Board of Intermediate Education (TS)

Junior Inter Mathematics - IB (2021)

Model Paper (English Version)

Time: 3 Hrs. **Maximum Marks: 75**

Note: This question paper consists of three sections A, B and C

SECTION − A

I. **Very short answer type questions.**

i) Answer All the questions.

ii) Each question carries Two marks. **10 × 2 = 20**

1. Transform the equation $4x − 3y + 12 = 0$ into

   (i) Slope − Intercept form   (ii) Intercept form

2. Find the value of 'P' if the lines $4x − 3y − 7 = 0$, $2x + Py + 2 = 0$ and $6x + 5y − 1 = 0$ are concurrent

3. Find the ratio in which the XZ − plane divides the line joining A $(−2, 3, 4)$ and B $(1, 2, 3)$

4. Find the equation of the plane whose intercepts on x, y, z − axes are 1, 2, 4 respectively

5. Compute $\lim\limits_{x \to 0} \dfrac{x(e^x − 1)}{1 − \cos x}$

6. Compute $\lim\limits_{x \to \infty} \dfrac{x^2 + 5x + 2}{2x^2 − 5x + 1}$

7. If $f(x) = 1 + x + x^2 + ... + x^{100}$, then find $f'(x)$

8. If $f(x) = \log (\sec x + \tan x)$ then find $f'(x)$

9. If $y = x^2 + 3x + 6$, $x = 10$ and $\Delta x = 0.01$ then find Δy and dy

10. Find the approximate value of $\sqrt{82}$

SECTION − B

II. **Short answer type questions.**

i) Answer any Five questions.

ii) Each question carries Four marks. **5 × 4 = 20**

11. Find the equation of the locus of P if the ratio of the distance from P to A $(5, −4)$ and B$(7, 6)$ is 2 : 3.

12. When the axes rotated through an angle α, find the transformed equation of $x \cos\alpha + y \sin\alpha = p$

13. Find the value of y if the line joining the points $(3, y)$ and $(2, 7)$ is parallel to the line joining the points $(−1, 4)$ and $(0, 6)$.

14. Compute $\lim\limits_{x \to a} \dfrac{(x \sin a − a \sin x)}{x − a}$

15. Find the derivative of $\tan 2x$ from the first principle.

16. Find the angle between the curves given

    $x + y + 2 = 0$, $x^2 + y^2 − 10y = 0$

17. Find the equations of the tangent and the normal to the curve $y = 5x^4$ at the point $(1, 5)$.

18. A $(2, 3)$ and B $(-3, 4)$ are two given points. Find the equation of the locus of P. So that the area of the triangle PAB is 8.5 sq. units.

19. When the origin is shifted to point A$(2, 3)$ the transformed equation of the curve is $X^2 + 3XY - 2Y^2 + 17X - 7Y - 11 = 0$. Find the original equation of the curve.

20. Show that the points O$(0, 0, 0)$, A$(2, -3, 3)$, B$(-2, 3, -3)$ are collinear. Find the ratio in which each point divides the segment joining the other two.

SECTION – C

III. Long Answer type questions.

   i) Answer any Five questions.

   ii) Each question carries Seven marks. $5 \times 7 = 35$

21. Find the ortho – centre of the triangle formed by the lines $x + 2y = 0$, $4x + 3y - 5 = 0$ and $3x + y = 0$

22. If the second degree equation $S \cong ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ in the two variable x and y represents a pair of straight line then show that

   i) $abc + 2fgh - af^2 - bg^2 - ch^2 = 0$ and

   ii) $h^2 \geq ab$, $g^2 \geq ac$, and $f^2 \geq bc$

23. Find the angle between the lines joining the origin to the points of intersection of the curve $x^2 + 2xy + y^2 + 2x + 2y - 5 = 0$ and the line $3x - y + 1 = 0$

24. Find the angle between the lines whose direction cosines satisfy the equation $l + m + n = 0$ and $l^2 + m^2 - n^2 = 0$

25. If $\sqrt{1 - x^2} + \sqrt{1 - y^2} = a(x - y)$ then show that $\dfrac{dy}{dx} = \sqrt{\dfrac{1 - y^2}{1 - x^2}}$

26. If the tangent at any point on the curve $x^{2/3} + y^{2/3} = a^{2/3}$ intersects the coordinate axes in A and B then show that the length AB is a constant.

27. From a rectangular sheet of dimension 30 cm $\times$ 80 cm four equal squares of side x cm are removed at the corner, and the sides are then turned up so as to form an open rectangular box. Find the value of x, so that the volume of the box is the greatest.

28. Find the equation of straight lines passing through $(1, 2)$ and making an angle of 60° with the line $\sqrt{3}\,x + y + 2 = 0$.

29. If $x = \dfrac{3at}{1 + t^3}$, $y = \dfrac{3at^2}{1 + t^3}$ then find $\dfrac{dy}{dx}$.

30. Show that the curves $y^2 = 4(x + 1)$ and $y^2 = 36(9 - x)$ intersect orthogonally.

Please click for Answers

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