

PART - I

14 X 1 = 14

Answer all the questions. (Choose the correct answer from the give four alternatives and write with the option code)

1.  $A = \{a, b, p\}$ ,  $B = \{2, 3\}$ ,  $C = \{p, q, r, s\}$  then  $n((A \cup C) \times B)$  is  
 1) 8                      2) 20                      3) 12                      4) 16
2. Let  $f(x) = \sqrt{1+x^2}$  then  
 1)  $f(xy) = f(x) \cdot f(y)$                       2)  $f(xy) \geq f(x) \cdot f(y)$   
 3)  $f(xy) \leq f(x) \cdot f(y)$                       4) None of these
3. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is  
 1) 2025                      2) 5220                      3) 5025                      4) 2520
4. Condition for a, b, c to be in A.P. is  
 1)  $C = \left(\frac{a+b}{2}\right)$     2)  $a = \left(\frac{b+c}{2}\right)$                       3)  $b = a + c$                       4)  $b = \left(\frac{a+c}{2}\right)$
5. If  $(x-6)$  is the HCF of  $x^2 - 2x - 24$  and  $x^2 - kx - 6$  then the value of k is  
 1) 3                      2) 5                      3) 6                      4) 8
6. The values of a and b if  $4x^4 - 24x^3 + 76x^2 + ax + b$  is a perfect square are  
 1) 100, 120                      2) 10, 12                      3) -120, 100                      4) 12, 10
7. Transpose of a column matrix is  
 1) unit matrix    2) diagonal matrix                      3) column matrix    4) row matrix
8. If p, q are two consecutive odd numbers and p + q, pq, x are Pythagorean triple then the value of x is  
 1)  $pq + 2$                       2)  $p^2 + q^2$                       3)  $(p+q)^2$                       4) 2 pq
9. If (5, 7), (3, p) and (6, 6) are collinear, then the value of p is  
 1) 3                      2) 6                      3) 9                      4) 12
10. if slope of the line PQ is  $\frac{1}{\sqrt{3}}$  then slope of the perpendicular bisector of PQ is  
 1)  $\sqrt{3}$                       2)  $-\sqrt{3}$                       3)  $\frac{1}{\sqrt{3}}$                       4) 0
11. If  $\cot^2 45^\circ - \sin^2 60^\circ = x \cdot \sin 30^\circ \cdot \cos 30^\circ$  then the value of x is  
 1) 1                      2)  $\sqrt{3}$                       3)  $\frac{1}{\sqrt{3}}$                       4) 2
12. If the radius of the base of a cone is tripled and the height is doubled then the volume is  
 1) made 6 times    2) made 18 times    3) made 12 times    4) unchanged

13. The mean of 11 observation is  $\bar{x}$ , if first term is increased by 1 second term is increased by 2 and so on. What will be the new mean?  
 1)  $\bar{x} + 66$       2)  $\bar{x} + 11$       3)  $\bar{x}$       4)  $\bar{x} + 6$
14. The probability of getting a job for a person is  $\frac{x}{3}$ . If the probability of not getting the job is  $\frac{2}{3}$  then the value of x is  
 1) 2      2) 1      3) 3      4) 1.5

## PART-II

Answer 10 questions. (Question No. 28 is compulsory)  $10 \times 2 = 20$

15. Let f be a function  $f: N \rightarrow N$  defined by  $f(x) = 3x + 2$ ,  $x \in N$ . Find the images of 1, 2, 3.
16. Find the rational form of the number  $0.\overline{123}$ .
17. Solve:  $\frac{x}{x-1} + \frac{x-1}{x} = 2\frac{1}{2}$ .
18. If  $A = \begin{pmatrix} 0 & 4 & 9 \\ 8 & 3 & 7 \end{pmatrix}$ ,  $B = \begin{pmatrix} 7 & 3 & 8 \\ 1 & 4 & 9 \end{pmatrix}$  then find the matrix  $3A - 9B$ .
19. If  $A = \frac{x+1}{x-1}$ ,  $B = \frac{x-1}{x+1}$  then find  $\frac{A+B}{A-B}$ .
20. The perimeters of two similar triangles ABC and PQR are respectively 36cm and 24cm. If PQ = 10cm, find AB.
21. You are downloading a song. The percent y (in decimal form) of mega bytes remaining to get downloaded in x seconds is given by  $y = -0.1x + 1$  after how many seconds the song will be downloaded completely?
22. The horizontal distance between two buildings is 70m. The angle of depression of the top of the first building when seen from the top of the second building is  $45^\circ$ . If the height of the second building is 120m, find the height of the first building.
23. Prove that  $\frac{1}{\operatorname{cosec} \theta - \sin \theta} = \tan \theta \cdot \sec \theta$ .
24. The slant height of a frustum of a cone is 5cm and the radii of its ends are 4cm and 1cm. Find its curved surface area.



25. A solid sphere and a solid hemisphere have equal total surface area. Prove that the ratio of their volume is  $3\sqrt{3} : 4$ .
26. A die is rolled and a coin is tossed simultaneously. Find the probability that the die shows an odd number and the coin shows head.
27. Find the standard deviation of first 21 natural numbers.
28. Find the mean of first 100 odd natural numbers.

### PART - III

Answer 10 questions. (Question No. 42 is compulsory).  $10 \times 5 = 50$

29. Let  $A =$  The set of all natural numbers less than 8,  $B =$  the set of all prime numbers less than 8,  $C =$  The set of even prime number, verify that  $(A \cap B) \times C = (A \times C) \cap (B \times C)$ .

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

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

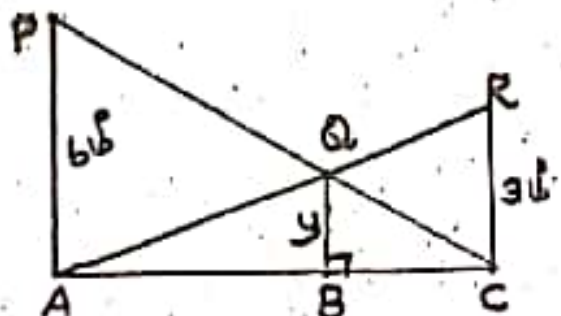
31. Find the sum of all natural number between 300 and 600 which are divisible by 7.
32. If  $S_n = (x + y) + (x^2 + xy + y^2) + (x^3 + x^2y + xy^2 + y^3) + \dots$  n terms then prove

$$\text{that } (x - y) S_n = \left[ \frac{x^2 (x^n - 1)}{x - 1} - \frac{y^2 (y^n - 1)}{y - 1} \right].$$

33. The hypotenuse of a right angled triangle is 25cm and its perimeter 56cm. Find the length of the smallest side.

34. If  $A = \begin{pmatrix} 1 & 1 \\ -1 & 3 \end{pmatrix}$ ,  $B = \begin{pmatrix} 1 & 2 \\ -4 & 2 \end{pmatrix}$ ,  $C = \begin{pmatrix} -7 & 6 \\ 3 & 2 \end{pmatrix}$  verify that  $A(B + C) = AB + AC$ .

35. Two vertical poles of heights 6m and 3m are the value of  $y$ .



36. Find the area of the quadrilateral formed by the points (8, 6), (5, 11), (-5, 12) and (-4, 3).
37. Find the equation of a straight line through the intersection of lines  $5x - 6y = 2$ ,  $3x + 2y = 10$  and perpendicular to the line  $4x - 7y + 13 = 0$ .
38. If  $A + B = 90^\circ$  then prove that  $\frac{\tan A \tan B + \tan A \cot B}{\sin A \sec B} - \frac{\sin^2}{\cos^2 A} = \cot^2 B$ .
39. A right circular cylindrical container of base radius 6cm and height 15cm is full of ice cream. The ice cream is to be filled in cones of height 9cm and base radius 3cm, having a hemispherical cap. Find the number of cones needed to empty the container.
40. Find the coefficient of variation of 24, 26, 33, 37, 29, 31.

## November

Mon		4	11	18	25
Tue		5	12	19	26
W		6	13	20	27
Thu		7	14	21	28
F	1	8	15	22	29
Sat	2	9	16	23	30
Sun	3	10	17	24	

41. A person chooses a date at random in November for a party. Find the probability that he chooses.
- A Monday.
  - Wednesday
  - A Friday.
  - A Saturday (or) A Sunday.

42. Find the quadratic equation whose roots

are  $\frac{p+q}{p}$  and  $\frac{p+q}{q}$ . Also find

the nature of roots when  $p = 2$  and  $q = 3$ .

## PART - IV

Answer all the questions.

2 X 8 = 16

43. a) Draw a triangle ABC of base  $BC = 8\text{cm}$ ,  $\angle A = 60^\circ$  and the bisector of  $\angle A$  meets BC at D such that  $BD = 6\text{cm}$ . (OR)
- b) Draw a circle of radius 4.5cm. Take a point on the circle. Draw the tangent at that point using the alternative segment theorem.
44. a) Draw the graph of  $y = 2x^2$  and hence solve  $2x^2 - x - 6 = 0$ . (OR)
- b) Draw the graph of  $y = x^2 - 5x - 6$  and hence solve  $x^2 - 5x - 14 = 0$ .