

Madhyamik 2013
(Bifurcated Syllabus)

(According to Syllabus of Class X only)

[The answers of the questions of PART-I are to be given at the beginning of the answer-script mentioning the question numbers in the serial order. Necessary calculation and drawing, if any, must be given in the right hand side by drawing margins at the first few pages in the answer-script. Tables and calculator are not allowed. Approximate value

of π may be taken as $\frac{22}{7}$, if necessary. Graph paper will be supplied, if required.]

(Alternative questions of 7 and 13 are given in page no. 17 for sightless candidates.)

[Additional question (no. 18) for external candidates is given in page no. 18.)

PART-I

The answers of all questions of this part are to be written at the beginning of the answer-script.

1. Answer **all** questions :

(i) If the ratio of cost price and selling price of an article is 5 : 4, what is the percentage of loss ? 1

(ii) $(1 - x)^2 + y^2 = 0$, what is the value of $(x + y)$? [x, y are real numbers] 1

(iii) $(x^2 - 20x - a)$ will be a perfect square when the value of 'a' will be

(a) 100 or, (b) -100 or, (c) 0 or, (d) 80. [Write down the correct answer.] 1

(iv) If the measure of an angle of a cyclic quadrilateral is 75° , what is the measure of the angle opposite to the given angle ? 1

(v) In which quadrant does the point (4, -3) lie ? 1

(vi) What is the value of $(\cos^2 20^\circ + \cos^2 70^\circ)$? 1

2. Answer **all** the questions:

(i) Average age of 7 boys is 7 years. When another boy joins them, then the average age of these 8 boys becomes 8 years. What is the age of the new boy ? 2

(ii) If 75% of A = 40% of B, what is the value of (A : B) ? 2

(iii) If $x + \frac{9}{x} = 6$, determine the numerical value of x^2 . 2

(iv) Determine the greatest value of x from the following inequation :

$$(2x - 2) \geq (3x + 5). \quad 2$$

(v) ABC is an equilateral triangle. Side BC is produced to D such that $CD = AB$. What is the measure of $\angle BAD$? 2

(vi) AB is a diameter of a cyclic quadrilateral ABCD. If $\angle ACD = 50^\circ$, determine the measure of $\angle BAD$. 2

(vii) If $\sin 3x = 1$, what is the value of $\tan 2x$? 2

PART-II

3. Answer any **TWO** questions (algebraic method may be applied) : $2 \times 5 = 10$

(a) A mixture of dettol and water contains 80% water. What volume of dettol is to be added to 60 litres of this mixture, so that the new mixture may contain 75% water ?

(b) The price of coal is increased by 25%. If a family wants to keep the same monthly expenditure for coal, what percentage of coal consumption is to be reduced ?

(c) Bimalbabu lent some money for 4 years at 8% simple interest per annum to a person and lent double the money for the same period at 10% simple interest per annum to another person. Bimalbabu got Rs. 960 more as interest from the second person than the first person. What is the total amount of money lent by Bimalbabu ?

(d) The compound interest on Rs. 5,000 for two years is Rs. 408. Find the rate of interest per annum.

4. Answer any **ONE** question : 4

(a) Find the L.C.M. of

$$3a^2 - 5ab - 12b^2 ; a^5 - 27a^2b^3 ; 9a^2 + 24ab + 16b^2 .$$

(b) Find the H.C.F. of

$$x^3 - 4x ; 4x^2 - 20x + 24 ; x^2 - 4x + 4.$$

5. Solve (any **ONE**) : 3

(a) $x - 2y = 24 ; x - 8y = 48$

[using the method of elimination or of cross multiplication]

(b) $\frac{1}{x} - \frac{1}{3} = \frac{1}{x+2} - \frac{1}{5} .$

6. Answer any **ONE** question : 4

(a) Plants are planted in rows in a garden in such a way that the total number of rows exceeds the number of the plants in each row by 5. If the total number of plants in the garden is 336, find the number of plants in each row.

(b) If the product of two consecutive odd numbers is 783, determine the two numbers.

7. Draw the graphs of the inequations and indicate the solution region (any **ONE**) : 4

(a) $x \geq 0 ; y \geq 0$ and $2x + 3y \leq 12$

(b) $x + y \leq 5$ and $x + y \geq -5 .$

8. Answer any **ONE** question : 3

(a) If $a : b = b : c$, show that $(a + b)^2 : (b + c)^2 = a : c$.

(b) If $a^2 = by + cz$, $b^2 = cz + ax$, $c^2 = ax + by$, show that

$$\frac{x}{a+x} + \frac{y}{b+y} + \frac{z}{c+z} = 1 .$$

9. Answer any **ONE** question : 3

(a) y varies directly with square of x , and $y = 9$ when $x = 9$. What is the value of x when $y = 4$?

(b) If $(a + b) \propto \sqrt{ab}$, show that

$$(\sqrt{a}[\?][\?] + \sqrt{b}) \propto (\sqrt{a} - \sqrt{b})$$

10. Answer any **ONE** question : 3

(a) If $x = 3 + \sqrt{3}$ and $xy = 6$, find the value of $(x + y)^2$.

(b) Find the simplest value of

11. Answer any **TWO** questions : $2 \times 5 = 10$

(a) Prove that the angle which an arc of a circle subtends at the centre, is double the angle subtended by it at any point on the circle.

(b) Prove that the area of the square on the hypotenuse of a right angled triangle is equal to the sum of the areas of the squares on the other two sides of the triangle.

(c) Prove that the tangent to a circle at any point on it is perpendicular to the radius through the point of contact.

12. Answer any **ONE** question : 3

(a) There are two concentric circles such that two chords AB and AC of greater circle touch the smaller at P and Q respectively. Prove that $PQ = \frac{1}{2}BC$.

(b) PQR is a triangle and X is mid-point of PQ. If a line through X parallel to QR intersect PR at the point Y, prove that Y is the mid-point of PR.

13. Answer any **ONE** question: 5

(a) Draw a line segment AB of length 4 cm. Draw two circles of radius 2 cm each with centres A and B. Also draw any one direct common tangent to the circles.

(b) Draw an equilateral triangle having each side of length 7 cm. Also draw the in-circle of the triangle.

14. Answer any **ONE** question : 3

(a) The base of a right prism is a triangle having sides of lengths 12 cm, 16 cm and 20 cm. The volume of the prism is 1152 c.c. Find the height of the prism.

(b) The area of the curved surface of a right circular cone is $\sqrt{10}$ times the area of its base. Show that the height of the cone is three times the radius of the base.

15. Answer any **ONE** question: 4

(a) The area of curved surface of a solid right circular cylinder is 1320 sq.cm. If the diameter of the base of the cylinder is 14 cm, find its height.

(b) The base of a right pyramid is a rectangle whose length and breadth are respectively 12 m and 9 m. If the length of the slant edge of the pyramid is 8.5 m, find the volume of the pyramid.

16. Answer any **TWO** questions : $2 \times 3 = 6$

(a) Find the circular measure of $52^\circ 52' 30''$.

(b) Find the value of $\tan \theta$ from the relation :

$$5\sin^2\theta + 4\cos^2\theta = \frac{9}{2}, \text{ where } 0^\circ < \theta < 90^\circ.$$

(c) If $x = \sin^2 30^\circ + 4\cot^2 45^\circ - \sec^2 60^\circ$, find the value of x.

(d) If $\tan \alpha = \cot \beta$, find the value of $\cos(\alpha + \beta)$, where $0^\circ < \alpha, \beta < 90^\circ$.

17. Answer any **ONE** question : 5

(a) From a point on the roof of a house, it is observed that the angle of depression of the top and the foot of a lamp post are respectively 30° and 60° . Find the ratio of the height of the house and that of the lamp post.

(b) The ratio of the heights of two towers is 1 : 3. The angle of elevation of the top of the bigger tower from the foot of the smaller tower is 60° . Find the angle of elevation of the top of the smaller tower from the foot of the bigger tower.

[Alternative Questions for Sightless Candidates]

7. Find the co-ordinates of five points lying in the solution region satisfying the inequations :

$$2x + 3 \leq 12; x \geq 0; y \geq 0. \quad 4$$

13. Answer any **ONE** question : 5

(a) Describe the procedure of drawing a tangent at a point on a circle.

(b) Describe the procedure of determining $\sqrt{21}$ geometrically.

[Additional Question for External Candidates]

18. Answer **all** questions :

(i) Find the interest of Rs. 3,000 for 2 years at the rate of 9% per annum simple interest. 2

(ii) The co-ordinates of a point P is (5, 12); find the distance between origin and the point P. 2

(iii) Simplify : 2

(iv) ABCD is a cyclic quadrilateral where $\angle A = 75^\circ$ and $\angle B = 105^\circ$; find the measures of $\angle C$ and $\angle D$. 2

(v) What is the value of $\sec 45^\circ$? 1

(vi) The area of a square is 36 sq. cm. Find the length of its side. 1