ZIAUDDIN UNIVERSITY EXAMINATION BOARD

Total Time 3 hours
Total Marks: 100

Class: XII **HIGHER SECONDARY SCHOOL CERTIFICATE EXAMINATION 2024**
Time Allowed: 20 minutes **SUBJECT: MATHEMATICS MODEL PAPER**

Q1: **SECTION "A"** **Marks: 20**

Note: Attempt all questions from this section. Each question carries **one** mark.

i. $\lim_{y\to\infty}\left(1+\frac{1}{y}\right)^y =$
(a) 0 (b) 1 (c) e (d) e^y

ii. $\lim_{x\to 0}\frac{sin2x}{x}$
(a) 2 (b) $\frac{1}{2}$ (c) ∞ (d) 0

iii. $\lim_{x\to 2}\frac{x^2-4}{x-2}$
(a) $x+2$ (b) $x-2$ (c) $x+4$ (d) $x-4$

iv. If $y = e^{f(x)}$ then $\frac{dy}{dx}$ = :
(a)$e^{f(x)}$ (b) $e^{f(x)}f'(x)$ (c) $\frac{e^{f(x)}}{f(x)}$ (d) none of these

v. $\int cotx \ dx =$
(a) $ln\,sinx + c$ (b)$tan\,x + c$ (c)$sin\,x + c$ (d)$cosec^2x + c$

vi. $\int\frac{dx}{x\sqrt{x^2-1}}$
(a) $\sin^{-1}x + c$ (b) $\cos^{-1}x + c$ (c) $\tan^{-1}x + c$ (d) $\sec^{-1}x + c$

vii. $\int secx\,dx$= :
(a) $\ln(secx\,tanx) + c$ (b) $ln(secx + tanx) + c$ (c) $secx + c$ (d) $tanx + c$

viii. $\int cos90dx$ is equal to:
(a) $\cos 90^o + c$ (b) $\frac{cos90}{90} + c$ (c) 0 (d) $0.5x + c$

ix. $[\bar{a}\ \bar{b}\ \bar{c}]$ gives the volume of :
(a) parallelopiped (b) parallelogram (c) triangle (d) none of these

x. If a, b, c are coplanar vectors then [a b c] is:
(a) 0 (b) 1 (c) – 1 (d) 2

xi. If e > 1, then the conic is:
(a) circle (b) ellipse (c) parabola (d) hyperbola

xii. The "e" of parabola is:
(a) $\frac{1}{2}$ (b) – 1 (c) 1 (d) 0

xiii. If $b^2 = a^2(e^2 - 1)$, then the conic is called:
(a)ellipse (b)hyperbola (c)circle (d) parabola

xiv. If $m_1 = 2$ and $m_2 = -\frac{1}{2}$ then tanθ will be:
(a) ∞ (b) 0° (c) 90° (d) $-1°$

xv. Two intercept form of a straight line is:
(a) $ax + by + c = 0$ (b) $y - y_1 = m(x - x_1)$ (c) $\frac{x}{a}+\frac{y}{b} = 1$ (d) $y = mx + c$

xvi. The point $(-3,-1)$ with respect to the line $3x - 4y + 5 = 0$
(a) below (b) above (c) right side (d) none of these

xvii. Intercepts of the line $2x - 4y + 1 = 0$ are
(a) $-\frac{1}{2},\frac{1}{4}$ (b) $-\frac{1}{2},-\frac{1}{4}$ (c) $-\frac{1}{2},\frac{1}{4}$ (d) none of these

xviii. $\frac{d}{dx}secx$:
(a) $-cosec^2x$ (b) $secxtanx$ (c) $\sec^2 x$ (d) none of these

xix. If $f(x) = \tan^{-1}3x$, then $f'(x)$ is:
(a) $\frac{1}{1+9x^2}$ (b) $\frac{1}{9+x^2}$ (c) $\frac{3}{9+x^2}$ (d) $\frac{3}{1+9x^2}$

xx. If y = $lncosx$, then $\frac{dy}{dx}$ = :
(a) $\frac{1}{sinx}$ (b) cosx (c) -cotx (d) tanx

END OF SECTION A

ZIAUDDIN UNIVERSITY
EXAMINATION BOARD

Total Time 3 hours
Total Marks: 100

Class: XII **HIGHER SECONDARY SCHOOL CERTIFICATE EXAMINATION 2024**
Time: 2 hours 40 minutes **SUBJECT: MATHEMATICS SECTION "B" AND SECTION "C"** **Total Marks 80**

SECTION "B" SHORT ANSWER QUESTIONS — Marks 50

Note: Attempt any **ten** questions from this section. Each questions carries **five** marks.

Q.2 (i) A straight line passes through the points A(-12,-13) & B(-2,-5). Find the point on the line whose ordinate is 1.

(ii) If the line through (2,5) & (-3,-2) is perpendicular to the line through (4,-1) & (x,3). Find x.

OR

The centroid of the triangle whose two vertices are (2,4) & (3,-4) are found to be (3,1). Find its third vertex.

(iii) Find the coordinate of the foot of perpendicular from $(-2,5)$ to $3x + y + 11 = 0.2x + ky + 1 = 0$ be concurrent ?

(iv) Find the volume of parallelepiped whose three adjacent sides are represented by the vectors $\vec{a} = 2\hat{\imath} - 3\hat{\jmath} + 4\hat{k}$, $\vec{b} = \hat{\imath} + 2\hat{\jmath} - \hat{k}$, $\vec{c} = 3\hat{\imath} - \hat{\jmath} + 2\hat{k}$.

OR

Prove that $[\vec{a} + \vec{b} \quad \vec{b} + \vec{c} \quad \vec{c} + \vec{a}] = 2[\vec{a} \quad \vec{b} \quad \vec{c}]$

(v) Find the equation of the circle touching each of the axes in 4th quadrant at a distance of 6 units from the origin.

(vi) Find the equation of the circle which passes through the origin and cuts off intercepts equal to 3 & 4 from the axes.

(vii) Show that the tangents at the end of the lectra rectra of a hyperbola have slopes $\pm e$.

(viii) Show that the eccentricities e_1 & e_2 of the two conjugate hyperbolas satisfy the relation $e_1{}^2 + e_2{}^2 = e_1{}^2 e_2{}^2$

(ix) If $y = \sqrt{5}x + k$ is a tangent to the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$. Find the value of k

(x) Find the derivative by the first principle at x=a in the domain D(f) of the function f(x) = cosecx or f(x) = $\sqrt[3]{x^2}$

(xi) Evaluate any two of the following:

(a) $\lim_{x \to 0} \frac{1-\cos x}{\sin x}$ (b) $\lim_{x \to 0} \frac{\tan x - \sin x}{\sin^3 x}$ **OR** $\lim_{x \to 1} \left\{\frac{1}{1-x} - \frac{3}{1-x^3}\right\}$

(c) $\lim_{x \to 0} \frac{\operatorname{cosec}\theta - \cot\theta}{\theta}$ OR $\lim_{x \to 0} \frac{3e^x - e^{-x} - 2}{x}$

(xii) Find the maximum or minimum values of $f(x) = x^3 - 9x^2 + 15x + 3$
OR $f(x) = e^x \sin x$

(xiii) Find $\frac{dy}{dx}$ of any two the following

(i) $y = \cot^{-1}\left(\frac{2x}{1-x^2}\right)$

(ii) $y = \sqrt[5]{x^2 - 6x + 5}$

(iii) $y = \ln\sqrt{1 + x^2} + \tan^{-1} x$

(xiv) Find the points of trisection of the segment joining by the points (3,4) and (7,7).

(xv) For what value of k will the three lines $2x - 3y - 7 = 0$, $4x - 3y - 11 = 0$ and $2x + ky + 1 = 0$ be concurrent ?

SECTION "C" DETAILED ANSWER QUESTIONS — Marks 30

Note: Attempt any **five** questions from this section. Each question carries **six** marks.

Q3.(i) Evaluate any three of the following:

(i) $\int (3x^2 + 2x)\sqrt[3]{x^3 + x^2 + 7}\,dx$ (ii) $\int_0^{\frac{\sqrt{3}}{2}} \frac{x^3}{\sqrt{9-x^2}}\,dx$

(iii) $\int e^x \frac{1+\sin x}{1+\cos x}\,dx$ (iv) $\int \cos 4x . \cos 2x\,dx$

(ii) Prove that the parabolas $x^2 = 4by$ & $y^2 = 4ax$ intersect at an angle $\tan^{-1}\frac{3}{2}\left(\frac{a^{\frac{1}{3}}b^{\frac{1}{3}}}{a^{\frac{2}{3}} + b^{\frac{2}{3}}}\right)$

(iii) Prove that the line $lx + my + n = 0$ and the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$have just one point in common if $a^2l^2 + b^2m^2 - n^2 = 0$.

(iv) Prove that the four points $(3,4), (-1,-4), (-1,2), (3,-6)$ are concyclic and find the equation of the circle on which they lie.

(v) Find the equation of two straight lines passing through the point (3, -2) and inclined at 60° to the line $\sqrt{3}\,x + y = 1$.

(vi) Find relative maximum and relative minimum values, if any of the function

$$f(x) = \frac{x}{\ln x} \quad \forall\ x \in \Re.$$

(vii) Determine the equation of the line which passes through the point (-2,-4) and has the sum of its intercepts equalt to 3.