Score

Answer any 6 questions from 1 to 8. Each carries 3 scores. **(6×3=18)**

1. i) For two sets A and B, $A \cup B = A$ iff

a) $A = \phi$ b) $A \neq B$ c) $A \subseteq B$ d) $B \subseteq A$ **(1)**

ii) Write all subsets of $\{-1, 1\}$. **(1)**

iii) Write the set builder form of $\{3, 6, 9, 12, 15\}$. **(1)**

2. i) Draw the graph of $f(x) = |x + 1| - 1$. **(2)**

ii) Write the domain and range of $f(x)$. **(1)**

3. i) The value of $2 \sin 15° \cos 15°$ is **(1)**

a) 1 b) $\frac{1}{2}$ c) $\frac{1}{\sqrt{2}}$ d) $\frac{\sqrt{3}}{2}$

ii) Find the value of $\cos 75°$. **(2)**

4. i) If $5C_4 + 5C_3 = nC_4$, then n =

a) 5 b) 6 c) 7 d) 8 **(1)**

ii) In how many ways can 5 girls and 3 boys be seated in a row so that no two boys are together ? **(2)**

5. How many terms of the G.P. $3, \frac{3}{2}, \frac{3}{4}, \ldots$ are needed to give the sum $\frac{3069}{512}$? **(3)**

6. Find the equation of the line which is equidistant from the parallel lines.
$9x + 6y - 7 = 0$ and $3x + 2y + 6 = 0$. **(3)**

7. i) Find the equation of the circle concentric with $x^2 + y^2 - 6x - 8y - c = 0$ and passing through $(-1, -2)$. **(2)**

ii) Find the equation of directrix and focus of the parabola $4x^2 + y = 0$. **(1)**

8. i) For a parabola eccentricity e is **(1)**

a) $e = 1$ b) $e = 0$ c) $e < 1$ d) $e > 1$

Score

ii) Match the following : (2)

Equation	Conic
$3x^2 - y^2 + x - 2y + 5 = 0$	Circle
$x^2 + 3y^2 + 2x + y + 3 = 0$	Parabola
$2x^2 + 2y^2 - 3y + 2 = 0$	Ellipse
$x^2 - 4x - 4y + 3 = 0$	Hyperbola

Answer any 6 questions from 9 to 16. Each carries 4 scores. **(6×4=24)**

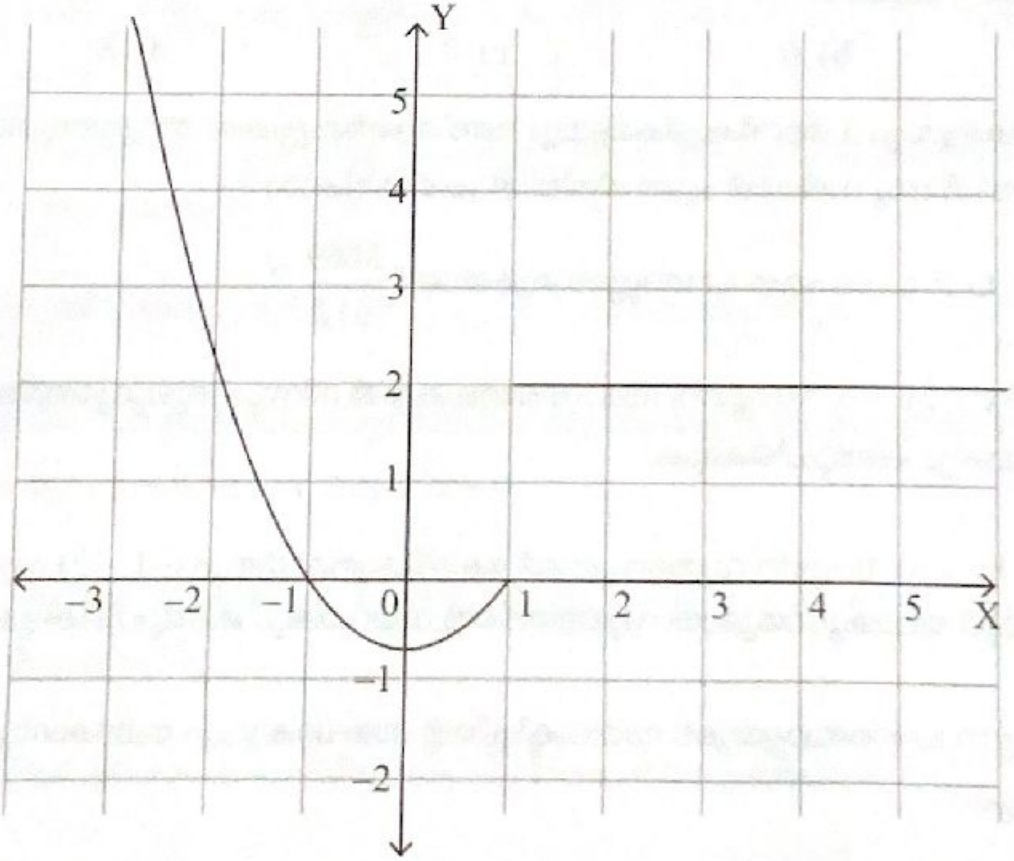
9. i) Which of the following is a finite set ? (1)

a) $[1, 3]$ b) $\{x : x \in R, x < 3\}$

c) ϕ d) N

ii) Consider $A = \{1, 2, 3, 4, 5, 6, 7\}$, $B = \{2, 4, 6\}$ and $C = \{1, 5\}$ prove that $A - (B \cup C) = (A - B) \cap (A - C)$. (3)

10. i) From figure write the definition of f(x). (2)



ii) Write domain and range of $g(x) = \sqrt{x^2 - 1}$. (2)

Score

11. i) $\sin(\pi + x) =$

a) $\sin x$ b) $-\sin x$ c) $\cos x$ d) $-\cos x$ **(1)**

ii) If $\cos x = \frac{-1}{2}$ and $\pi < x < \frac{3\pi}{2}$, find $4\tan^2 x - 3\,\text{cosec}^2 x$. **(2)**

iii) Find the value of $\sin\left(\frac{-11\pi}{3}\right)$. **(1)**

12. i) The value of $i^{10} + i^{11} + i^{12} + i^{13}$ is **(1)**

a) 1 b) -1 c) i d) 0

ii) Express $(3 - 2i)^2$ in $a + ib$ form. **(1)**

iii) Write the multiplicative inverse of $5 - 12i$. **(2)**

13. i) Solve the inequality and mark the solution in a number line.

$37 - (3x + 5) \geq 9x - 8(x - 3)$. **(2)**

ii) Rohan obtained 70 and 60 marks in first two examinations. Find the minimum mark he should get in the third examination to have an average of at least 50 marks. **(2)**

14. i) The sum of coefficients in the expansion of $(1 - x)^n$ is **(1)**

a) 2^n b) 1 c) 0 d) -1

ii) Using Binomial theorem, find the value of

$\left(\sqrt{3} + \sqrt{2}\right)^4 + \left(\sqrt{3} - \sqrt{2}\right)^4$. **(3)**

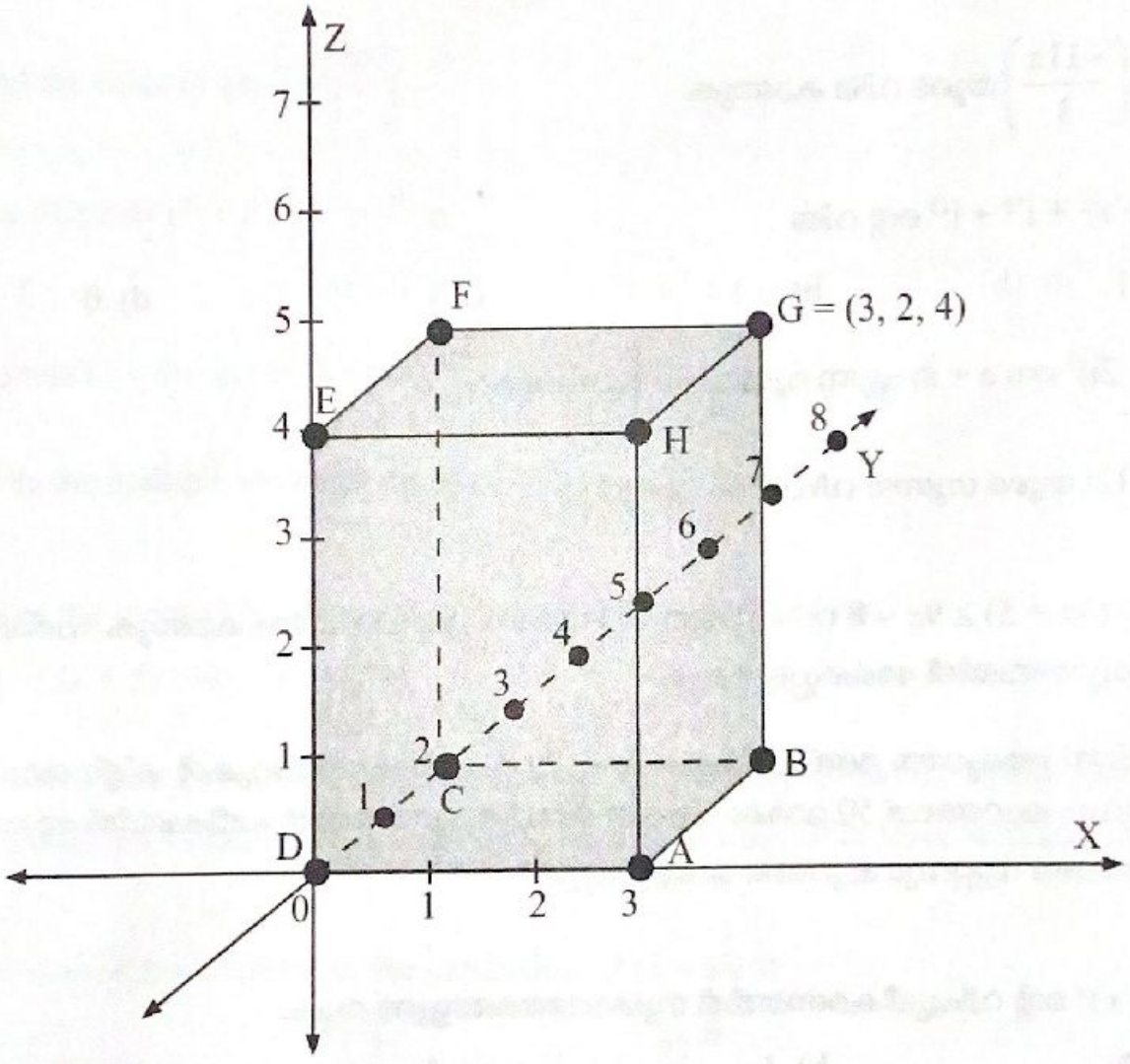
15. Find foci, vertices, eccentricity and length of latus rectum of $9x^2 - 16y^2 = 144$. **(4)**

Score

16. In figure ABCDEFGH is a prism and G = (2, 3, 4).

i) Find the co-ordinates of A, B, C, E, F and H. **(3)**

ii) Find the distance CG. **(1)**



Answer any 3 questions from 17 to 20. Each carries 6 scores. **(3×6=18)**

17. i) Find the radius of the circle in which the central angle of 60° intercepts an arc of length 31.4 cm. **(2)**

ii) Draw the graph of cos(x). **(1)**

iii) Prove that, $\sin 2x + 2 \sin 4x + \sin 6x = 4 \cos^2 x \cdot \sin 4x$. **(3)**

Score

18. i) If $9p_5 + 5 \times 9p_4 = 10p_r$, find r ? **(2)**

ii) Find the number of 4 digit numbers that can be formed using the digits 1, 2, 3, 4, 5 if no digit is repeated ? How many of these will be even ? **(2)**

iii) Find the number of arrangements of the letters of the word 'INDEPENDENCE' if all the vowels occur together. **(2)**

19. i) If x, $\sqrt{8}$, $\frac{x}{2}$ are three consecutive terms of a G.P., then the value of x is

a) 2 b) 4 c) $4\sqrt{2}$ d) 8 **(1)**

ii) Insert 3 numbers between 1 and 256, so that the resulting sequence is a G.P. **(2)**

iii) The sum of first three terms of a G.P. is $\frac{39}{10}$ and their product is 1. Find the terms. **(3)**

20. i) The angle between the lines $2x - y + 3 = 0$ and $x + 2y + 3 = 0$ is

a) 30° b) 45° c) 60° d) 90° **(1)**

ii) The centroid of a triangle is (2, 7) and two of its vertices are (4, 8) and (–2, 6). The third vertex is **(1)**

a) (0, 0)

b) (4, 7)

c) (7, 4)

d) (7, 7)

iii) a) The perpendicular from origin to a line meets it at the point (–2, 9). Find the equation of the line. **(3)**

b) Find also the distance from origin to the line. **(1)**
