RISE OF NATION ACADEMY

"We Create the Impeccable Creature"

Test Paper

Standard – XII

Subject –Mathematics

Max. Marks - 80 **Date** – 13/10/2019

Min. Marks – 40 **Time – 3 hrs.**

1 Marks Question:

Q.1 If a relation R on the set {1, 2, 3} be defined by R = {(1, 2)}, then R is –

(a) reflexive (b) transitive (c) symmetric (d) None of these

Q.2 If $A = \{x \in Z : 0 \leq x \leq 12\}$ and R is the relation in A given by R = {(a, b) : a = b}. Then, the set of all element related to 1 is

(a) {1, 2} (b) {2, 3} (c) {1} (d) {2}

Q.3 The value of $\tan^{-1}\left[2sin(2\cos^{-1}\frac{\sqrt{3}}{2})\right]$ is

(a) $\frac{\pi}{3}$ (b) $\frac{2\pi}{3}$ (c) $\frac{-\pi}{3}$ (d) $\frac{\pi}{6}$

Q.4 If A and B are two matrices of the order 3 x m and 3 x n respectively and m = n, then the order of the matrix (5A – 2B) is-

(a) m x 3 (b) 3 x 3 (c) m x n (d) 3 x n

Q. 5 If the sides of an equilateral triangle are increasing at the rate of 4 cm/s, then the rate at which the area increases, when side is 5 cm, is

(a) 10 cm^2 /s (b) $\sqrt{3}$ cm^2 /s (c) $10\sqrt{3}$ cm^2 /s (d) $\frac{10}{3}$ cm^2 /s

Q.6 $\int_0^{\frac{\pi}{2}} \sqrt{1 - sin2x}\, dx$ is equal to –

(a) $2\sqrt{2}$ (b) $2(\sqrt{2}+1)$ (c) 2 (d) $2(\sqrt{2}-1)$

Q.7 $\int \frac{cos2x}{(sinx+cosx)^2} dx$ is equal to

(a) $\frac{1}{sinx+cosx}+c$ (b) $log|sinx+cosx|+c$ (c) $log|sinx-cosx|+c$ (d) $\frac{1}{(sinx+cosx)^2}+c$

Q.8 if $f(x)=2x$ *and* $g(x)=\frac{x^2}{2}+1$, then which of the following can be a discontinuous function?

(a) $f(x)+g(x)$ (b) $f(x)-g(x)$ (c) $f(x).g(x)$ (d) $\frac{g(x)}{f(x)}$

Q.9 Two numbers of possible matrices of order 3 x 3, with each entry 2 or 0 is

(a) 9 (b) 27 (c) 81 (d) 512

Q.10 Matrices A and B will be inverse of each other only if

(a) AB = BA (b) AB = BA = O (c) AB = O, BA = I (d) AB = BA = I

Q.11 Let A be the non – singular square matrix of order 3 x 3, then $|adj\ A|$ is equal to

(a) $|A|$ (b) $|A|^2$ (c) $|A|^3$ (d) $3|A|$

Q.12 The function $f(x)=\frac{4-x^2}{4x-x^3}$ is

(a) discontinuous at only one point (b) discontinuous at exactly two points

(c) discontinuous at exactly three points (d) None of the above

Q.13 If $cosy=xcos(a+y)$ with $cosa\neq 1$, then $\frac{dy}{dx}$ is

(a) $\frac{sin^2(a+y)}{sina}$ (b) $\frac{cos^2(a+y)}{sina}$ (c) $sin^2(a+y)sina$ (d) None of these

Q.14 Derivative of $\cot^{-1}\left[\frac{\sqrt{1+sinx}+\sqrt{1-sinx}}{\sqrt{1+sinx}-\sqrt{1-sinx}}\right]$. $0<\frac{\pi}{2}$ is

(a) $\frac{1}{2}$ (b) 1 (c) 2 (d) None of these

Q.15 If $x^y=y^x$, then $x(x-ylogx)\frac{dy}{dx}$ *is equal to* −

(a) $y(y - xlogy)$ (b) $y(y + xlogy)$ (c) $x(x + ylogx)$ (d) $x(y - xlogy)$

Q.16 For the function $f(x) = x^3 - 5x^2 - 3x,\ x \in (a, b),$ where a = 1 and b = 4, the value of c for mean value theorem where $c \in (a, b) is -$

(a) 1 (b) $\sqrt{3}$ (c) 2 (d) $5/\sqrt{2}$

Q.17 If an error of 1° is made in measuring the angle of a sector of radius 30 cm, then the approximate error in its area is

(a) 450 cm^2 (b) 25π cm^2 (c) 2.5π cm^2 (d) None of these

Q.18 A right circular cylinder which is open at the top and has a given surface area, will have the greatest volume, if its height h and radius r are related by

(a) 2h = r (b) h = 4r (c) h = 2r (d) h =r

Q.19 Family of curves y = F(x) + C can be represented geometrically by shifting any one of the curves …..A….. to itself. Here, A refers to

(a) perpendicular (b) parallel (c) Both (a) and (b) (d) None of these

2 Marks Question:

Q.20 The value of $\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} \left(x^3 + xcosx + \tan^5 x + 1\right) dx\ is$

(a) zero (b) 2 (c) π (d) 1

(a) reflexive (b) transitive (c) symmetric (d) None of these

Q.21 Find the value of $\tan^{-1}(1) + \cos^{-1}\left(\frac{-1}{2}\right) + \sin^{-1}\left(\frac{-1}{2}\right).$

Q.22 If matrix $\begin{bmatrix} 0 & a & 3 \\ 2 & b & -1 \\ c & 1 & 0 \end{bmatrix} is$ a skew symmetric matrix, then find the values of a, b and c.

Q.23 Show that the function $f(x) = \begin{cases} \frac{sinx}{x} + cosx, & if\ x \neq 0 \\ 2, & if\ x = 0 \end{cases}$ **is continuous at x = 0.**

Q.24 If $x = acos\theta\ and\ y = bcos\theta$, **then find** $\frac{dy}{dx}$.

Q.25 A particle moves along the curve $6y = x^3 + 2$. **Find the points on the curve at which the y – coordinate is changing 2 times as fast as the x – coordinate.**

Q.26 It is given that at x = 1, the function $x^2 - 62x^2 + ax + 9$ **attains maximum value on the interval [0, 2]. Find the value of a.**

4 Marks Question:

Q.27 Find $\int \frac{2cosx}{(1+sinx)(1+sin^2x)} dx$.

Q.28 Evaluate $\int [sin(logx) + cos(logx)]dx$.

Q.29 The area of the region bounded by the curve $y^2 = sinx$ **between 0 and** 2π **is**

(a) 2 sq. units (b) 4 seq. units (c) 3 sq. units (d) 1 sq. units

Q.30 Show that the semi – vertical angle of the cone of the maximum volume and of given slant height is $\cos^{-1}\frac{1}{\sqrt{3}}$

Q.31 If the function $f(x) = \begin{cases} 3ax + b, & if\ x > 1 \\ 11, & if\ x = 1 \\ 5ax - 2b, & if\ x < 1 \end{cases}$ **is continuous at x = 1, then find the values of a and b.**

Q.32 Given a function define by $f(x) = \sqrt{4 - x^2};\ 0 \leq x \leq 2, 0 \leq f(x) \leq 2$. **Show that f is bijective function.**

6 Marks Question:

Q.33 If $\cos^{-1}\frac{x}{a}+\cos^{-1}\frac{y}{b}=\theta, then\ prove\ that\ \frac{x^2}{a^2}-\frac{2xy}{ab}cos\theta+\frac{y^2}{b^2}=sin^2\theta.$

Q.34 Find the inverse of Metrix $A=\begin{bmatrix}1 & 2 & 4\\ -1 & -2 & -1\\ 2 & 1 & -1\end{bmatrix}$ by elementary transformation method and verify that $A\,A^{-1}=I.$

Q.35 If $A=\begin{bmatrix}2 & -1 & 2\\ 2 & 1 & 2\\ 2 & 2 & 1\end{bmatrix}, then\ verify\ that\ A^3-6A^2+9A-4I=O\ and\ hence\ find\ A^{-1}.$

Q.36 Find the equation of tangent to the curve $x=acos\theta+a\theta sin\theta,\ y=asin\theta-acos\theta\ at\ any\ point\ \theta$ of the curve. Also show that at any point θ of the curve the normal is at a constant distance from origin.

Q.37 Show that the altitude of the right circular cone of maximum volume that can be inscribed in a sphere of radius r is $\frac{4r}{3}$. Also, show that the maximum volume of the cone is $\frac{8}{27}$. Of the volume of sphere.

Q.38 Show that the condition that the curves $ax^2+by^2=1\ and\ a_1x^2+b_1y^2=1$ should intersect orthogonally is that $\frac{1}{a}-\frac{1}{b}=\frac{1}{a_1}-\frac{1}{b_1}$.