

Mark {a, b, c, or d} for the correct answer in the space below for Q.1. - Q.10 [ Marks 10 x 1.5 = 15 ]

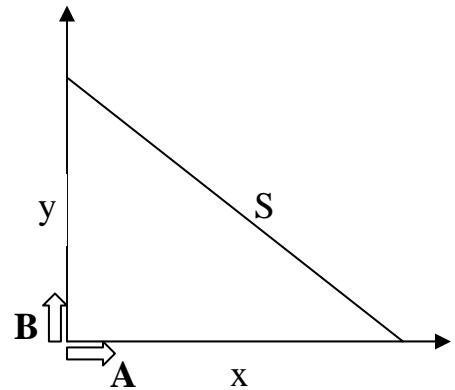
Q. No.	1	2	3	4	5	6	7	8	9	10
Select from {a,b,c,d}										

- Q.1. Let  $f(x) = |x|$ , then  $f(x)$  satisfies on  $[-1, 1]$  the conditions of  
 (a) Rolle's theorem only, (b) Mean value theorem only, (c) both Rolle's and Mean value theorems ,  
 (d) None of these.
- Q.2. The liner approximation of the  $f(x) = \cos x + x$  near  $a = 0$  is  
 (a)  $1+x$ , (b)  $x$ , (c)  $1-x$ , (d)  $2+x$
- Q.3. If  $y = x^2 + 1$ , then the approximate value of  $y$  when  $x$  changes from 1 to 1.01 is given by  
 (a) 0.01, (b) 0.2, (c) 0.02, (d) None of these.
- Q.4. If  $A = \pi r^2$ , and Rate of increase of  $A$  is  $\frac{dA}{dt} = 4\pi$  cm/sec, then the rate of increase of radius  $r$   
 at  $r = 1$  cm is  
 (a) 1 cm/sec, (b)  $2\pi$  cm/sec, (c) 2 cm/sec, (d) None of these.
- Q.5. If  $f(x)$  has a critical number  $x = -1$  and  $f''(-1) = +2$ , then at  $x = -1$   
 (a)  $f(x)$  has local minima, (b)  $f(x)$  has local maxima, (c)  $f(x)$  has a point of inflection,  
 (d) None of these.
- Q.6. The absolute maxima of  $f(x) = 1 - x^{\frac{2}{3}}$  on  $[-1, 8]$  is  
 (a) 8, (b) -1, (c) 1, (d) 0.
- Q.7. The critical numbers of  $f(x) = \sqrt{x^2 - 4}$  are  
 (a) 0, (b) -2, 2 (c) -2, 0, 2 (d) None of these.
- Q.8.  $f(x) = x^3 - 6x^2 + 5$  is decreasing on the interval  
 (a)  $[4, \infty)$ , (b)  $(-\infty, 0]$ , (c)  $[0, 4]$ , (d) None of these.
- Q.9. The  $x$ - coordinate of the points of inflection of  $f(x) = 2x^2 + \frac{2}{x}$  is  
 (a) -1, (b) 1, (c) 0, (d) None of these.
- Q.10. If  $f(x) = x^4 - 6x^2$ , it is concave downwards on  
 (a)  $(-\infty, -1)$ , (b)  $(-1, 1)$ , (c)  $(1, \infty)$ , (d) None of these.

Q.11. Use implicit differentiation to find  $\frac{dy}{dx}$  if the curve given by the equation  $\cos(x - y) = y \sin x$ . [4]

Q.12. If  $y = \left[ \frac{\tan(3x)}{\sqrt{x}} \right]^2$ , find  $\frac{dy}{dx}$ . [3]

Q.13. Two boats started from a point at the same time. Boat A is moving at rate of 4 ft/sec towards east and Boat B is moving at the rate of 3 ft/sec towards north. Find the rate at which the distance between boats are changing after 10 secs. [5]



Q.14. Verify that the conditions of Rolle's theorem are satisfied for the  $f(x) = x^2 - 6x + 8$  on  $[2,4]$ , also find all values of  $c$  that satisfy the conclusion of the theorem. [5]

Q.15. Let  $f(x) = 2x^3 - 3x^2 - 12x + 3$ , use second derivative test to find local extrema, discuss concavity and find all points of inflection, sketch the graph. [8]