ASSIGNMENT-1

EE24BTECH11057-SHIVAM SHILVANT*

- 9) The slope of tangent to curve y=f(x) at [x, f(x)] is 2x + 1. If the curve passes through the point (1,2), then the area bounded by curve, the x axis and the line x = 1 is (1995S)
 - a) $\frac{5}{6}$
- b) $\frac{6}{5}$ c) $\frac{1}{6}$
- d) $\frac{6}{1}$
- 10) If $f(x) = \frac{x}{\sin x}$ and $g(x) = \frac{x}{\tan x}$, where $0 < x \le 1$, then in this interval (1997 2Marks)
 - a) both f(x) and g(x) are increasing functions.
 - b) both f(x) and g(x) are decreasing functions.
 - c) f(x) is an increasing function.
 - d) g(x) is an increasing function.
- 11) The function $f(x) = \sin^4 x + \cos^4 x$ increases
 - a) $0 < x < \frac{\pi}{8}$

c) $\frac{3\pi}{8} < x < \frac{5\pi}{8}$

b) $\frac{\pi}{4} < x < \frac{3\pi}{8}$

- d) $\frac{5\pi}{8} < x < \frac{3\pi}{4}$
- 12) Consider the following statements in S and

(2000S)

(1999 - 2Marks)

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S: Both $\sin x$ and $\cos x$ are decreasing functions in the interval $\left(\frac{\pi}{2},\pi\right)$

R: If a differentiable function decreases in a interval (a,b), then its derivative also decreases in (a, b).

Which of the following is true?

- a) Both S and R are wrong.
- b) Both S and R are correct, but R is not the correct explanation of S.
- c) S is correct and R is correct explanation for S.
- d) S is correct and R is wrong.
- 13) Let $f(x) = \int e^x (x-1)(x-2) dx$. Then f decreases in the interval (2000S)

(2000S)

a) $(-\infty, -2)$

(1,2)

b) (-2, -1)

- d) $(2, +\infty)$
- 14) If normal to curve y = f(x) at the point (3,4) makes an angle $\frac{3\pi}{4}$ with the positive x-axis, then f'(3) = (2000S)
 - a) $-\frac{1}{3}$ b) $-\frac{3}{4}$

- c) $\frac{4}{3}$ d) 1
- 15) Let $f(x) = \begin{cases} |x|, & \text{for } 0 < |x| \le 2 \\ 1, & \text{for } x = 0 \end{cases}$ then at x = 0,
 - a) a local maximum
 - b) no local maximum
 - c) a local minimum
 - d) no extremum
- 16) For all $x \in (0,1)$ (2000S)
 - a) $e^x < 1 + x$
 - b) $\log_{e} (1 + x) < x$
 - c) $\sin x > x$
 - d) $\log_e x > x$
- 17) If $f(x) = xe^{x(1-x)}$, then f(x) is (2001S)
 - a) increasing on $\left[-\frac{1}{2}, 1\right]$
 - b) decreasing on R
 - c) increasing on R
 - d) decreasing on $\left[-\frac{1}{2}, 1\right]$
- 18) The triangle formed by tangent to curve $f(x) = x^2 + bx b$ at the point (1, 1) and the coordinate axes, lies in the first quadrant. If its area is 2, then the value of b is (2001S)
 - a) -1

c) -3

b) 3

- d) 1
- 19) Let $f(x) = (1+b^2)x^2 + 2bx + 1$ and let m(b) be the minimum value of f(x). As b varies, the range of m(b) is (2001S)

b)
$$(0, \frac{1}{2}]$$
 c) $[\frac{1}{2}, 1]$

c)
$$\left[\frac{1}{2}, 1\right]$$

- 20) The length of a longest interval in which the function $3 \sin x 4 \sin^3 x$ is increasing, (2002S)is
 - a) $\frac{\pi}{3}$

c) $\frac{3\pi}{2}$

b) $\frac{\pi}{2}$

- d) π
- 21) The point(s) on the curve $y^3 + 3x^2 = 12y$ where the tangent is vertical, is(are) (2002S)

a)
$$\left(\pm \frac{4}{\sqrt{3}}, -2\right)$$

(0,0)

b)
$$\left(\pm\sqrt{\frac{11}{3}},1\right)$$

- d) $\left(\pm \frac{4}{\sqrt{2}}, 2\right)$
- 22) In [0,1] Lagranges Mean Value theorem is NOT applicable to (2003S)

a)
$$f(x) = \begin{cases} \frac{1}{2} - x, x < \frac{1}{2} \\ \left(\frac{1}{2} - x\right)^2, x \ge \frac{1}{2} \end{cases}$$

b) $f(x) = \begin{cases} \frac{\sin x}{x}, x \ne 0 \\ 1, x = 0 \end{cases}$

b)
$$f(x) = \begin{cases} \frac{\sin x}{x}, & x \neq 0 \\ 1, & x = 0 \end{cases}$$

- c) f(x) = x|x|
- d) f(x) = |x|
- 23) Tangent is drawn to ellipse $\frac{x^2}{27} + y^2 = 1$ at $(3\sqrt{3}\cos\theta, \sin\theta)$ (where $\theta \in (0, \frac{\pi}{2})$). Then the value of θ such that sum of intercepts on axes made by this tangent is minimum, is (2003S)
 - a) $\frac{\pi}{3}$

b) $\frac{\pi}{6}$

c) $\frac{\pi}{8}$