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Standard X

Reg.No.:

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MATHEMATICS

B. Adithya

Time: 3.00 hrs.

Part - I

Marks: 100

14 x 1 = 14

I. Answer all the questions.

1. If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$, then fog is

a) $\frac{3}{2x^2}$

b) $\frac{2}{3x^2}$

c) $\frac{2}{9x^2}$

d) $\frac{1}{6x^2}$

2. $7^{4K} \equiv \underline{\hspace{2cm}} \pmod{100}$

a) 1

b) 2

c) 3

d) 4

3. The value of $(1^3 + 2^3 + 3^3 + \dots + 15^3) - (1 + 2 + 3 + \dots + 15)$ is

a) 14400

b) 14200

c) 14280

d) 14520

4. Which of the following should be added to make $x^4 + 64$ a perfect square?

a) $4x^2$

b) $16x^2$

c) $8x^2$

d) $-8x^2$

5. Which of the following can be calculated from the given matrices $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{pmatrix}$ and

$$B = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

(i) A^2

(ii) B^2

(iii) AB

(iv) BA

a) (i) and (ii) only

b) (ii) and (iii) only

c) (ii) and (iv) only

d) All of these

6. How many tangents can be drawn to the circle from an exterior point?

a) One

b) Two

c) Infinite

d) Zero

7. Which one of the following cannot be Pythagorean triplets?

a) (3,4,5)

b) (5,12,13)

c) (4,5,6)

d) (6,8,10)

8. A man walks near a wall, such that the distance between him and the wall is 10 units. Consider the wall to be the y-axis. The path travelled by the man is

a) $x = 10$

b) $y = 10$

c) $x = 0$

d) $y = 0$

9. If A is a point on the y-axis whose ordinate is 8 and B is a point on the x-axis whose abscissae is 5 then the equation of the line AB is

a) $8x + 5y = 40$

b) $8x - 5y = 40$

c) $x = 8$

d) $y = 5$

10. $\frac{1 + \tan^2 A}{1 + \cot^2 A} = ?$

a) $\sec^2 A$

b) -1

c) $\cot^2 A$

d) $\tan^2 A$

11. A tower is 60 m high. Its shadow is x metres shorter when the sun's altitude is 45° than when it has been 30° , then x is equal to
- a) 41.92 m b) 43.92 m c) 43 m d) 45.6 m
12. The total surface area of a hemi-sphere is how much times the square of its radius?
- a) π b) 4π c) 3π d) 2π
13. The range of the data 8,8,8,8,8,.....8 is
- a) 0 b) 1 c) 8 d) 3
14. A bag contains 3 red balls and 7 white balls. One of the ball is drawn at random from the bag. Then the probability of getting green ball is
- a) $\frac{3}{10}$ b) $\frac{7}{10}$ c) 0 d) 1

Part - II

II. Answer any 10 questions. (Q.No.28 is compulsory)

10 x 2 = 20

- ✓ 15. If $A = \{1,3,5\}$ and $B = \{2,3\}$, then show that $n(A \times B) = n(A) \times n(B)$
- ✓ 16. Let $f(x) = x^2 - 1$, find $f \circ f$.
- ✓ 17. Find the 8th term of the G.P : 9, 3, 1,
- ✓ 18. Simplify : $\frac{4x^2y}{2z^2} \times \frac{6xz^3}{20y^4}$
- ✓ 19. Determine the quadratic equations, whose sum and product of roots are $-9, 20$
20. State Ceva's theorem.
- ✓ 21. Find the slope of a line joining the given points (14, 10) and (14, -6)
22. Find the equation of a straight line passing through (5, 7) and is (i) Parallel to x axis
(ii) Parallel to y axis
- ✓ 23. From the top of a rock $50\sqrt{3}$ m high, the angle of depression of a car on the ground is observed to be 30° . Find the distance of the car from the rock.
24. A cylindrical drum has a height of 20 cm and base radius of 14 cm. Find its total surface area.
- ✓ 25. The volumes of two cones of same base radius are 3600 cm^3 and 5040 cm^3 . Find the ratio of heights.
26. Find the standard deviation of first 7 natural numbers.
- ✓ 27. A die is rolled and a coin is tossed simultaneously. Find the probability that the die shows an odd number and the coin shows a head.
- ✓ 28. Find the largest number which divide 47 and 23 leaving remainder 7 in each case.

(3)

X Maths

Part - III

III. Answer any 10 questions. (Q.No.42 is compulsory)

10 x 5 = 50

29. Let $f : A \rightarrow B$ be a function defined by $f(x) = \frac{x}{2} - 1$ where $A = \{2, 4, 6, 10, 12\}$,

$B = \{0, 1, 2, 4, 5, 9\}$. Represent f by

(i) Set of ordered pairs

(ii) A table

(iii) An arrow diagram

(iv) A graph

30. If the function $f : \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = \begin{cases} 2x+7 & \text{if } x < -2 \\ x^2-2 & \text{if } -2 \leq x < 3 \\ 3x-2 & \text{if } x \geq 3 \end{cases}$

then the values of (i) $f(4)$ (ii) $f(4) + 2f(1)$ (iii) $\frac{f(1) - 3f(4)}{f(-3)}$

31. Find the 15th, 24th and n^{th} term (general term) of an A.P is given by 3, 15, 27, 39,

32. Rekha has 15 square colour papers of size is 10 cm, 11 cm, 12 cm,, 24 cm.

How much area can be decorated with these colour papers?

33. Find the square root of the following polynomial by division method :

$$x^4 - 12x^3 + 42x^2 - 36x + 9$$

34. From a group of $2x^2$ black bees, square root of half of the group went to a tree. Again eight-ninth of the bees went to the same tree. The remaining two got caught up in a fragrant lotus. How many bees were there in total?

35. Let $A = \begin{pmatrix} 1 & 2 \\ 1 & 3 \end{pmatrix}$, $B = \begin{pmatrix} 4 & 0 \\ 1 & 5 \end{pmatrix}$ show that $(A - B)^T = A^T - B^T$

36. In $\triangle ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $AD = 8x - 7$, $DB = 5x - 3$, $AE = 4x - 3$ and $EC = 3x - 1$, find the value of x

37. You are downloading a song. The percent y (in decimal form) a mega bytes remaining to get downloaded in x seconds is given by $y = -0.1x + 1$.

(i) Find the total MB of the song

(ii) After how many seconds will 75% of the song gets downloaded?

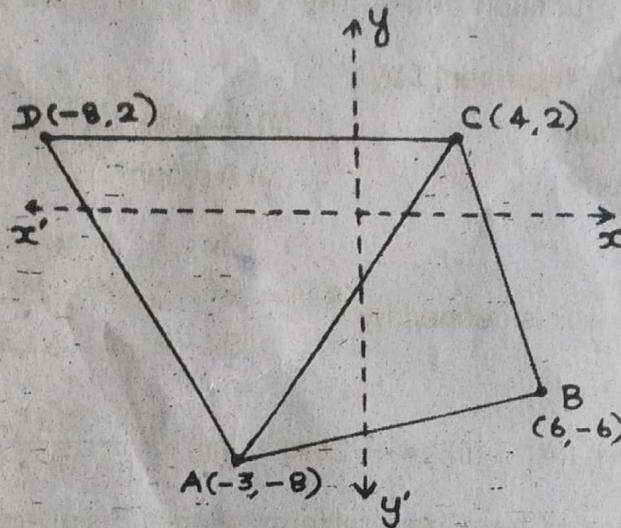
(iii) After how many seconds the song will be downloaded completely?

38. From the top of the tree of height 13 m, the angle of elevation and depression of the top and bottom of another tree are 45° and 30° respectively. Find the height of the second tree. ($\sqrt{3} = 1.732$)

39. A rectangular sheet of paper 40 cm x 22 cm is rolled to form a cylinder of height 40 cm. Find the volume of the cylinder so formed.

40. If the radii of the circular ends of a frustum which is 45 cm high are 28 cm and 7 cm, find the volume of the frustum.

41. Three unbiased coins are tossed once. Find the probability of getting atmost 2 tails or at least 2 heads.
- ✓ 42. Given a quadrilateral ABCD with vertices $A(-3, -8)$, $B(6, -6)$, $C(4, 2)$, $D(-8, 2)$



- (i) Find the area of $\triangle ABC$
- (ii) Find the area of $\triangle ACD$
- (iii) Using the results of (i) & (ii), find the area of quadrilateral ABCD.

Part - IV

IV. Answer all the questions.

2 x 8 = 16

43. a) Construct a triangle $\triangle PQR$ such that $QR = 5$ cm, $\angle P = 30^\circ$ and the altitude from P to QR is of length 4.2 cm.

(OR)

- b) Construct a triangle similar to a given triangle LMN with its sides equal two $\frac{4}{5}$ of the corresponding sides of the triangle LMN. (Scale factor $\frac{4}{5}$)
44. a) Varshika drew 6 circles with different sizes. Draw a graph for the relationship between the diameter and circumference of each circle (approximately) as shown in the table and use it to find the circumference of a circle when its diameter is 6 cm.

Diameter (x) cm	1	2	3	4	5
Circumference (y) cm	3.1	6.2	9.3	12.4	15.5

(OR)

- b) Discuss the nature of solutions of the following quadratic equations
 $x^2 - 8x + 16 = 0$
