

R-223 (H/E)

Mathematics - 2017

Time : 3 Hours]

Class : 10th

[M. M. : 100

Instructions : (i) All questions are compulsory (ii) Question Numbers 1 to are objective type questions. (iii) Internal options are given in question numbers 6 to 26. (iv) Draw neat and clean labelled diagram wherever required.

Q 1. Choose the correct option and write it in your answer book.

1 × 5 = 5

(i) When $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ 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 $2x + 3y = 6$, if $y = 0$ then write the value of x .

- (a) 3 (b) -3 (c) 0 (d) $\frac{1}{3}$

(iii) The discriminant of the quadratic equation is:

- (a) $-b_2 + 4ac$ (b) $b_2 - 4ac$
(c) $-b_2 - 4ac$ (d) $b_2 + 4ac$

(iv) All circles are:

- (a) Congruent (b) Equal
(c) Similar (d) All of these

(v) Relation between arc of circle, angle subtended at the center by arc and radius is:

- (a) Arc = $\frac{\text{radius}}{\text{angle}}$ (b) Radius = $\frac{\text{angle}}{\text{arc}}$

(c) Arc = radius × angle

(d) Angle = $\frac{\text{arc}}{\text{radius}}$

Q2. Write true/false in the following:

1 × 5 = 5

- (i) Algebraic expression $x^2 + x\sqrt{x}$ is a polynomial.
- (ii) Education cess is an indirect tax.
- (iii) Sum of the opposite angles of a cyclic quadrilateral is 360° .
- (iv) All four diagonals of a cuboid are equal.
- (v) The arithmetic mean of 7, 8, 9 is 9.

Q3. Fill in the blanks.

1 × 5 = 5

- (i) Zero of a linear polynomial $ax+b$ is _____
- (ii) Amount paid in installments is always _____ than the cash price or cash down payment.
- (iii) Three medians of a triangle are _____
- (iv) The two tangents drawn from an external point to a circle are _____
- (v) The probability of impossible event is _____

Q4. Write the answer in on word/sentence of each

1 × 5 = 5

- (i) What will be the duplicate ratio of 9:25?
- (ii) Write the definition of professional tax.
- (iii) Define the segment of a circle.
- (iv) Define straight line.
- (v) Write the formula of whole surface of hollow cylinder.

Q5. Match the correct column:

1 × 5 = 5

Column 'A'

Column 'B'

- | | | | |
|-------|--|-----|----------------------------|
| (i) | $\tan(90^\circ - \theta)$ | (a) | $\sqrt{3}$ |
| (ii) | $\frac{1}{\sec \theta}$ | (b) | ∞ |
| (iii) | $\tan 90^\circ$ | (c) | 1 |
| (iv) | $\tan \theta \times \operatorname{cosec} \theta$ | (d) | $\cot \theta$ |
| (v) | $\sin \theta$ | (e) | $\cos \theta$ |
| | | (f) | $\sqrt{1 - \cos^2 \theta}$ |
| | | (g) | $\frac{\sqrt{3}}{2}$ |

Q6. Write the characteristic property of side-angle side similarity. 2

(OR) What are the conditions for the similarity of the triangle?

Q7. In two triangles, the measure of sides and angles are as follows. Show that $\triangle ABC$, $\triangle PQR$ are similar or not?

$AB = 4$ centimeter, $AC = 5$ centimeter, $\angle A = 60^\circ$, $PQ = 6$ centimeter, $PR = 7.5$ centimeter, $\angle P = 60^\circ$. 2

(OR) Write the statement of converse of fundamental proportionality theorem (Thales Theorem).

Q8. Check whether 8 cm, 15cm and 17cm are the sides of right angled triangle? 2

(OR) What is the meaning of similar and similarity?

Q9. The speeds of 10 Motor Cyclists are recorded in kilometer per hour as following: 2

47, 53, 49, 60, 39, 42, 53, 52, 53, 55

Find the mean from the above data.

(OR) Write the names of two methods used to determine the mean of grouped data.

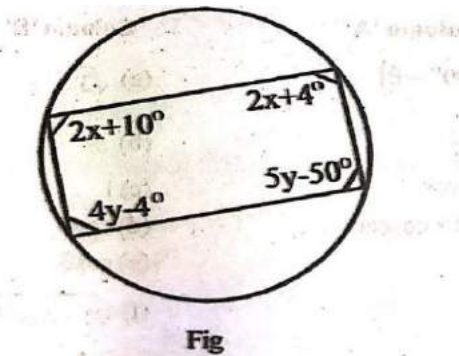
Q10. If the probability of raining tomorrow is 0.4 then what will be the probability of not raining tomorrow. 2

(OR) Find the probability of getting a number greater than 4 in a single throw of dice.

Q11. Find the length of a chord which is at a distance of 3 centimeter, from the center of circle of radius 5 centimeter. 3

(OR) Prove that the angle in the semicircle is right angle.

Q12. Find the value of x and y in the given figure: 3



(OR) Prove that the perpendicular from the center of a circle to a chord bisects the chord.

Q13. Compute the mean of the marks obtained in the examination by the students of any class from the following grouped data. 3

Marks Obtained	Number of Students
0-10	12
10-20	18
20-30	27
30-40	20
40-50	17
50-60	06

(OR) Find the probability that a leap year, selected randomly, will contain 53 Thursdays.

Q14. Find the mode of the following frequency table:

3

Class Interval	10-20	20-40	40-60	60-80	80-100
Frequency	10	17	26	22	15

(OR) Write any 3 uses of cost of living index number.

Q15. Solve the following system of equation by substitution method.

4

$$\begin{aligned} 3x+2y &= 14 \\ -x + 4y &= 7 \end{aligned}$$

(OR) By adding 5 to the denominator and subtracting 5 from its numerator $\frac{1}{7}$ is obtained. If 4 is subtracted from its numerator then $\frac{1}{3}$ is obtained. Find that number.

Q16. Solve for x and y the system of equations:

4

$$\begin{aligned} x+ ay &= b \\ ax-by &= c \end{aligned}$$

(OR) In triangle PQR, $\angle P=x^\circ$, $\angle Q=3x^\circ$ and $\angle R=y^\circ$, $3y-5x=30$ then find the value of each angle of triangle PQR.

Q17. If $x = \frac{4ab}{a+b}$ then prove that $\frac{x+2a}{x-2a} + \frac{x+2b}{x-2b} = 2$.

4

(OR) IF $\frac{a}{y+z} + \frac{b}{z+x} = \frac{c}{x+y}$ then prove that $\frac{a(b-c)}{y^2-z^2} = \frac{b(c-a)}{z^2-x^2} = \frac{c(a-b)}{x^2-y^2}$.

Q18. If α and β are the roots of equations, equation $ax^2+bx+c=0$, then find the value of $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$.

4

(OR) Solve the following equation by factorization method.

$$x^2 - \frac{11x}{4} + \frac{15}{8} = 0.$$

Q19. A building is surmounted by a flag, from a point on the ground 20 meter away from the foot of a building, the angle of elevation of the top of building and flag are 45° and 60° . Find the height of the building and length of the flag. 4

(OR) From the top of 50 meter high hill, the angle of depression of the top and the bottom of a tower are 30° and 45° . Find the height of the tower.

Q 20. Find the length of arc and area of the sectors, if the angles subtended at the center and the radii are 120° and 2.1cm respectively. 4

(OR) The radius and height of a cylinder are in the ratio of 2:3. If the volume of the cylinder is 1617cm^3 , then find its whole surface area.

Q21. Three solid spheres having the diameters 2 centimeter, 12 centimeter and 16 centimeter respectively are melted to form a sphere. Find the radius of the sphere. 4

(OR) An iron sphere of diameter 6 centimeter is melted and drawn into a cylindrical wire. If the diameter of wire is 0.2 centimeter, then find the length of the wire.

Q22. Find all other zeros of polynomial $f(x) = x^3 + 13x^2 + 32x + 20$, if one of the zeros is -2. 5

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

Q23. Solve by using formula $10y^2 - 11y - 6 = 0$. 5

(OR) The sum of the ages of a man and his son is 45 years. Four years ago, the product of their ages was 160. Find their present ages.

Q24. Find the difference between compound interest and simple interest for Rs, 2000 at the rate of 5% per annum interest for 3 years. 5

(OR) A watch is sold for Rs, 960 cash or for Rs, 480 cash down payment and two monthly installments of Rs, 245 each. Find the rate of interest charged under the installment plan.

Q25. Construct the incircle of the equilateral triangle whose one side is 8 centimeter. Measure its radius. 5

(OR) Construct a ΔABC , similar to a given ΔABC whose sides are in the ratio 7:5.

Q26. Simplify the expression $(1 + \cot\theta - \operatorname{cosec}\theta)(1 + \tan\theta + \sec\theta)$.

5

(OR) Prove it without using the table.

$$\frac{\sec 37^\circ}{\operatorname{cosec} 53^\circ} + \frac{\sin 42^\circ}{\cos 48^\circ} = 2.$$