MIDTERM EXAMINATION
MTH101- Calculus And Analytical Geometry

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

$$h(x) = \frac{1}{(x-2)(x-4)}$$

The domain of the function 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 $(L - \varepsilon) < f(x) < L + \varepsilon$ holds in any subset of the interval

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

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

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

- ▶ $|f(x)-L| < \varepsilon$
- ▶ $|f(x)-L| > \varepsilon$
- ▶ $|f(x)-L| < \varepsilon+1$
- ▶ 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

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

- ▶ $\log_b a + \log_b c$
- ▶ $\log_a b + \log_c b$
- ▶ $\log_{a+c} b$
- ▶ None of these

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

$\log_b a^r = ------$

- ▶ $a \log_b r$
- ▶ $r \log_b a$
- ▶ $b \log_a r$
- ▶ 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 .....

► $(-4,1),\sqrt{6}$
► $(-4,1),6$
► $(-4,-1),\sqrt{6}$
► 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 $P(x) = c_0 + c_1 x + ... + c_n x^n$ and any real number a

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

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

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 $f(x)=3\sqrt{x} and g(x)=\sqrt{x}$ what is true about these functions

- $f(x).g(x)=3x$
- $f(x)/g(x)=3x$
- $f(g(x))=3x$
- 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 $\frac{d}{dx}(\frac{f}{g})$

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

Question No: 21 (Marks: 2)

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

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

Question No: 22 (Marks: 3)

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

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 $y = \sqrt{x^2+1}$

Question No: 24 (Marks: 10)

Evaluate the following limit

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