

**Series RMT-DS2**

Code No. **RSPL/1**

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

(Q1-Q10) are multiple choice questions. Select the most appropriate answer from the given options.

- If two numbers  $a$  and  $b$  are expressed as  $a = xy^2p$  and  $b = xq$  where  $x, y, p, q$  are prime numbers, then  $\text{lcm}(a, b)$  is
  - $y^2$
  - $xy^2pq$
  - $x^2y^2pq$
  - $x$
- Number of zeroes for a zero polynomial is (are)
  - 0
  - 1
  - none
  - infinite
- Given a pair of linear equations  $x - 3y + 5 = 0$  and  $ax - \frac{3}{4}y + 4 = 0$  are inconsistent, then value of  $a$  is
  - 4
  - $\frac{1}{4}$
  - 3
  - any real number
- A line segment gets divided by the point  $\left(\frac{2k-3}{k+1}, \frac{k+3}{k+1}\right)$  in the ratio  $k:1$ . If point of division lies on the  $x$ -axis then its coordinates are
  - $\left(\frac{9}{2}, 0\right)$
  - $\left(-\frac{9}{2}, 0\right)$
  - $\left(0, \frac{9}{5}\right)$
  - $\left(0, -\frac{9}{5}\right)$
- Given  $\triangle ABC \sim \triangle DEF$  such that  $AL : DM = 3 : 7$ , where  $AL$  and  $DM$  are the medians of  $\triangle ABC$  and  $\triangle DEF$  respectively, then  $\text{ar}(\triangle DEF) : \text{ar}(\triangle ABC)$  is
  - 3:7
  - 49:9
  - 9:49
  - 7:3
- If  $5 \cot \theta = 4$ , then the value of  $(2 \sin \theta - 5 \cos \theta) \div \sin \theta$  is
  - 2
  - 2
  - 6
  - 6
- A lamp post  $2\sqrt{3}$  m high casts a shadow 6 m long on the ground, the Sun's elevation at this moment is
  - $30^\circ$
  - $60^\circ$
  - $90^\circ$
  - $45^\circ$
- If the area of the circle is numerically equal to twice the circumference of the circle, the diameter of the circle is
  - 6 units
  - 10 units
  - 8 units
  - 4 units

9. Two coins are tossed simultaneously, the probability of getting at most one tail is

- (a)  $\frac{1}{3}$                       (b)  $\frac{3}{4}$                       (c)  $\frac{1}{6}$                       (d)  $\frac{1}{9}$

10. A box contains balls numbered 5 to 30. A ball is drawn from the box, the probability that the ball drawn has prime number is

- (a)  $\frac{8}{25}$                       (b)  $\frac{2}{5}$                       (c)  $\frac{4}{13}$                       (d)  $\frac{7}{25}$

**(Q11-Q15) Fill in the blanks**

11. If  $3k - 1$ ,  $k + 3$ ,  $k - 1$  are in AP, then  $k$  is equal to \_\_\_\_\_.
12. Distance of the point whose ordinate is 3 and abscissa is 7 from the point  $(-1, 4)$  is \_\_\_\_\_.

**OR**

The mid-point of the line segment joining the points  $(3, -4)$  and  $(-6, 8)$  lies in \_\_\_\_\_ quadrant.

13.  $\sec \theta = \operatorname{cosec} \theta$  \_\_\_\_\_ an identity. (is/is not).
14. Given a circle with centre O, PT and PR are the tangents to the circle meeting the circle at T and R respectively. If the angle between the tangents is  $35^\circ$ , then the angle between the radii OT and OR is \_\_\_\_\_.
15. Two trigonometric ratios which can take any real value greater than or equal to one are \_\_\_\_\_.

**(Q16-Q20) Answer the following**

16. If  $5 \sin \alpha = 3$ , the find the value of  $\sec \alpha$ .

**OR**

Can we say that  $\sin \theta = 2$ , for some angle  $\theta$ . Give reasons in support of your answer.

17. Find the relation between  $x$  and  $y$  if the points  $(x, y)$ ,  $(a, 0)$  and  $(0, b)$  are collinear.

18. Write the relation between the mean, median and mode of the given data.
19. Check if  $x = -3$  is a solution of the quadratic equation  $(x - 2)^2 - 3x - 10 = 0$ .
20. A pair of linear equations can be consistent or inconsistent. Can there be any other possibility? If yes, give an example taking one of the equations as  $2x - y + 7 = 0$ .

### SECTION - B

21. Find the HCF of 124 and 279 using prime factorisation.
22. Which term of the AP 3, 15, 27, 39,..... is 132 more than its 54<sup>th</sup> term?

**OR**

Find the value of the middle most term(s) of the arithmetic progression  
-11, -7, -3, ....., 49.

23. In  $\triangle ABC$ , L and M are the points on the sides CA and CB such that LM is parallel to AB. If  $AL = x - 3$ ,  $AC = 2x$ ,  $BM = x - 2$ ,  $BC = 2x + 3$ , find the value of  $x$ .
24. Charvi just finished her exams and she was making a programme to have an outing with parents. They went to a restaurant for a dinner. She saw that a quiz paper is placed on the table so that as food is served children can use their time in working out different quizzes. Charvi got interested in one of the quizzes which reads as:

A rectangular sheet of paper  $44 \text{ cm} \times 18 \text{ cm}$  given. First it is asked to roll along the length to form a cylinder and then along the breadth to form a cylinder.

Charvi asked her father which out of the two has more capacity, arguments and counter arguments started. In the meantime food was served. Can you solve their problem?

25. If the mean of the following distribution is 6, find the value of  $p$ .

<b>x</b>	2	4	6	10	$p + 5$
<b>f</b>	3	2	3	1	2

26. A circular park has an area of  $48 \text{ m}^2$  and inside the circular park  $30 \text{ m}^2$  area is cemented and the rest of the area is green. Janya is playing bat ball with her friends in the cemented area. What is the probability that while playing the ball will land in green area?

**OR**

Today is SEWA period day. Different activities are performed by the students according to their choice. Three topics were given 'Swachhh Bharat', 'Swasth Bharat' and 'Plastic Mukht Bharat'. Three students have to give their presentations. Teacher told the students that out of 17 cards one card will be drawn and the student of that roll number will give the presentation. To be fair cards numbered 1, 2, 3, ....., 17 are put in a box and mixed thoroughly. One card is drawn from the box

- (i) how many possible outcomes are there?
- (ii) what are favourable outcomes for a prime number?
- (iii) what is the probability that a student with composite roll number will give the presentation?

**SECTION - C**

27. Sum of the digits of a two digit number is 12. The number obtained by interchanging the two digits exceeds the given number by 18. Find the number.

**OR**

Find the value of  $k$ , such that the pair of linear equations  $kx + 3y = k - 3$ ,  $12x + ky = k$  is consistent, dependent.

28. As we are progressing, new innovative methods are being developed to increase the production of crops and vegetables. Sometimes we use ingredients which affect our health. We should be careful about that and while using vegetables we must take all the precautions which we listen in TV or other media. For this miniature farming has also been developed and only those fertilisers are used which are not harmful. Taking a clue from the above a farmer wants to start



100 m<sup>2</sup> rectangular vegetable garden. Since he has only 30 m barbed wire he fences the sides of the rectangular garden and lets his house compound wall act as the fourth fence.

(i) Write the perimeter of the garden excluding wall.

(ii) What are the dimensions of his garden?

29. Find the sum of all three digit numbers which when divided by 11 leave remainder 5.

30. In what ratio does the y-axis divide the join of (-2, 4) and (4, 5)? Find the co-ordinates of the point of division.

**OR**

If (a, b) is the mid-point of the line segment joining the points A(10, -6) and B(k, 4) and  $a - 2b = 18$ . Find the value of k and distance AB.

31. Two circles with centres O and O' of radii 3 cm and 4 cm respectively intersect at two points P and Q such that OP and O'P are tangents to two circles, find the length of the common chord PQ.

32. Prove that:  $\frac{1}{\sec A + \tan A} - \frac{1}{\cos A} = \frac{1}{\cos A} - \frac{1}{\sec A - \tan A}$

33. As more and more awareness is created to keep city clean, help in reducing pollution, beautifying the city. You must have noticed in Metro and other places of the city, the walls are decorated with art pieces and paintings. One such painting on a wall is in the form of an equilateral triangle of area  $49\sqrt{3}$  m<sup>2</sup>. It is noticed that taking each angular point as centre circles have been described with radius equal to half the length of the side of the triangle. There is some area of the triangular part not included in the circles.

(i) What is the perimeter of an equilateral triangle?

(ii) Find the area of the triangle not included in the circles.

34. Prove that  $\sqrt{5}$  is an irrational number.

**OR**

Prove that the square of any positive integer is of the form  $4q$  or  $4q + 1$ , for some positive integer q.

### SECTION – D

35. Points A and B are 90 km apart from each other on a highway. A car starts from A and another from B at the same time. If they go in the same direction they meet in 9 hours and if they go in opposite directions they meet in  $9/7$  hours. Find the speeds of the two cars.
36. If two triangles are similar, show that their areas are proportional to the squares of the corresponding altitudes.

OR

Perpendicular AD on the base BC of a  $\triangle ABC$  meets BC at D such that  $DB = 3CD$ . Prove that  $2AB^2 = 2AC^2 + BC^2$ .

37. Construct triangle ABC, in which  $AB = 4$  cm,  $\angle B = 120^\circ$  and  $BC = 5$  cm. Construct another triangle  $AB'C'$ , such that  $AB' = \frac{4}{5}AB$ .
38. A straight highway leads to the foot of the tower. A man standing at the top of the tower observes a car at an angle of depression of  $30^\circ$ , which is approaching to the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be  $60^\circ$ . Find the time taken by the car to reach the foot of the tower from this point.

OR

Two poles of equal heights are standing opposite to each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are  $60^\circ$  and  $30^\circ$  respectively. Find the height of the poles and the distance of the point from the poles.

39. An open container made up of metal sheet is in the form of a frustum of a cone of height 7 cm with radii of lower and upper circular ends are 4 cm and 10 cm respectively. Find the cost of oil which can completely fill the container at the rate of ₹ 100 per litre. (take  $\pi = \frac{22}{7}$ )

**OR**

The difference between the outer and the inner curved surface areas of a hollow right circular cylinder 14 cm long, is  $88 \text{ cm}^2$ . If the volume of the metal used in making the cylinder is  $176 \text{ cm}^3$ , find the inner and outer diameter of the cylinder.

40. For a pollution free environment, trees play an important part and it is emphasized to plant as many trees as possible. You also must have planted plants in your school. One of the schools surveyed the plants they had planted in terms of their heights and recorded the following information:

Height(in cm)	Number of trees
Less than 7	26
Less than 14	55
Less than 21	92
Less than 28	140
Less than 35	216
Less than 42	298
Less than 49	338
Less than 56	360

- (i) Represent the data as a grouped frequency data.  
(ii) Find the mode of the data. What does mode represent?