MIDTERM EXAMINATION
Spring 2009
MTH101- Calculus And Analytical Geometry (Session - 6)
Time: 60 min
Marks: 40

Calculus & Analytical Geometry-I

Question No: 1 (Marks: 1) - Please choose one

The set {…,-4,-3,-2,-1,0,1,2,3,4,..} is know as set of …….

- Natural numbers
- Integers
- Whole numbers
- None of these

Question No: 2 (Marks: 1) - Please choose one

The domain of the function $h(x) = \frac{1}{(x-2)(x-4)}$ is

- $(-\infty, 2) \cup (2, 4) \cup (4, +\infty)$
- $(-\infty, 2\} \cup \{2, 4\} \cup \{4, \infty)$
- $(-\infty, 2.5) \cup (2.5, 4.5) \cup (4.5, \infty)$
- All of these are incorrect

Question No: 3 (Marks: 1) - Please choose one

If the $\lim_{x \to a} f(x) = L$ then the inequality $(L - \epsilon) < f(x) < L + \epsilon$ holds in any subset of the interval

- $(a - \delta, a) \cup (a, a + \delta)$
- $(a - 1, a) \cup (a, a + 1)$
- $(a - \epsilon, a) \cup (a, a + \epsilon)$
- None of these

Question No: 4 (Marks: 1) - Please choose one

$L - \epsilon < f(x) < L + \epsilon$ Can be written as

- $f(x) - L < \epsilon$
- $f(x) - L > \epsilon$
- $f(x) - L < \epsilon + 1$
- None of these

Question No: 5 (Marks: 1) - Please choose one

If a function satisfies the conditions

f(c) is defined

$\lim_{x \to c^+} f(x)$

Exists

$\lim_{x \to c^+} f(x) = f(c)$

Then the function is said to be

- Continuous at c
- Continuous from left at c

► Continuous from right at c

► None of these

Question No: 6 (Marks: 1) - Please choose one

$\frac{d}{dx}[sex] = - - - - -$

► $\frac{\sin x}{1-\sin^2 x}$

► $\frac{-\sin x}{1-\sin^2 x}$

► $\frac{1}{1-\sin^2 x}$

► None of these

Question No: 7 (Marks: 1) - Please choose one

$\log_b ac = - - - - - -$

► $\log_a b + \log_c b$

► $\log_{a+c} b$

► None of these

Question No: 8 (Marks: 1) - Please choose one

$\log g^r = - - - - - -$

► $a \log_b r$

- $b\log_a r$
-
- None of these

Question No: 9 (Marks: 1) - Please choose one

If $f''(x) < 0$ on an open interval (a,b) then f is ---------- on (a,b)

- None of these
- Concave up
- Concave down
- Closed

Question No: 10 (Marks: 1) - Please choose one

If f is a twice differentiable function at a stationary point x_0 and $f''(x_0) > 0$ then f has relative ..... At x_0

- Minima
- Maxima
- None of these

Question No: 11 (Marks: 1) - Please choose one

A line is called a tangent line to the circle if it meets the circle at precisely .....

- One point
- Two points
- Infinite points
- None of these

Question No: 12 (Marks: 1) - Please choose one

The equation $(x+4)^2 + (y-1)^2 = 6$ represents a circle having center at ..... and radius .....

- $(-4,1), 6$

- $(-4,-1)$, 6
- ►
- None of these

Question No: 13 (Marks: 1) - Please choose one

The $\lim_{x \to a} f(x)$ *where* $f(x) = k$

(k is a constant) is equal to

- k+2
- k+1
- k
- kf

Question No: 14 (Marks: 1) - Please choose one

For any polynomial $P(x) = c_0 + c_1 x + \ldots + c_n x^n$ and any real number a

$\lim_{x \to a} P(x) = c_0 + c_1 a + \ldots + c_n a^n =$

- $P(a)$
- ►
- $P(a+1)$
- ►
- $P(a-1)$
- ►
- $\frac{1}{P(a)}$
- ►

Question No: 15 (Marks: 1) - Please choose one

Polynomials are always ..... Function

- Continuous
- Discontinuous

Question No: 16 (Marks: 1) - Please choose one

$\frac{D}{Dx}[dh(x)] = - - - -$

where d is a constant

- $dh(x)$
- $dh'(x)$
- 0
- None of these

Question No: 17 (Marks: 1) - Please choose one

The graph $x = y^2$ is symmetric about

- X-axis
- Y-axis
- Origin
- None of these

Question No: 18 (Marks: 1) - Please choose one

Consider two function $f(x) = 3 \quad x and g(x) = \quad x$ what is true about these functions

- $f(x).g(x) = 3x$
- $\frac{f(x)}{g(x)} = 3x$
- $f(g(x)) = 3x$
- None of these

Question No: 19 (Marks: 1) - Please choose one

The formula $\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ is called ..... with respect to x of the function f

- Derivative
- Slope
- Tangent
- None of these

Question No: 20 (Marks: 1) - Please choose one

Suppose that $f \text{ and } g$ are differentiable function of x then $\frac{d}{dx}\left(\frac{f}{g}\right)$

- $\frac{g.f' - f.g'}{g^2}$
- $\frac{g.f' + f.g'}{g^2}$
- $\frac{g.f' - f.g'}{g}$
- None of these

Question No: 21 (Marks: 2)

If

$$\frac{dy}{dx} = -\frac{3yx^2 + 1}{28y^3 + x^3}$$

then find the slope of the tangent line at the point (2, 0).

Question No: 22 (Marks: 3)

$$Let \quad f(x) = \begin{cases} x^2 - x - 2 & if \quad x \neq -1 \\ x + 1 & \\ -3 & if \quad x = -1 \end{cases}$$

At what points the function f is continuous and discontinuous? At point of discontinuity if any explain why it is discontinuous?

Question No: 23 (Marks: 5)

Differentiate w.r.t. x by chain rule $y = x^2 + 1$

Question No: 24 (Marks: 10)

Evaluate the following limit.

$$\lim_{y \to -2} g(y) \quad \text{where, } g(y) = \begin{cases} y^2 + 5 & \text{if } y < -2 \\ 3 - 3y & \text{if } y \geq -2 \end{cases}$$