BOARD OF INTERMEDIATE & SECONDARY EDUCATION HYDERABAD

Excellence – Equity - Empathy

MATHEMATICS MODEL PAPER (CLASS XII)

Time: 2 Hours **M. Marks: 100**

Note: (i) Attempt all questions. Each question carries one mark.
(ii) Write only the answer in full on the first specified page of answer copy with choice (A, B, C & D)

SECTION "A" Marks: 50

MULTIPLE CHOICE QUESTIONS (MCQS)

Q.No.1 Choose the correct answer for each from the given options:

1) $\chi \to 0$ means that x:
(a) x is very close to zero but not actually zero (b) x approaches zero or x tends to zero
(c) Both of a and b (d) None of these

2) $\lim_{x \to \infty} \left(\frac{a}{x}\right) =$
(a) 0 (b) 1 (c) ∞ (d) None of these

3) The curve $9x^2 + 16y^2 = 144$ crosses the y – axis at the points:
(a) $(\pm 4, 0)$ (b) $(0, 3)$ (c) $(\pm 3, 0)$ (d) $(0, \pm 3)$

4) The equation to the line through (3,1) and parallel to $2x + 5y - 4 = 0$
(a) $5x - 2y = 13$ (b) $2x + 5y = 11$ (c) $2x + 5y = 13$ (d) None of these

5) Centroid of triangle divides the median internally in the ratio:
(a) 3:2 (b) 2:3 (c) 2:1 (d) 3:4

6) $\frac{d}{dx}$ is:
(a) An operator (b) A function (c) Binary relation (d) Both a and b

7) If $y = x^2 + x - 12$ then $\lim_{x \to 3} \frac{f(x) - f(3)}{x - 3}$
(a) 2 (b) 0 (c) 7 (d) -1

8) If the point on graphy $y = f(x)$ *where* $f(x)$ is neither increasing nor decreasing and $f'(x) = 0$ then that point is called:
(a) Maximum Point (b) Minimum Point (c) Stationary Point (d) Both a and b

9) $\int f(x)dx = F(x)$ *when*:
(a) $f(x) = F(x)$ (b) $f'(x) = F(x)$ (c) $F'(x) = f(x)$ (d) Both a and b

10) Slope of non-vertical straight line with $\propto$ as its inclination is defined by:
(a) $m = tan \propto$ (b) $m = \frac{sin\propto}{cos\propto}$ (c) Both a and b (d) None of these

11) The equation of chord of the parabola $y^2 = 12x$ joining (0,0) and (3,6) is:
(a) $y = 2x$ (b) $y = 4x$ (c) $y = 2x + 1$ (d) $4y - 3x = 0$

12) $\int \frac{1}{5x-4}\, dx =$
(a) $\frac{1}{5} ln(5x - 4) + c$ (b) $ln(5x - 4) + c$ (c) $\frac{1}{5} ln(5x + 4) + c$ (d) $\frac{5}{(5x-4)^2}$

13) The straight line $ax + by + c = 0$ will be parallel to $x - axis$ *if*:
(a) $a = 0$ (b) $b = 0$ (c) $c = 0$ (d) None of these

14) The set of point which are equidistant from a fixed point is called:
(a) Circle (b) Parabola (c) Ellipse (d) Hyperbola

15) The equation of tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at the point (x_1, y_1) is:
(a) $yy_1 = 2a(x - x_1)$ (b) $\frac{xx_1}{a^2} + \frac{yy_1}{b^2} = 1$ (c) $\frac{xx_1}{a^2} - \frac{yy_1}{b^2} = 1$ (d) None of these

16) $\int_a^b f(x)dx \; \forall \; a, b \in \mathbb{R}, a \leq b$ then integration is called:
(a) Definite integral (b) Indefinite integral (c) Simple integral (d) None of these

17) What does the scalar triple product given:
(a) Area of square (b) Volume of square (c) Volume of cylinder
(d) Volume of parallelopied

18) Two circles are said to be concentric if they have:
(a) Same Centre (b) Same radii (c) Different Centre (d) Same Diameter

19) The equation of nor mal to the hyperbola $x^2 - y^2 = 49$ *at* $(8, \sqrt{15})$ is:
(a) $\sqrt{15}\,x + 8y = 16/\sqrt{15}$ (b) $8x - \sqrt{15y} = 4a$ (c) Both a and b (d) Both b and c

20) The vector product of a vector by itself is always:
(a) 1 (b) -1 (c) 0 (d) 2

21) $\lim_{x \to 1} \frac{x^n - 1}{x - 1}$
(a) n (b) n-1 (c) 0 (d) n^2

22) The distance between two point (-1,4) and (3,-2) is:
(a) $4\sqrt{13}$ units (b) $2\sqrt{13}$ units (c) 52 units (d) $13\sqrt{2}$ units

23) Two lines $l_1 = a_1 x + b_1 y + c_1 = 0$ and $l_2 = a_2 x + b_2 y + c_2 = 0$ are perpendicular if and only if:
(a) $a_1 a_2 - b_1 b_2 = 0$ (b) $a_1 a_2 + b_1 b_2 = 0$ (c) $a_1 b_2 - b_2 b_1 = 0$
(d) $a_1 b_2 + a_2 b_1 = 0$

24) The rate of change of any physical quantity is called:
(a) Continuity (b) Derivative (c) Antiderivative (d) N.O.T

25) A function is said to be strictly increasing in (a,b) if for $x_1, x_2 \in (a,b)$ when $x_1 > x_2$ implies that:
(a) $f(x_1) > f(x_2)$ (b) $f(x_1) < f(x_2)$ (c) $f(x_1) = f(x_2)$ (d) $f(x_1) \neq f(x_2)$

26) $\int \frac{1}{\sqrt{ay+b}}\, dy = 0$
(a) $\frac{2}{a}\sqrt{ay+b} + c$ (b) $\frac{a}{2}\sqrt{ay+b} + c$ (c) $\sqrt{ay+b} + c$ (d) N.O.T

27) The equation of circle with centre (4,-2) and radius 8 units is:
(a) $x^2 + y^2 - 8x + 4y - 44 = 0$ (b) $(x+4)^2 + (y-2)^2 = 64$
(c) $x^2 + y^2 + 8x - 4y - 44 = 0$ (d) $(x-4)^2 + (y+2)^2 = 8$

28) If the line $y - x = c$ is tangent to parabola $y^2 = 4ax$ then C is equal to:
(a) $\frac{1}{a}$ (b) a (c) m (d) -m

29) The physical quantity possesses both magnitude and direction is called:
(a) Vectors (b) Scalers (c) Variable (d) Constant

30) $\lim_{x \to o} \frac{e^{sinx}-1}{x}$
(a) 0 (b) 1 (c) -1 (d) 2

31) If origin is mid point of $(x, 2)$ and (2,y) then (x, y) =?
(a) (2,2) (b) (-2,2) (c) (-2,-2) (d) (2,-2)

32) The equation of line parallel to the line x + y – 2 = 0 and passing through the point (0,1) is:
(a) x + y – 2 = 0 (b) x – y – 2 = 0 (c) x + y + 1 = 0 (d) x + y – 1 = 0

33) Y = ln sinx, then dy/dx
(a) $\frac{1}{sinx}$ (b) $Cosx$ (c) $Cotx$ (d) $Tanx$

34) The function $f(x) = x^2 + 3x + 2, x \in [-4, 1]$ increasing in:
(a) (- 3/2, 1] (b) [-4, - 3/2) (c) (-4,0) (d) (0,1)

35) $\int \sqrt{25 - x^2}\, dx =$
(a) $sin^{-1}x + c$ (b) $\frac{1}{2}\left[x\sqrt{25-x^2} + 25\sin\frac{x}{5}\right] + c$
(c) $\frac{1}{2}\left[x\sqrt{25-x^2} + 25ln\,(x + \sqrt{25-x^2})\right]$ (d) N.O.T

36) $ax^2 + by^2 + 2gx + 2fy + c = o$ represents a circle if:
(a) a = b ≠ o (b) a > o, b = o or b > o (c) a > o, b > o, | a | ≠ | b |
(d) a > o, b > o, or a < o, b < o

37) The equation of tangent to the hyperbola $x^2 - 9y^2 = 9$ at the point $\left(5, \frac{-4}{3}\right)$is:
(a) $5x + 12y = 9$ (b) $5x - 12y = 9$ (c) $2x - 3y + 7 = 0$ (d) $4x - 3y + 9 = 0$

38) The volume of parallelepiped whose edges are represented by a = [2, -3, 4], b = [1, 2, -1] and e = [3, -1, 2] is:
(a) 5 (b) 6 (c) 7 (d) 8

39) $\lim_{x \to \infty} \left(\frac{x}{1+x}\right)^x$
(a) e^{-1} (b) $e^{1/2}$ (c) e^2 (d) e^3

40) The point of concurrency of medians of triangle is called _____ of triangle.
(a) In Centre (b) Circum Centre (c) Orthocenter (d) Centroid

41) Which of the following point lies below the line 10x-12y + 17 = 0
(a) (20,15) (b) (1,3) (c) $(0, \frac{17}{12})$ (d) (-2, 4)

42) If $x = at^2$, y = 2at then $\frac{dy}{dx}$ at t = 1 is:
(a) 0 (b) 1 (c) $\frac{1}{t}$ (d) 2a

43) The function $f(x) = x^2 - x - 2$ has minimum value at:
(a) x = 0 (b) $x = \frac{1}{2}$ (c) $x = \frac{9}{4}$ (d) x = - 9/4

44) $\int e^{2-3x}\, dx =$
(a) $\frac{e^{2-3x}}{3} + c$ (b) $-\frac{(e^{2-3x})}{3} + c$ (c) $\frac{e^{2-3x}}{2} + c$ (d) $\frac{e^{2-3x}}{4} + c$

45) If (x, 3) and (3,5) are end points of a diameter with centre (2,y) then (x,y) is:
(a) (1,4) (b) (4,1) (c) (8,2) (d) (2,8)

46) If a = [P, 1,0], b = [1, 1, 3] and c = [2, 1, -2] are coplanar then P = ?
(a) $\frac{3}{5}$ (b) $\frac{4}{5}$ (c) $\frac{6}{5}$ (d) $\frac{8}{5}$

47) $\int x \cos x\, dx$
(a) $x \sin x + \cos x + c$ (b) $x \cos x + \sin x + c$ (c) $x \sin x - \cos x + c$
(d) $x \cos x - \sin x + c$

48) A line parallel to y – axis has an inclination 90° its slope is:
(a) 1 (b) 0 (c) ∞ (d) N.O.T

49) The point (3a, a) is 6 unit from the line 5 – 12y – 3 = 0 then a =?
(a) 27 (b) -25 (c) -25 and 27 (d) +27

50) Angle between lines 4x + 5 = 0 and 6y – 7 = 0 is:
(a) 30° (b) 45° (c) 0° (d) 90°

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SECTION "B" Marks: 30

Note: Solve any SIX of the following questions. Each Question Carries 05 Marks.

Q.No.2 Find the limit of $\lim_{x \to 0} \frac{9e^x - e^{-x} - 8}{x}$:

Q.No.3 Evaluate $\int x^3 (x^2 - 1)^{\frac{4}{3}} dx$:

Q.No.4 Find $\frac{dy}{dx}$ when $Y = (Sin^{-1}x)^{lnx}$

Q.No.5 Find the equation of Line through intersection of the line $7x - 13y + 46 = 0$ and $19x + 11y - 41 = 0$ and passing through the point (3,1)

Q.No.6 The line joining the point P(2,-3) and Q(-4,5) is trisected. Find the coordinates of the point of trisection

Q.No.7 Find the extreme value of the function 'f' given by $f(x) = (x^2-x)(x-2) \forall x \in \mathbb{R}$

Q.No.8 Find the equation of the circle which passes through the point (-2,-4) and has the same center as the circle whose equation is $x^2 + y^2 - 4x - 6y - 23 = 0$

Q.No.9 Find the equation of the tangent and normal at the point (3,6) to the parabola $y^2 = 12x$

Q.No.10 Find Cos $(\overrightarrow{AB}, \overrightarrow{AC})$ in a triangle whose vertices are A (-2,0), B(4,3) and C(5,-1)

SECTION "C" Marks: 20

Descriptive Answers

Note: Solve any TWO of the following question: Each question (6+4) Marks.

Q.No.11 (a) Find the equation of the straight line which passes through the point (-3,2) and is such the portion of it between the axes is divided by the point in the ratio 1:2.

(b) Find $\int \frac{x}{\sqrt{4+x^2}} dx$

Q.No.12 (a) Show that the rectangle of maximum area inscribed in a circle of radius "a" is a square of area $2a^2$.

(b) Find the centre and radius of the circle $x^2 + y^2 - 3x + y = \frac{15}{4}$

Q.No.13 (a) Find the unit vector perpendicular to both of the vectors $\hat{i} + 2\hat{j} + 2\hat{k}$ and $3\hat{i} - 2\hat{j} - 4\hat{k}$. Also calculate the sine of the angle between these two vectors.

(b) Find $\frac{dy}{dx}$ at "t" for the curve given by equation $x = \ln t + \sin t$, $y = e^t + \cos t$

THE END