D-123 (H/E)   **Mathematics - 2018**

Time : 3 Hours]   Class : 10th [M. M. : 100

Instructions: (i) All questions are compulsory. (ii) Question No. 1 to 5 are objective type questions. (iii) Internal options are given in question number 6 to 26. (iv) Draw neat and clean labelled diagrams wherever required.

Q1. Choose the correct option and write it in your answer book   1×5=5

(i)   When $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$ then the system of equations $a_1x + b_1y+c_1=0$ and $a_2x+b_2y+c_2=0$

       (a) Has two solutions
       (b) Has no solution
       (c) Has infinitely many solutions
       (d) Has unique solution

(ii)   In equation $3x +2y=7$, then, write the value of x.

       (a) 1   (b) 2
       (c)-1   (d) 3

(iii)   The discriminant of the quadratic equation $x^2-7x-5=0$ is

       (a) 17   (b) 69
       (c) 29   (d) 20

(iv)   All squares are

       (a) Congruent   (b) Equal
       (c)Similar   (d) All of the above

(v)   The sum of the pairs of opposite angles of a cyclic quadrilateral is

       (a) 360°   (b)90°
       (c)180°   (d)270°

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Q2. Write True/ False in the following: $\qquad$ 1×5=5

      (i)   Algebraic expression $x^2+3\sqrt{x}-4$ is not a polynomial.
      (ii)   Property tax is an indirect tax
      (iii)   The line joining the center of a circle to the mid-point of a chord in a perpendicular to the chord
      (iv)   Volume of cuboid=Length x Breadth x Height
      (v)   2 is the mode of the following observation:
             2,3,4,2,12,9,8,9,6,9,5,9

Q3. Fill in the blanks: $\qquad$ 1×5=5

      (i)   Third proportional of 8, 12 is _____

      (ii)   Compound amount = Principle $\times \left(1 + \dfrac{}{100}\right)$

      (iii)   Congruent figures are _____

      (iv)   If two chords of a circle are equidistant from the center of the circle, then they are _____ to each other.

      (v)   The probability of any sure event is always_____

Q4. Write the answer in one word/ sentence of each: $\qquad$ 1×5=5

      (i)   Additive inverse of $x - \dfrac{1}{x}$ is
      (ii) $\log\dfrac{m}{n} =$
      (iii)   The edge of a cube is 5cm. What will be its volume?
      (iv)   The relation between arc of a circle, angle subtended by the arc at the center and radius is
      (v)   Define Angle of Elevation.

Q5. Match the Correct Pair: $\qquad$ 1×5=5

Column (A)	Column (B)
(i) $\sin^2 45° + \cos^2 45°$	(a) 0
(ii) $\cot(90° - \theta)$	(b) $\csc^2 \theta$
(iii) $\cos\theta \cos(90° - \theta) - \sin\theta \sin(90° - \theta)$	(c) $\dfrac{\sqrt{3}}{2}$
(iv) $1 + \cot^2 \theta$	(d) 1
(v) $\cos 30°$	(e) $\cos\theta$
	(f) $\tan\theta$
	(g) 2

Q6. What is the meaning of similarity?   2
(OR) What are the conditions for the similarity of polygons?

Q7. The perimeters of two similar triangles are 30cm and 20cm respectively. If one side of the triangle is 12 cm, then find the length of the corresponding side of the other triangle.   3
  (OR) Write the statement of Basic Proportionality Theorem (Thales Theorem).

Q8. Check whether 6cm, 8cm and 10cm are the sides of right angled triangle?   2
(OR) ΔACB is an isosceles triangle such that AC=BC, if $AB^2 = 2AC^2$, then prove that ΔACB is a right angled triangle.

Q9. Find the median of the following values:
    15, 35, 18, 26, 19, 25, 29, 20, 27.   2
(OR) Write any two merits of the Arithmetic Mean.

Q10. Find the probability that an even number turns up in a single throw of a die.   2
(OR) Find the probability of getting head and tail at a time in single throw of a coin.

Q11. A chord of length 30cm is drawn at a distance of 8cm from the center of the circle. Find the radius of a circle.   3
(OR) Prove that, the length of two tangents drawn from an external point to a circle are equal.

 Q12. Prove that, the angles in the same segment of a circle are equal to each other.
  (OR) Prove that, the angles in the semicircle is right angle.   3

Q13. If the mean of 5 observations x, x+2, x+4, x+6, x+8 is 11, then find the value of x
(OR) Find the arithmetic mean of 47, 53, 49, 60, 39, 42, 53, 52, 50, 55.   3

Q14. Find the median of the following frequency distribution table: 3

Variable X	4	6	8	10	12	14	16
Frequency F	2	4	5	3	2	1	4

(OR) Write two merits and one demerit of median.

Q15. Solve the following system of equation by Substitution Method: 4x+ y=7   4
                                    3x-2y=11.
(OR) If in ΔABC, <C=2<B=<A+<B+20, then find all the three angles of the triangle.

Q16. A fraction became $\frac{1}{4}$ when 2 is subtracted from its numerator and 3 is added to its denominator and on adding 6 to numerator and multiplying denominator by 3, it becomes $\frac{2}{3}$. Find the fraction.   4
(OR) The sum of two numbers is 7. If the sum of these numbers is 7 times of its difference, then find the numbers.

Q17. If b is the mean proportional of a and c then prove that $\frac{a^2+b^2}{ab} = \frac{a+c}{b}$ 4

(OR) If $\frac{x}{b+c} = \frac{y}{c+a} = \frac{z}{a+b}$ then prove that (b-c) x+ (c-a) y + (a-b) z =0

Q18. Solve the following equation by formula method.   4

x^2- 5x-6 = 0

(OR) If α, β are the roots of quadratic equation ax^2+ bx +c =0, then find the value of $\alpha^2+\beta^2$.

Q19. At a point 25 m away from the foot of a building, the angle of elevation at the top of the building is 45º. Find the height of the building.   4

(OR) From the top of 60m high light house, the angle of depression of the ship is 60º. Find the distance between the ship and food of the light house.

Q20. Find the length of arc and area of sector of the circle, if the angle subtended at the center and the radius are 60º and 6 cm respectively.   4

(OR) If V is the volume of cuboid, whose length is a, breadth is b and height is c and S is its total surface area, then prove that $\frac{1}{V} = \frac{2}{S}[\frac{1}{a} + \frac{1}{b} + \frac{1}{c}]$.

Q21. Two cubes of each 15cm sides are joined end to end. Find the total surface area of the resulting cuboid.   4

(OR) An iron sphere of radius 8 cm is melted then recasted into small spheres each of radius 1 cm. Find the number of small spheres.

Q22. Which rational expression should be added to $\frac{x^3-1}{x^2+2}$ to get$\frac{2x^3-x^2+3}{x^2+2}$?

5

 (OR) Factorise a^2 (b+c) + b^2(c+a) + c^2(a+b) +3abc.

Q23. The sum of a number and its reciprocal is$\frac{26}{5}$. Find the number.   5

(OR) Solve $\sqrt{3x^2 - 2}$ + 1=2x.

Q24. Find the depreciation and the depreciated cost of a motor cycle after 3 years at the rate of 10% depreciation, which costs Rs, 40,000.   5

(OR) Find the amount and compound interest on Rs, 2000 for 2 years at the rate of 10% per annum compound interest.

Q25. Construct a triangle whose sides are 4cm, 6cm and 8cm. Draw the circumcircle of a triangle. Write the steps of construction also.   5

(OR) Construct a triangle ABC, in which BC=6.5cm, <A= 60º and median AD=4.5cm.

Q26. Prove it without using the table: 5

$\frac{\sin 70°}{\cos 20°} + \frac{cosec\ 20°}{\sec 70°}$- 2cos70ºcosec20º=0.

(OR) Prove that: $\frac{1+\cos A}{\sin A} + \frac{\sin A}{1+\cos A} = \frac{2}{\sin A}$.