frac{1}{4} \ln \frac{|x-2|}{|x+2|} + C \ .$$

C

 $\frac{1}{2} l n \frac{|x-2|}{|x+2|} + C$ 

D

None of the above