BOARD OF INTERMEDIATE EDUCATION A.P.: HYDERABAD
MODEL QUESTION PAPER w.e.f. 2012-13
MATHEMATICS - IB

(English Version)

Time: 3 hours **Max. Marks: 75**

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

SECTION - A

10 x 2 = 20 Marks

I. Very Short Answer Questions:
(i) Answer <u>All</u> Questions
(ii) Each Question carries <u>Two</u> marks.

1. Find the value of x, if the slope of the line passing through (2, 5) and (x, 3) is 2.

2. Transform the equation $x + y + 1 = 0$ into the normal form.

3. Show that the points (1, 2, 3), (2, 3, 1) and (3, 1, 2) from an equilateral Triangle.

4. Find the angle between the planes $2x - y + z = 6$ and $x + y + 2z = 7$.

5. Show that $\underset{x \to 0+}{Lt} \left\{ \frac{2|x|}{x} + x + 1 \right\} = 3$.

6. Find $\lim_{x \to 0} \frac{e^{x+3} - e^3}{x}$.

7. If $f(x) = a^x e^{x^2}$ find $f'(x)$ (where $a > 0, a \neq 1$).

8. If $y = \log[\sin(\log x)]$, find $\frac{dy}{dx}$.

9. Find the approximate value of $\sqrt[3]{65}$.

10. Find the value of 'C' in Rolle's theorem for the function $f(x) = x^2 + 4$ on $[-3, 3]$.

SECTION - B **5 x 4 = 20 Mar**

II. Short Answer Questions.

(i) Answer any Five questions.

(ii) Each Question carries Four marks.

11. A (2, 3) and B (–3, 4) be two given points. Find the equation of the Locus of P, so that the area of the Triangle PAB is 8.5 sq. units.

12. When the axes are rotated through an angle $\frac{\pi}{6}$ find the transformed equation of $x^2 + 2\sqrt{3}\,xy - y^2 = 2a^2$.

13. Find the points on the line $3x - 4y - 1 = 0$ which are at a distance of 5 units from the point (3, 2).

14. Show that $f(x) = \begin{cases} \frac{\cos ax - \cos bx}{x^2} & \text{if } x \neq 0 \\ \frac{1}{2}(b^2 - a^2) & \text{if } x = 0 \end{cases}$

where a and b are real constants is continuous at '0'.

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

16. A particle is moving in a straight line so that after t seconds its distance s (in cms) from a fixed point on the line is given by $s = f(t) = 8t + t^3$. Find (i) the velocity at time $t = 2$ sec (ii) the initial velocity (iii) acceleration at $t = 2$ sec.

17. Show that the tangent at any point θ on the curve $x = c\sec\theta$, $y = c\tan\theta$ is $y\sin\theta = x - c\cos\theta$.

SECTION - C **5 x 7 = 35 Marks**

III. Long Answer Questions.

(i) Answer any Five questions.

(ii) Each Question carries Seven marks.

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

19. Show that the area of the triangle formed by the lines $ax^2 + 2hxy + by^2 = 0$ and $lx + my + n$ is $\left| \frac{n^2\sqrt{h^2 - ab}}{am^2 - 2hlm + bl^2} \right|$.

20. Find the value of *k*, if the lines joining the origin to the points of intersection of the curve $2x^2 - 2xy + 3y^2 + 2x - y - 1 = 0$ and the line $x + 2y = k$ are mutually perpendicular.

21. If a ray with d.c's *l*, *m* , *n* makes an angles α, β, γ and δ with four diagonals of a cube, then show that $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta = \frac{4}{3}$.

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

23. At any point *t* on the curve $x = a(t + \sin t)$; $y = a(1 - \cos t)$ find lengths of tangent and normal.

24. A wire of length l is cut into two parts which are bent respectively in the form of a square and a circle. Find the lengths of the pieces of the wire, so that the sum of the areas is the least.

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