

BOARD OF INTERMEDIATE EDUCATION
JUNIOR INTER MATHS 1 (B)
MODEL PAPER (English Version)

Time: 3 Hours

Max. Marks: 75

SECTION – A

I. (i) Very Short Answer Type questions.

(ii) Answer ALL questions.

(iii) Each question carries TWO Marks. 10 × 2 = 20

1. Find the condition for the points (a, 0), (h, k), (0, b) where $ab \neq 0$ to be collinear.
2. Find the distance between the parallel lines $10x - 6y - 9 = 0$ and $5x - 3y - 4 = 0$.
3. $A = (1, 1, 1)$, $B = (-2, 4, 1)$ are the vertices of a Δ ABC, for which $O = (0, 0, 0)$ is the centroid. Find the vertex C.
4. Find the equation of the plane which is parallel to the ZX – plane and which passes through the point (0, 4, 4).
5. Evaluate: $\lim_{x \rightarrow a} \left[\frac{\tan(x - a)}{x^2 - a^2} \right]$
6. Evaluate: $\lim_{x \rightarrow \infty} (\sqrt{x+1} - \sqrt{x})$.
7. If $f(x) = (4 + x^2) e^{2x}$, then find $f'(x)$.
8. If $x = a \cos^3 t$, $y = a \sin^3 t$, then find $\frac{dy}{dx}$.
9. Find the approximate value of $\sin 62^\circ$.
10. Find 'c', if $f(x) = e^x$, $a = 0$, $b = 1$ satisfies Lagrange's Mean Value theorem.

SECTION – B

II. (i) Short Answer Type questions.

(ii) Answer any FIVE questions.

(iii) Each question carries FOUR Marks. 5 × 4 = 20

11. Find the equation to the locus of P, if $A = (4, 0)$, $B = (-4, 0)$ and $|PA - PB| = 4$.

12. Find the transformed equation of $3x^2 + 10xy + 3y^2 = 9$ when the axes are rotated through an angle $\frac{\pi}{4}$.
13. Find the equation of the line parallel to the line $3x + 4y = 7$ and which passes through the point of intersection of the lines $x + 3y - 6 = 0$ and $x - 2y - 3 = 0$.
14. A function $f(x) = K^2 x - K$, if $x \geq 1$
 $= 2$ if $x < 1$ is given to be continuous on R . Then find the values of K .
15. Find the derivative of $\cos^2 x$ from first principle.
16. A container which is in the shape of an inverted cone has height 8 m and radius 6 m at the top. If it is filled with water at the rate of $2 \text{ m}^3 / \text{min.}$, how fast is the height of water changing when the level is 4 m?
17. Find the intervals in which the function $f(x) = x^3 + 5x^2 - 8x + 1$ $x \in R$, strictly increases and decreases.

SECTION – C

III. (i) Long Answer Type questions.

(ii) Answer any FIVE questions.

(iii) Each question carries SEVEN Marks.

$5 \times 7 = 35$

18. Find the circumcentre of the triangle whose sides are $3x - y - 5 = 0$, $x + 2y - 4 = 0$, $5x + 3y + 1 = 0$.
19. Show that the straight lines represented by $3x^2 + 48xy + 23y^2 = 0$ and $3x - 2y + 13 = 0$ form an equilateral triangle and show that its area is $\frac{13}{\sqrt{3}}$ sq. units.
20. Show that the pairs of lines $3x^2 + 8xy - 3y^2 = 0$ and $3x^2 + 8xy - 3y^2 + 2x - 4y - 1 = 0$ form a square.
21. If a variable line in two adjacent positions has direction cosines (l, m, n) and $(l + \delta l, m + \delta m, n + \delta n)$, show that the small angle $\delta\theta$, between the two positions is given by $(\delta\theta)^2 = (\delta l)^2 + (\delta m)^2 + (\delta n)^2$.
22. Find $\frac{dy}{dx}$, if $y = (\sin x)^{\log x} + (x)^{\sin x}$
23. Show that the curves $y^2 = 4(x + 1)$ and $y^2 = 36(9 - x)$ intersect orthogonally.
24. Find two positive integers x and y such that $x + y = 60$ and xy^3 is maximum.