

36. Find the LCM (Least Common Multiple) of the following.

$$x^3 + y^3, x^3 - y^3, x^4 + x^2y^2 + y^4$$

37. If $m - nx + 28x^2 + 12x^3 + 9x^4$ is a perfect square, then find the values of m and n.

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

39. Find the area of the quadrilateral formed by the points $(-4, 5)$, $(0, 7)$, $(5, -5)$ and $(-4, -2)$.

40. If the vertices of a ΔABC are $A(2, -4)$, $B(3, 3)$ and $C(-1, 5)$. Find the equation of the straight line along the altitude from the vertex B.

41. From the top and foot of a 40m high tower, the angles of elevation of the top of a lighthouse are found to be 30° and 60° respectively. Find the height of the lighthouse. Also find the distance of the top of the lighthouse from the foot of the tower.

42. A heap of paddy is in the form of a cone whose diameter is 4.2 m and height is 2.8 m. If the heap is to be covered exactly by a canvas to protect it from rain, then find the area of the canvas needed.

43. Prove that the standard deviation of the first n natural numbers is $\sigma = \sqrt{\frac{n^2 - 1}{12}}$

44. If a die is rolled twice find the probability of getting an even number in the first time or a total of 8.

45. a) Find the equations of the straight lines each passing through the point $(6, -2)$ and whose sum of the intercepts is 5.

(OR)

b) A cuboid shaped slab of iron whose dimensions are $55 \text{ cm} \times 40 \text{ cm} \times 15 \text{ cm}$ is melted and recast into a pipe. The outer diameter and thickness of the pipe are 8 cm and 1 cm respectively. Find the length of the pipe. (Take $\pi = \frac{22}{7}$)

Section - IV (Marks : 20)

Note: Answer both the questions choosing either of the alternatives: 2x10=20

46. a) Construct a ΔABC such that $AB = 6 \text{ cm}$, $\angle C = 40^\circ$ and the altitude from C to AB is of length 4.2 cm.

(OR)

b) Construct a cyclic quadrilateral ABCD with $AB = 7 \text{ cm}$, $\angle A = 80^\circ$, $AD = 4.5 \text{ cm}$ and $BC = 5 \text{ cm}$.

47. a) Draw the graph of $y = 2x^2$ and hence solve $2x^2 + x - 6 = 0$.

(OR)

b) Draw the graph of $xy = 20$, and use the graph to find y when $x = 5$, and to find x when $y = 10$.

Full Portion Test - 3

Standard X

MATHEMATICS

Time: 2.30 hrs.

Marks: 100

Instructions: 1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

2) Use Black or Blue ink to write and pencil to draw diagrams.

Note: This question paper contains four sections.

Section - I (Marks : 15)

Note: i) Answer all the 15 questions.

ii) Choose the correct answer from the given four alternatives and write the option code and the corresponding answer. 15x1=15

1. For any two sets A and B, $\{(A \setminus B) \cup (B \setminus A)\} \cap (A \cap B)$ is

- a) ϕ b) $A \cup B$ c) $A \cap B$ d) $A' \cap B'$

2. The next term of $\frac{1}{20}$ in the sequence $\frac{1}{2}, \frac{1}{6}, \frac{1}{12}, \frac{1}{20}$ is

- a) $\frac{1}{24}$ b) $\frac{1}{22}$ c) $\frac{1}{30}$ d) $\frac{1}{18}$

3. If $1 + 2 + 3 + \dots + n = k$, then $1^3 + 2^3 + 3^3 + \dots + n^3$ is equal to

- a) k^2 b) k^3 c) $\frac{k(k+1)}{2}$ d) $(k+1)^3$

4. The G.C.D of $(x^3 + 1)$ and $(x^4 - 1)$ is

- a) $x^3 - 1$ b) $x^3 + 1$ c) $x + 1$ d) $x - 1$

5. The common root of the equations $x^2 - bx + c = 0$ and $x^2 + bx - a = 0$ is

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

6. If $(5 \ x \ 1) \begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix} = (20)$, then the value of x is

- a) 7 b) -7 c) $\frac{1}{7}$ d) 0

7. Slope of the straight line which is perpendicular to the straight line joining the points $(-2, 6)$ and $(4, 8)$ is equal to

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

8. The point of intersection of the straight lines $y = 0$ and $x = -4$ is
 - a) (0, -4)
 - b) (-4, 0)
 - c) (0, 4)
 - d) (4, 0)
9. ΔABC is a right angled triangle where $\angle B = 90^\circ$ and $BD \perp AC$. If $BD = 8$ cm, $AD = 4$ cm, then CD is
 - a) 24 cm
 - b) 16 cm
 - c) 32 cm
 - d) 8 cm
10. If a straight line intersects the sides AB and AC of a ΔABC at D and E respectively and is parallel to BC , then $\frac{AE}{AC} =$
 - a) $\frac{AD}{DB}$
 - b) $\frac{AD}{AB}$
 - c) $\frac{DE}{BC}$
 - d) $\frac{AD}{EC}$
11. $(1 - \cos^2 \theta)(1 + \cot^2 \theta) =$
 - a) $\sin^2 \theta$
 - b) 0
 - c) 1
 - d) $\tan^2 \theta$
12. $\sin^2 \theta + \frac{1}{1 + \tan^2 \theta} =$
 - a) $\operatorname{cosec}^2 \theta + \cot^2 \theta$
 - b) $\operatorname{cosec}^2 \theta - \cot^2 \theta$
 - c) $\cot^2 \theta - \operatorname{cosec}^2 \theta$
 - d) $\sin^2 \theta - \cos^2 \theta$
13. If the surface area of a sphere 100π sq cm, then its radius is equal to
 - a) 25 cm
 - b) 100 cm
 - c) 5 cm
 - d) 10 cm
14. The variance of 10, 10, 10, 10, 10 is
 - a) 10
 - b) $\sqrt{10}$
 - c) 5
 - d) 0
15. If $P(A) = 0.25$, $P(B) = 0.50$, $P(A \cap B) = 0.14$ then $P(\text{neither } A \text{ nor } B) =$
 - a) 0.39
 - b) 0.25
 - c) 0.11
 - d) 0.27

Section - II (Marks : 20)

- Note: i) Answer ten questions. 10x2=20
 ii) Question No.30 is compulsory. Select any 5 questions from the first 14 questions.

16. Draw Venn diagram $A \cup (B \cap C)$.
17. Find the 17th term of the A.P. 4, 9, 14, ...
18. Find the value of k , if $1^3 + 2^3 + 3^3 + \dots + k^3 = 4356$.
19. Find the GCD of the following $x - 27a^3x$, $(x - 3a)^2$.
20. If α and β are the roots of the equation $2x^2 - 3x - 1 = 0$ find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$.

21. Find a and b if $a \begin{pmatrix} 2 \\ 3 \end{pmatrix} + b \begin{pmatrix} -1 \\ 1 \end{pmatrix} = \begin{pmatrix} 10 \\ 5 \end{pmatrix}$.

22. If $A = \begin{pmatrix} 2 & 3 \\ -9 & 5 \end{pmatrix} - \begin{pmatrix} 1 & 5 \\ 7 & -1 \end{pmatrix}$ then find the additive inverse of A .
23. Find the centroid of the triangle whose vertices are $A(4, -6)$, $B(3, -2)$ and $C(5, 2)$.
24. Find the value of a if the straight lines $5x - 2y - 9 = 0$ and $ay + 2x - 1 = 0$ are perpendicular to each other.
25. In ΔABC , the internal bisector AD of $\angle A$ meets the side BC at D . If $BD = 2.5$ cm, $AB = 5$ cm and $AC = 4.2$ cm then find DC .
26. Prove that $\frac{1 + \sec \theta}{\sec \theta} = \frac{\sin^2 \theta}{1 - \cos \theta}$
27. A ramp for unloading a moving truck, has an angle of elevation of 30° . If the top of the ramp is 0.9 m above the ground level, then find the length of the ramp.
28. The volume of a solid right circular cone is 4928 cu.cm. If its height is 24 cm, then find the radius of the cone. (Take $\pi = \frac{22}{7}$)
29. Two coins are tossed together. What is the probability of getting at most one head?
30. a) If one of the roots of the equation $3x^2 - 10x + k = 0$ is $\frac{1}{3}$, then find the other root and also the value of k .
 (OR)
 b) The thickness of a hemispherical bowl is 0.25 cm. The inner radius of the bowl is 5 cm. Find the outer curved surface area of the bowl. (Take $\pi = \frac{22}{7}$)

Section - III (Marks : 45)

- Note: i) Answer nine questions. 9x5=45
 ii) Question No.45 is compulsory. Select any 8 questions from the first 14 questions.

31. Use Venn diagrams to verify De Morgan's law for set difference $A \setminus (B \cap C) = (A \setminus B) \cup (A \setminus C)$.
32. A function $f : [-7, 6) \rightarrow \mathbb{R}$ is defined as follows:

$$f(x) = \begin{cases} x^2 + 2x + 1 & ; -7 \leq x < -5 \\ x + 5 & ; -5 \leq x \leq 2 \\ x - 1 & ; 2 < x < 6 \end{cases}$$
 Find (i) $2f(-4) + 3f(2)$ (ii) $f(-7) - f(-3)$ (iii) $\frac{4f(-3) + 2f(4)}{f(-6) - 3f(1)}$
33. Find the sum of all 3 digit natural numbers, which are divisible by 8.
34. Find the total area of 12 squares whose sides are 12 cm, 13 cm, ... 23 cm. respectively.
35. Factorize: $x^3 - 7x + 6$