

THE WEST BENGAL COUNCIL OF RABINDRA OPEN SCHOOLING

Model Question in respect of Madhyamik Examination

SUBJECT – MATHEMATICS

SET-1

Time: 3 hours 15 minutes

Full Marks: 90

1. Choose the correct answer for each of the following questions: $1 \times 6 = 6$

- (i) The number of integers between -3 and 7 (except -3 and 7) is
(a) 7 (b) 9 (c) 10 (d) infinite
- (ii) The degree of the equation $x - x^2 - 7x^3 + 5 = 0$ is
(a) 0 (b) 1 (c) 2 (d) 3
- (iii) If AB is a diameter of a circle with centre at O and C is a point on the circle such that $\angle OAC = 45^\circ$, then the measure of $\angle OCB$ is
(a) 30° (b) 45° (c) 60° (d) 90°
- (iv) The value of 60° in circular system is
(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{5}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{3}$
- (v) If the circumference of a circle is 4π cm, then the length of the diameter of the circle is
(a) 1 cm (b) 2 cm (c) 4 cm (d) 8 cm
- (vi) If the sales tax is Rs. 385 on the purchase of a furniture that costs Rs. 5500, then the sales tax rate is
(a) 5% (b) 7% (c) 8% (d) 9%

2. Fill in the blanks (any five): $1 \times 5 = 5$

- (i) For any non-zero value of a , $a^0 =$ -----
- (ii) If $x = y = z$, then the value of $x^2 + y^2 + z^2 - xy - yz - zx$ is -----
- (iii) If the diagonals of a parallelogram $ABCD$ are equal, the measure of $\angle ABC$ is -----

- (iv) If $\sin \theta = \frac{3}{5}$, then $\cos \theta = \text{-----}$
- (v) If the radius of a right-circular cylindrical drum is 5 cm and its height is twice its radius, then the drum will contain ----- litres of water.
- (vi) The marked price of a coat is Rs. 2500. If an additional discount of 10% is given except a summer discount of 20%, then the selling price of the coat will be Rs. -----

3. Write true or false (any five):

$1 \times 5 = 5$

- (i) 5, 10, 15 are in continued proportion.
- (ii) $\frac{2}{x} + \frac{x}{2} = 1$ is a quadratic equation.
- (iii) The line joining the mid-points of any two sides of a triangle is parallel to the third side.
- (iv) The value of $\cot 12^\circ \cot 78^\circ$ is 1.
- (v) If the radius of a sphere is doubled, then the volume of the sphere will be double the volume of the first sphere.
- (vi) If a sum of money doubles itself as principle with interest in 6 years, then the rate of simple interest per annum is 20%.

4. Answer the following questions (*any ten*):

$2 \times 10 = 20$

- (i) If the ratio of nitrogen to phosphorus in a fertilizer is 2 : 3, then find the amount of phosphorus in 20 kgs of the fertilizer.
- (ii) The total population of a village is 2500. The number of illiterates in the village is 1000. What is the percentage of literacy in the village?
- (iii) If $x : y = 3 : 4$, find the value of $2x + 3y : 5x + 7y$.
- (iv) If x is a positive integer, find the solutions of the inequation $2x - 3 < 6 - x$.
- (v) If each of the interior angles of a regular polygon is 156° , find the the number of sides of the polygon.

- (vi) If the length of the tangent from a point at a distance 5 cm from the centre of a circle is 4 cm, find the radius of the circle.
- (vii) The lengths of the sides of a triangle are 4 cm, 15 cm and 17 cm. Is the triangle right-angled?
- (viii) Prove that $\sec^4 \theta - \tan^4 \theta = 1 + 2 \tan^2 \theta$.
- (ix) Find the value of $\sin^2 \frac{\pi}{4} - \cos^2 \frac{\pi}{4}$.
- (x) When a wire is bent to form a circle, its diameter becomes 14 cm. If a square is formed with that wire, what will be the length of its sides?
- (xi) How many solid cubes each with 5 cm edge can be made by melting a solid metallic cube with edge 15 cm.
- (xii) If the interest is compounded quarterly and the rate of interest is 10% per annum, find the amount of interest for a fixed deposit of Rs. 40,000 for 2 years.

5. Answer *any one* question:

$5 \times 1 = 5$

- (i) Charging 35% profit on each saree, a cloth merchant puts label on a saree as its price. At the time of selling, he allows a discount of 10% on the labelled price. What is his gain percent?
- (ii) A person deposited some money with a bank at 5% simple interest per annum and receives an interest of Rs. 90. How long does the person deposit the amount so as to get the interest equal to the principal? (Assume that the rate of interest remains the same.)

6. Answer *any one* question:

$3 \times 1 = 3$

- (i) Factorise: $x^3 + 5x^2 + x + 3$.
- (ii) 5 years ago, the sum of the ages of father and his son was 35 years. After 5 years, the age of the father will become 4 times the age of the son. Express the present ages of the father and the son with the help of equations.

7. Answer *any one* question: $3 \times 1 = 3$

(i) Solve by the method of elimination:

$$2x + 3y = 5$$

$$3x - 2y = 1$$

(ii) Solve by the method of cross-multiplication:

$$13(x - y) = 3(15 - x)$$

$$7x - 4y = 18$$

8. Answer *any one* question: $3 \times 1 = 3$

(i) A positive real number is 30 less than its square. Find the number.

(ii) Draw the graph of the equation $2x + 3y = 12$.

9. Answer *any one* question: $5 \times 1 = 5$

(i) Prove that the medians of a triangle are concurrent.

(ii) Prove that the angle subtended by an arc at the centre of a circle is twice the angle by the same arc at the circumference.

10. Answer *any one* question: $3 \times 1 = 3$

(i) In a triangle PQR , a straight line parallel to the side QR intersects the sides PQ and PR at the points M and N , respectively. If $PN = 2PM$, find $MQ : NR$.

(ii) GH is a diameter of a circle centred at O . AB and CD are the tangents at the points G and H , respectively. Prove that AB and CD are parallel.

11. Answer *any one* question: $5 \times 1 = 5$

(i) Draw an equilateral triangle with sides 4 cm each. Draw the circum-circle of the triangle. (Only traces of construction are required.)

- (ii) Draw two circles with radii 3 cm and 4 cm, their centres being 8 cm apart. Draw a direct common tangent to these two circles. (Only traces of construction are required.)

12. Answer *any two* questions:

$$3 \times 2 = 6$$

- (i) The difference in measures of two opposite angles of a cyclic quadrilateral is 40° , find the measures of these angles.
- (ii) If θ is positive acute angle and $3 \sin^2 \theta + 2 \cos^2 \theta = 2\frac{1}{2}$, find the value of $\tan \theta$.
- (iii) Show that $\sin 50^\circ \cos 40^\circ + \cos 50^\circ \sin 40^\circ = 1$.

13. Answer *any one* question:

$$5 \times 1 = 5$$

- (i) From a place on the bank of a river, a man measures the angle of elevation of the top of a chimney, standing on the other bank, just opposite to the man, as 30° . If the height of the chimney is 200 metres, then what is the width of the river at that place?
- (ii) From a point on the roof of a house, 5 metres high, the angle of elevation of the top of a tree and angle of depression of the foot of it are 30° and 45° , respectively. What is the height of the tree?

14. Answer *any two* questions:

$$4 \times 2 = 8$$

- (i) A palm tree, 18 metres high, is bent at point above the ground due to storm and its top just meets the ground at a distance 12 metres from its foot. At what height is the tree bent?
- (ii) If the height of a right circular cone is 12 cm and the diameter of its base is 30 cm, find the total surface area of the cone.
- (iii) How many solid cylindrical rods of length 16 mm and diameter 7 cm can be made by melting three solid iron balls each of 14 cm diameter?

15. Answer *any two* questions:

$$4 \times 2 = 8$$

- (i) A loan of Rs. 15000 is to be paid back in 3 yearly instalments. If 10% compound interest per annum on remaining amount is included in instalments, find each of the instalments.
- (ii) A company distributes 3000 shares of nominal value Rs. 10 each. If the company declares a dividend of Rs. 6000, find the rate of dividend. How much dividend will Biman receive for 40 shares?
- (iii) A person purchases a whole life insurance policy (without profit) of Rs. 15,000 at 27 years of age. If he wants to pay the premium yearly, what will be his premium? [A rebate of 3% is admissible in case of yearly premiums. In case of whole life insurance policy (without profit) at 27 years of age, the premium per Rs. 1000 is Rs. 13.65.]