

Series RMT-DS2

Code No. RSPL/2

Roll No.

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Candidates must write the Code on the title page of the answer-book.

- Please check that this question paper contains 8 printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains 40 questions.
- Please write down the Serial Number of the question before attempting it.
- 15 minutes time has been allotted to read this question paper.

MATHEMATICS (STANDARD)

Time Allowed : 3 Hours

Maximum Marks : 80

General Instructions :

- All the questions are compulsory.*
- The question paper consists of 40 questions divided into four sections–A, B, C and D.*
- Section–A comprises of 20 questions of 1 mark each. Section–B comprises of 6 questions of 2 marks each. Section–C comprises of 8 questions of 3 marks each. Section–D comprises of 6 questions of 4 marks each.*
- There is no overall choice. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2 marks each, three questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.*
- Use of calculators is not permitted.*

SECTION - A

(Q.1 - Q.10) are multiple choice type questions. Select the correct option.

1. The decimal representation of $\frac{91}{2^2 \cdot 5 \cdot 7}$ will
(a) terminate after 1 decimal place (b) terminate after 2 decimal places
(c) terminate after 3 decimal places (d) not terminate
2. The median of the following data is 525.

Class interval	Frequency
0-100	2
100-200	5
200-300	9
300-400	12
400-500	17
500-600	20
600-700	15
700-800	9
800-900	7
900-1000	4

The lower limit of the median class is

- (a) 400 (b) 500 (c) 550 (d) 700
3. The HCF of two numbers is 16 and their product is 3072, then their LCM is
(a) 256 (b) 92 (c) 162 (d) 192
4. If the pair of linear equations $2x + 5y = 7$ and $4x + 3y = b$ is consistent, the value of b can be
(a) any real number (b) 5
(c) 16 (d) 7

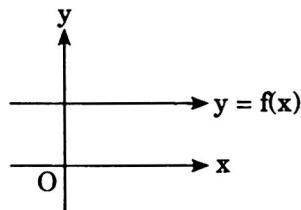
5. $\triangle ABC$ is an isosceles right-angled triangle, right angled at A, then
- (a) $\sec B = \operatorname{cosec} A$ (b) $\sin B = \cos C$
 (c) $\tan B = \cot A$ (d) $\cos B = \sec B$
6. If $\sin 3A = \cos 2A$, $3A < 90^\circ$, the value of A is
- (a) 20° (b) 90° (c) 18° (d) 36°
7. If $\sec(A + B) = \sqrt{2}$ and $\operatorname{cosec}(A - B)$ is not defined, then value of B is
- (a) 20° (b) 40° (c) 75° (d) 22.5°
8. Points P and Q trisect the line segment joining the points A(0, 8) and B(6, -4), then distance AP is, considering P to be near to A is
- (a) 6 units (b) 8 units (c) $2\sqrt{5}$ units (d) $2\sqrt{2}$ units
9. Distance of the point whose ordinate is 3 and abscissa is 7 from the x-axis is
- (a) 3 (b) -3 (c) 4 (d) -4
10. A line segment joining the points A(0, 8) and B(6, -4) gets divided by the point R(4, p) in the ratio 2 : 1. Then the value of p is
- (a) 0 (b) 4 (c) 7 (d) $\frac{2}{3}$

(Q.11 – Q.15) Fill in the blanks.

11. A bucket with different radii of top and bottom is of the form of a _____.
12. If α and β are the roots of a quadratic equation $2x^2 + kx - 7 = 0$, such that sum of the roots is twice their product, then the value of k is _____.

OR

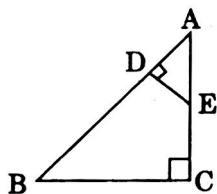
The graph of a polynomial $y = f(x)$ is shown, The number of zeroes of $f(x)$ are _____.



13. The perimeters of two similar triangles $\triangle ABC$ and $\triangle PQR$ are 35 cm and 49 cm respectively. The ratio of the corresponding sides of the triangles is _____.
14. If three numbers 4, 9, $2p$ are in AP then the value of p is _____.
15. A number is chosen at random from the numbers $-6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6$, the probability that square of the number is greater than 9 is _____.

(Q.16 – Q.20) Answer the following

16. Write a rational number and an irrational number between $\sqrt{2}$ and $\sqrt{3}$.
17. In the given figure, show that $\triangle ABC \sim \triangle AED$.



18. Radii of two concentric circles are 13 cm and 12 cm respectively. Find the length of the chord of the bigger circle which is tangent to the smaller circle.

OR

The angle between the tangents drawn from a point P outside a circle, with centre O , is 40° . Find the angle formed by the radii, which pass through the point of contact of the tangents and the circle, at the centre of the circle.

19. The sum of first n terms of an AP is $3n^2 - 5$, find the third term of the AP.
20. Without solving the equation, find the nature of the roots of the quadratic equation $\sqrt{2}x^2 - 5\sqrt{3}x + 2\sqrt{2} = 0$.

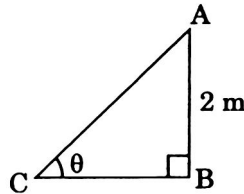
SECTION - B

21. Prove that a parallelogram circumscribing a circle is a rhombus.
22. Which term is first negative term for the AP 19, 16, 13, ...?
23. ABCD is a trapezium, in which AB is parallel to DC. Diagonals AC and BD intersect each other at O. If $\frac{AO}{OC} = \frac{BO}{OD} = \frac{1}{2}$ and $AB = 4$ cm, find CD.

OR

Prove that area of an equilateral triangle described on the side of a square is half the area of an equilateral triangle described on its diagonal.

- 24.** Some children are curious and always try to reason out. Once they saw their shadow during noon and evening, there was a vast difference between the length. They thought what could have been the angle of rays of the Sun, i.e. they were eager to find the elevation of the Sun. For this they put a rod erect and noted the length of shadow and drew a figure as shown.



- (i) If $\sin 2\theta = \cos(2\theta - 30^\circ)$, where 2θ and $2\theta - 30^\circ$ are acute angles, find θ .
- (ii) If the height of the rod is 2 m, what is the length of the shadow at that particular time?
- 25.** Player A throws a pair of dice and records the sum of the numbers as 9 appearing on the two dice and player B throws a die and records the number after adding 4 to the number appearing on the die. Who has a better chance of getting number 9?

OR

An integer is chosen from among the numbers 23 to 80. What is the probability that the number is divisible by 2 and 3 both?

- 26.** Mehul got his room renovated. He was arranging his table when he felt the need of a pen stand. He went to the shop with his father and asked for a pen stand. One of the pen stands had a cubical shape and was $10 \text{ cm} \times 5 \text{ cm} \times 3 \text{ cm}$ in size made of wood. There were two conical holes of radius 2 cm and depth 1 cm and one cylindrical hole of radius 1 cm and depth 1 cm to keep the pens. They liked the pen stand and as usual Mehul suddenly asked his father 'which hole has more space' conical or cylindrical? Both gave different answers. Can you help them (i) by finding the conical space and the cylindrical space? (ii) which hole has more space? (iii) also to find the volume of the wood used to make the pen stand?

SECTION - C

27. Prove that $4 - 2\sqrt{7}$ is an irrational number, given that $\sqrt{7}$ is an irrational number.

OR

Let d be HCF of 24 and 36. Find two numbers a and b , such that $d = 24a + 36b$.

28. If a_n represents the n th term of an AP, prove that $a_p + a_{p+2q} = 2a_{p+q}$.

29. Solve for x and y : $231x + 148y = 527$, $148x + 231y = 610$.

OR

Find the solution of pair of equations, $\frac{x}{10} + \frac{y}{5} - 1 = 0$, $\frac{x}{8} + \frac{y}{6} = 15$. Hence, find λ if $y = \lambda x + 5$.

30. On dividing the polynomial $f(x) = 3x^3 - 2x^2 + 5x - 5$ by the polynomial $p(x)$, the quotient and remainder are $x^2 - x + 2$ and -7 respectively, find $p(x)$.

31. A seating arrangement is made for the students to write an examination. Seats are arranged in rows and columns. The positions of three students are: student A is sitting at the 2nd row and 7th column, student B is sitting at 4th row and 11th column and student C is sitting at 6th row and 15th column.

(i) Find the position of each student as an ordered pair (x, y) , if x represents the position of a student in a row and y represents the position of a student in a column.

(ii) Find the distance of student B, from student A as well as student C.

(iii) Another student D is sitting at the position represented by the point $(8, 13)$.

Find the area enclosed by student triangle ACD.

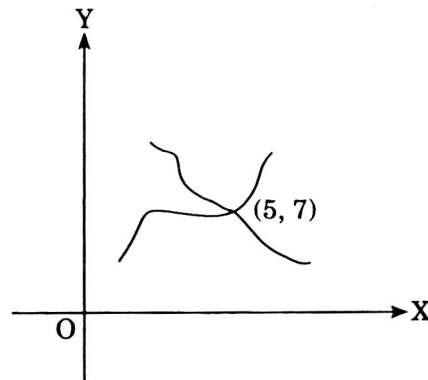
32. If $\sin \alpha + \sin^2 \alpha = 1$, find the value of $\cos^2 \alpha + \cos^4 \alpha$.

OR

Find A and B if, $2 \sin\{90^\circ - (2A - B)\} = 1$ and $\sqrt{3} \cot\{90^\circ - (A + B)\} = 1$.

33. A side of a red coloured square is 20 m. From the four corners sectors of radius 3 m each is cut out and a circle of radius 7 m is cut out from the centre of the square. Find the area of the red coloured square left.

34. Given data, which represents the marks of the students in a particular subject, was represented in the form of a 'less than type ogive' and 'more than type ogive', as shown.



- (i) How do you identify the curves 'less than type ogive' and 'more than type ogive' by looking at in terms of increasing order of curve or decreasing order of curve?
- (ii) If the two curves meet at the point (5, 7). Then what is the median of the data?
- (iii) If mode of the data is 7, find the mean of the data.

SECTION - D

35. Construct a right-angled triangle ABC right-angled at B with side BC = 6 cm and AC = 10 cm. Construct another triangle A'B'C whose sides are $\frac{3}{5}$ times the corresponding sides of the triangle ABC.

OR

Construct two circles of radii 3 cm and 2 cm with centres 7 cm apart. Draw the tangents from the centre of each circle to the other circle.

36. If two triangles are similar, prove that their areas are proportional to the squares of the corresponding sides.

OR

In a rhombus, prove that sum of the squares of all the sides is equal to the sum of the squares of its diagonals.

37. Speed of a boat in still water is 15 km/hour. It can go 30 km upstream and returns downstream to the same point in 4 hours 30 minutes. Find the speed of the stream.
38. A rocket toy has a hemispherical base, a cylindrical body and a conical nose cap. The rocket is 20 cm long. The hemisphere, the cylinder and the cone have a base diameter 3 cm each and the body of the cylindrical box is 8 cm long. Find the volume of the toy rocket.

OR

A spherical shell of internal and external diameters 6 cm and 10 cm respectively is melted and recast into a solid cylinder of height $10\frac{2}{3}$ cm. Find the total surface area and the volume of the cylinder thus formed.

39. From the top of a light house, the angles of depression of two ships on the opposite sides of it are observed to be α and β . If the height of the light house be h metre stand the line joining the ships passes through the foot of the light house, show that the distance between the ships is $\frac{h(\tan \alpha + \tan \beta)}{\tan \alpha \tan \beta}$ metres.
40. The arithmetic mean of the following frequency distribution is 50. But the frequencies f_1 and f_2 of the classes 20-40 and 60-80 are missing. Find the missing frequencies.

Class interval	0-20	20-40	40-60	60-80	80-100	Total
Frequency	17	f_1	32	f_2	19	120