Pimpri Chinchwad Education Trust's
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UDISE NO: 27252001412 College Index No: J.11.16.066

Unit Test –I 2020-21

Subject-Mathematics (40) **Marks-25**

Std-12 th Sci **Time – 1 $\frac{1}{2}$hr**

Section A

Q.1 Select and write most appropriate answer from the given alternatives for each subquestion. **[2 x5]**

1. If y = $e^{sin^{-1}x}$ and $(1 - x^2)(\frac{dy}{dx})^2 = Ay^2$ then A = ---------

   a) m b) -m c) m^2 d) $-m^2$

2. If $\log_{10}(\frac{x^2-y^2}{x^2+y^2}) = 2$ then $\frac{dy}{dx}$ = ----------

   a) $\frac{-99x}{101y}$ b) $\frac{99x}{101y}$ c) $\frac{-99y}{101x}$ d) $\frac{99y}{101x}$

Q.2 Answer the following questions **[1 X 3]**

1. Differentiate $\sin(x^2+x)$ with respect to x.
2. Find $\frac{dy}{dx}$ if $x + \sqrt{xy} + y = 1$
3. Find the approximate value of $\sqrt{8.95}$

Section B

Attempt any Four of the following. [2x4]

Q.3 Differentiate following function with respect to x , $(\sqrt{3x-5} - \frac{1}{\sqrt{3x-5}})^5$.

Q.4 Find the equation of tangent and normal to the curve at the point on it,

$x^2 - \sqrt{3}xy + 2y^2 = 5$ at $(\sqrt{3}, 2)$

Q.5 Using the derivative prove that , $\tan^{-1} x + \cot^{-1} x = \frac{\pi}{2}$

Q.6 Find approximate value of $(3.97)^4$.

Q.7 Find $\frac{d^2y}{dx^2}$ if x = a cos θ and y = bsin θ at $\theta = \frac{\pi}{4}$

Q.8 check whether conditions of Rolle's theorem are satisfied by the following function,

F(x) = x^2- 2x + 3 , x ∈ (1,4)

Section C

Attempt any Two of the following {2x3] Q.9 To Q.11

Q.9 A spherical soap bubble is expanding so that its radius is increasing at the rate of 0.02cm/sec. At what rate is the surface area is increasing, when its radius is 5 cm?

Q.10 If $Sec^{-1}\left(\frac{7x^3-5y^3}{7x^3+5y^3}\right)$ = m ,show that $\frac{d^2y}{dx^2} = 0$

Q.11 verify Lagrange's mean value theorem for the following functions, f(x) = x^2- 3x -1 , x ∈ $\left(\frac{-11}{7}, \frac{13}{7}\right)$

Section D

Attempt any One of the following **[1x4]**

Q 12. If y = f(x) is a differential function of x on the interval I and y is one one , onto and $\frac{dy}{dx} \neq 0$ On I. Also if $f^{-1}(y)$ is differentiable on I then $\frac{d}{dy}[f^{-1}(y)] = \frac{1}{f'(x)}$ or $\frac{dx}{dy} = \frac{1}{\frac{dy}{dx}}$ where $\frac{dy}{dx} \neq 0$

Q.13 If $x^m.y^n = (x + y)^{m+n}$,then prove that $\frac{dy}{dx} = \frac{y}{x}$