Std - X

M301

Register Number

Part III

Mathematics

Time Allowed : 3 Hours Maximum Marks : 100

Instruction : Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

Note : Draw diagrams and write equations wherever necessary

PART - I

Note : i) Answer all the questions. 14 x 1 = 14
ii) Choosee the most appropriate answer.

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. If $f\left(x - \frac{1}{x}\right) = x^2 + \frac{1}{x^2}$, $f(x) =$ ____

   a) $x^2 + 2$ b) $x^2 - 2$ c) $x^2 + \frac{1}{x^2}$ d) $x^2 - \frac{1}{x^2}$

3. The least number that is divisible by all the numbers from 1 to 10 (both inclusive)

   a) 5025 b) 2520 c) 5220 d) 2025

4. If $44 \equiv 8 \pmod{12}$, $113 \equiv 5 \pmod{12}$, $44 \times 113 =$ ____ $\pmod{12}$

   a) 1 b) 4 c) 3 d) 2

5. Graph of linear polynomial is

a) straight line b) circle
c) parabola d) hyperbola

6. If $A = \begin{pmatrix} y & 0 \\ 3 & 4 \end{pmatrix}$, $I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ and $A^2 = 16\ I$

a) $y = 4$ b) $y = 5$ c) $y = -4$ d) $y = 16$

7. In ΔLMN, $\angle L = 60^\circ$ $\angle M = 50^\circ$ If $\Delta LMN \sim \Delta PQR$, then the value of $\angle R$ is

a) 70° b) 40° c) 110° d) 30°

8. The slope of line joining (12,3) (4,a) is $\frac{1}{8}$. The value of 'a' is

a) 1 b) 4 c) -5 d) 2

9. The line is drawn by the points (0,0), (a,0), (0,b), then ——

a) $a = b$ b) $a + b = 0$ c) $ab = 0$ d) $a \neq b$

10. $\sin(\alpha + \beta) = 1$, $\cos(\alpha - \beta) =$ ——

a) $\sin\alpha$ b) $\cos\beta$ c) $\sin2\beta$ d) $\cos2\beta$

11. The spherical ball of radius r_1 units is melted to make 8 new identical balls each of radius r_2 units. Then $r_1 : r_2$ is ——

a) 2 : 1 b) 1 : 2 c) 4 : 1 d) 1 : 4

12. The range of 8, 8, 8, 8 ..... 8 is ——

a) 0 b) 1 c) 8 d) 3

13. A semicircular metal sheet of diameter 28 cm is joined to get a open cone. Find the volume

a) $\frac{1000}{3}\sqrt{3}\,cm^3$ b) $300\sqrt{3}\,cm^3$

c) $\frac{700}{3}\sqrt{3}\,cm^3$ d) $\frac{1078\sqrt{3}}{3}\,cm^3$

14. When three coins are tossed simultaneously the probability of getting the same faces is

a) $\frac{1}{8}$ b) $\frac{1}{4}$ c) $\frac{3}{8}$ d) $\frac{1}{3}$

PART - II

Note : i) Answer 10 questions in all. $10 \times 2 = 20$
ii) Q.No 28 is compulsory. Select any 9 questions from the first 14 questions.
iii) Each question carries two marks.

15. Define Null set

16. 

Identify function

17. If 3, x, 6.75 are in G.P. Find the x

18. Say True or False

a) The sum of two rational expressions is always a rational expression

b) The product of two rational expression is always a rational expression

19. What is the Value of x if $4\sqrt{x} = 16$?

20. The length of the tangent to a circle from a point p, which is 25 cm away from the centre is 24 cm. What is the radius of circle

21. Find the equation of straight line perpendicular to the line $2x - 3y + 6 = 0$.

22. Find the intercepts of the straight line $3x + 4y - 7 = 0$

23. Prove that $\frac{1 - \tan^2\theta}{\cot^2\theta - 1} = \tan^2\theta$

24. Define angle of elevation and angle of depression

25. Two circular cylinders are formed by rolling two rectangular aluminium sheets each dimension 12 m length and 5 m breath one by rolling along its length and the along its width. Find the ratio of their CSA.

26. Find the TSA of cylinder of radius 14 cm and height 10 cm

27. Fin the range and coefficient of range of the data 25, 26, 18, 22, 71, 38

28. Which will be the probability that a non leap year will have 53 Saturday?

PART - III

Note : i) Answer 10 questions in all. $10 \times 5 = 50$
ii) Q.No 42 is cmpulsory. Select any 9 questions from the first 14 questions.
iii) Each question carries five marks.

29. Represent the function f = {(1,2), (2,2), (3,2), (5,4)}
(i) arrow diagram (ii) a table form
iii) graph

30. Given A = {1, 2, 3}, B = {2, 3, 5} C = {3, 4} and D = {1, 3, 5} check if $(A \cap C) \times (B \cap D) = (A \times B) \cap (C \times D)$ is true?

31. The sum of first n, 2n and 3n terms of an A.P are S_1, S_2, S_3 repectively. Prove that $S_3 = 3(S_2 - S_1)$

32. A man saved Rs.16500 in ten years. In each year after the first he saved Rs.100 more than he did in the preceeding year. How much did he save in the first year.

33. Find the square root of $16x^4 + 8x^2 + 1$

34. If A = (1 −1 2), $B = \begin{pmatrix} 1 & -1 \\ 2 & 1 \\ 1 & 3 \end{pmatrix}$ and $C = \begin{pmatrix} 1 & 2 \\ 2 & -1 \end{pmatrix}$ show that then (AB)C=A(BC)

35. Find the equation of a straight line which has slope $\frac{-5}{4}$ and passing through the point of intersect of lines $7x + 3y = 10$ and $5x - 4y = 1$

36. Show that the points (−2,5), (6,−1) and (2,2) are collinear

37. Prove that $\frac{\sin A}{\sec A + \tan A - 1} + \frac{\cos A}{\operatorname{cosec} A + \cot A - 1} = 1$

38. The top of 15 m high tower makes an angle of davation of 60^0 with the bottom of an electronic pole and angle of elevation of 30^0 with the top of the pole. What is the height of the electric pole

39. A metallic sheet in the form of a section of a circle of radius 21cm has central angle of 216^0. The sector is made into a cone by bringing the bounding radii together.Find the volume of the cone formed.

40. Three unbiased coins are tossed once. Find the probability of getting atmost 2 tails or atleast 2 heads.

41. The consumption of number of guava and orange on a particular week by a family are given below.

Number of Guavas	3	5	6	4	3	5	4
Number of Oranges	1	3	7	9	2	6	2

42. A solid sphere of radius 6 cm is melted in to a hollow cylinder of uniform thickness. If the external radius of the base of the cylinder is 5 cm and its height is

32 cm then find the thickness of the cylinder.

PART - IV

Note : i) This section contains two questions, each with two alternatives.

ii) Answer both the questions choosing either of the alternatives. $2 \times 8 = 16$

43. There are 20 pieces of two, five, and ten rupee coins whose total value is Rs.95. When last two sorts are interchanged there is no change in the total value. Find the number of coins in each sort

(or)

Draw the graph of $y = x^2 + x - 2$ and hence solve $x^2 + x - 2 = 0$

44. State and prove alternate segment theorem

(or)

Draw ΔPQR such that PQ = 6.8 cm vertical angle is 50^0 and the bisector of the vertical angle meets the base at 'D' where PD = 5.2 cm.

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