

Padasalai's Centum Special Question Paper 2023

CLASS : X

SUBJECT : MATHEMATICS

MARKS : 100

TIME : 3 HRS

FULLY CREATIVE

PART – A

CHOOSE THE CORRECT ANSWER

14 X 1 = 14

1. If $f(x) = 3x + 1$ then preimage of 7 is (a) 16 (b) 2 (c) 22 (d) 4
2. n^{th} term of the sequence ak, ak^3, ak^5, \dots is
 (a) ak^n (b) ak^{2n-1} (c) ak^{n-1} (d) $ak^n + 1$
3. The condition for one root to be zero for a quadratic equation is
 (a) $a = 0$ (b) $b = 0$ (c) $c = 0$ (d) none
4. If two numbers x and $x + 1$ are co-prime then GCD of x and $x + 1$ is
 (a) 1 (b) $x + 1$ (c) x (d) 0
5. If A and B are two matrices which satisfies $A + B = B$ then A is matrix.
 (a) Row (b) Column (c) Null (d) Diagonal
6. The length of diagonal of a square is $4\sqrt{2}$ cm then its side is
 (a) 8cm (b) 4cm (c) 6cm (d) 12cm
7. The equation of a line passing through (2,3) and origin is
 (a) $3x - 2y + 12 = 0$ (b) $3x + 2y - 12 = 0$ (c) $3x - 2y = 0$ (d) $2x - 3y + 12 = 0$
8. If $A(1,-1)$ $B(0,4)$ $C(-5,3)$ are the vertices of ΔABC , The length of the median through B is (a) 13 (b) $\sqrt{13}$ (c) $\sqrt{6}$ (d) 6
9. The shadow of a pillar of height 5m is 5m. The sun is an altitude of
 (a) 90° (b) 45° (c) 60° (d) 30°
10. The value of $\frac{2\tan 30^\circ}{1-\tan^2 30^\circ}$ (a) $\sqrt{2}$ (b) $\sqrt{3}$ (c) $1/\sqrt{3}$ (d) 0
11. Radius of the hemisphere is 3 cm and depth of the hemisphere is
 (a) 3 cm (b) 2 cm (c) 9 cm (d) 6 cm
12. If the surface area of a sphere is 36π cm², then the volume of the sphere is equal to (a) 12π cm³ (b) 36π cm³ (c) 72π cm³ (d) 108π cm³
13. Variance of the first 11 natural numbers is (a) $\sqrt{5}$ (b) $\sqrt{10}$ (c) 5 (d) 0
14. Probability of getting 3 heads or 3 tails in tossing a coin 3 times is
 (a) $1/8$ (b) $1/4$ (c) $3/8$ (d) $1/2$

PART - B

ANSWER ANY 10 QUESTIONS (QUESTION NUMBER 28 IS COMPULSORY) 10 X 2 = 20

15. Is $f : \mathbb{N} \rightarrow \mathbb{N}$ defined by $f(x) = \frac{1}{2}(x + 1)$ a function? Justify your answer.

16. Find the value of $\sqrt{3\sqrt{3\sqrt{3}}}$

17. Simplify $\frac{a^3}{a-b} + \frac{b^3}{b-a}$

18. If α and β are the roots of the equation $x^2 - p(x + 1) - q = 0$ show that

$$(\alpha + 1)(\beta + 1) = 1 - q.$$

19. $A = \begin{pmatrix} 2 & 3 \\ -9 & 5 \end{pmatrix} - \begin{pmatrix} 1 & 5 \\ 7 & -1 \end{pmatrix}$, find the additive inverse of A.

20. Let PQ be a tangent to a circle at A and AB be chord. Let C be a point on the circle

such that $\angle BAC = 54^\circ$ and $\angle BAQ = 62^\circ$ find $\angle ABC$.

21. If $P(x, y)$ is any point on the line segment joining the points $(a, 0)$ and $(0, b)$, then

prove that $\frac{x}{a} + \frac{y}{b} = 1$, where $a, b \neq 0$.

22. Find the equation of the straight line perpendicular to the straight line

$x - 2y + 3 = 0$ and passing through the point $(1, -2)$.

23. A girl of height 150 cm stands in front of a lamp-post and casts a shadow of length

$150\sqrt{3}$ cm on the ground. Find the angle of elevation of the top of the lamp-post

24. Prove the identity $(\sin^6 \theta + \cos^6 \theta) = 1 - 3 \sin^2 \theta \cos^2 \theta$.

25. If the curved surface area of solid a sphere is 98.56 cm^2 , then find the radius

of the sphere.

26. The radii of two right circular cylinders are in the ratio of 3 : 2 and their heights

are in the ratio 5 : 3. Find the ratio of their curved surface areas.

27. Two coins are tossed together. What is the probability of getting at most one head.

28. Find the standard deviation of first 10 natural numbers.

PART - C**ANSWER ANY 10 QUESTIONS (QUESTION NUMBER 28 IS COMPULSORY) 10 X 5 = 50**

29. If $f(x) = \frac{x-1}{x+1}$, $x \neq -1$, then prove that $f(2x) = \frac{3f(x)+1}{f(x)+1}$

30. In a G.P with common ratio r , the sum of first four terms is equal to 15 and the sum of their squares is equal to 85. Prove that $14r^4 - 17r^3 - 17r^2 - 17r + 14 = 0$

31. If S_1, S_2, S_3 are the sums of the first n natural numbers, their squares and cubes respectively prove that $9(S_2)^2 = S_3 (1 + 8S_1)$.

32. In a ΔABC , $\angle C$ is 20° greater than $\angle A$. The sum of $\angle A$ and $\angle C$ is twice the $\angle B$.
Find the three angles.

33. The product of age of a man, 6 years before and 10 years later is 960.
Find the present age of man.

34. If $A = \begin{pmatrix} -2 \\ 4 \\ 5 \end{pmatrix}$ and $B = (1 \ 3 \ -6)$ then verify that $(AB)^T = B^T A^T$.

35. The mid points of the triangle are $(5, -3)$, $(-5, 3)$ and $(6, 6)$. Find the equation of the sides of the triangle.

36. Find the equation of the straight line which passes through $(1, 4)$ and has intercepts which are in the ratio 3:5.

37. If $\sin \theta = \cos \theta$ where θ is acute angle. Find the value of $2 \tan^2 \theta - \sin^2 \theta - 1$.

38. A hemispherical bowl of radius 30 cm is filled with soap paste. If this paste is made into cylindrical soap cakes each of radius 5 cm and height 2cm, how many cakes do we get?

39. A circus tent is to be erected in the form of a cone surmounted on a cylinder.
The total height of the tent is 49 m. Diameter of the base is 42 m and height of
The cylinder is 21 m. Find the cost of canvas needed to make the tent, if the cost of
canvas is `12.50/m² . (Take $\pi = \frac{22}{7}$)
40. Given $\sum x = 99$, $n = 9$, $\sum(x - 10)^2 = 79$, then find $\sum x^2$ and $\sum(x - \bar{x})^2$.
41. A bag contains 50 bolts and 150 nuts. Half of the bolts and half of the nuts are
rusted. If an item is chosen at random, find the probability that it is rusted or that it
is a bolt.
42. In right ΔABC right angled at C. If p is the length of the perpendicular from C to AB
And $AB = c$, $BC = a$, $CA = b$, then prove that (i) $pc = ab$ (ii) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$.

PART - D

ANSWER THE FOLLOWING QUESTIONS

2 X 8 = 16

43. (a) Construct a ΔABC such that $BC = 4.5\text{cm}$, $\angle A = 40^\circ$ and the median AM from A to
 BC is of length 4.7cm . Find the length of the altitude from A to BC . (OR)
- (b) Draw a circle of diameter 10cm . From a point P , 13cm away from its centre
draw the two tangents PA and PB to the circle and measure their lengths.
44. (a) A bank gives 10% S.I on deposits for senior citizens. Draw the graph for the
relation between the sum deposited and interest earned for one year
(i) the interest on the deposit of Rs 650 (ii) The amount to be deposited to earn
an interest of Rs 45 (OR)
- (b) Solve graphically $x^2 - 2x - 8 = 0$.

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