Army Public School, Dagshai

Class XI – Mathematics summer break task

Instructions: In mathematics notebook, Write the questions with **Black Pen** and solve them using **Blue Pen**

1. Write the following sets in the roaster from
   (i) $A = \{x : x \in R, 2x + 11 = 15\}$
   (ii) $B = \{x \mid x^2 = x, x \in R\}$
   (iii) $C = \{x \mid x \text{ is a positive factor of a prime number } p\}$
2. Write the following sets in the roaster form:
   (i) $D = \{t \mid t^3 = t, t \in R\}$
   (ii) $E = \left\{w \mid \frac{w-2}{w+3} = 3, w \in R\right\}$
   (iii) $F = \{x \mid x^4 - 5x^2 + 6 = 0, x \in R\}$
3. If Y = {x\x is a positive factor of the number $2^P(2^P - 1)$, where $2^P - 1$ is a prime number}. Write Y in the roaster form.

4. Given L= {1,2, 3,4}, M= {3,4, 5, 6} and N= {1,3,5} Verify that L– (M∪N) = (L– M)∩(L– N)

5. If A and B are subsets of the universal set U, then show that
   (i) A⊂ AU B
   (ii) A⊂B⇔AUB = B
   (iii) (A∩B)⊂ A

6. For all sets A, B and C, show that (A – B) ∩ (C – B) = A – (B ∪ C)

7. For all sets A and B, show that (A – B)∪ (A∩ B) = A

8. For all sets A, B and C, if A ⊂ B, then show that A ∩C⊂B ∩C

9. For all sets A and B, show that A ∪ (B -A) = A ∪ B

10. For all sets A and B, show that A – (A – B) = A ∩ B

11. For all sets A and B, show that A – (A ∩ B) = A – B

12. For all sets A and B, show that (A ∪ B)- B = A-B

13. Let A, B and C be sets. Then show that A ∩ (B ∪ C) = (A ∩ B)∪ (A ∩ C).

14. Two finite sets have m and n elements. The number of subsets of the first set is 112 more than that of the second set. The values of m and n are, respectively, (a) 4,7 (b) 7,4 (c) 4,4 (d) 7, 7

15. **The set $(A \cap B')' \cup (B \cap C)$ is equal to**
    (a) $A' \cup B \cup C$ (b) $A' \cup B$ (c) $A' \cup C'$ (d) $A' \cap B$

16. If A = {-1, 2, 3 } and B = {1, 3}, then determine (i) AxB (ii) BxC (c) BxB (iv) AxA

17. If P = {x : x < 3, x e N}, Q= {x : x≤2,x ∈ W}. Find (PU Q) x (P∩ Q), where W is the set of whole numbers.

18. IfA={x:x∈ W,x < 2}, B = {x : x∈N, 1 <.x < 5}, C= {3, 5}. Find (i) Ax(B∩Q) (ii) Ax(BUC)

19. In each of the following cases, find a and b. (2a + b, a – b) = (8, 3) (ii) {a/4, a – 2b) = (0, 6 + b)
20. Given R = {(x,y) : x,y ∈ W, $x^2 + y^2 = 25$}. Find the domain and range of R
21. If R_1 = {(x, y)| y = 2x + 7, where x∈ R and -5 ≤ x ≤ 5} is a relation. Then find the domain and range of R_1.
22. If R_2 = {(x, y) | x and y are integers and $x^2 + y^2 = 64$} is a relation. Then find R_2
23. If R_3 = {(x, |x|) | x is a real number} is a relation. Then find domain and range
24. Is the given relation a function? Give reasons for your answer.

    (i) h={(4,6), (3,9), (-11,6), (3,11)} (ii) f = {(x, x) | x is a real number}

    (iii) g = {(n, 1/n)| n is a positive integer} (iv) s= {(n, n^2) | n is a positive integer}

    (v) t= {(x, 3) | x is a real number}

25. If f and g are real functions defined by f(x) = x^2 + 7 and g(x) = 3x + 5, find each of the following

(i) $f(3) + g(-5)$ **(ii)** $f(1/2) \times g(14)$

(iii) $f(-2) + g(-1)$ **(iv)** $f(t) - f(-2)$

(v) $\dfrac{f(t) - f(5)}{t - 5}$, if $t \neq 5$

26. Find the values of x for which the functions f(x) = $3x^2$ -1 and g(x) = 3+ x are equal.

27. Find the domain of each of the following functions given by:

(i) $f(x) = \dfrac{1}{\sqrt{1 - \cos x}}$ **(ii)** $f(x) = \dfrac{1}{\sqrt{x + |x|}}$

(iii) $f(x) = x|x|$ **(iv)** $f(x) = \dfrac{x^3 - x + 3}{x^2 - 1}$

(v) $f(x) = \dfrac{3x}{28 - x}$

28. Find the range of the following functions given by:

(i) $f(x) = \dfrac{3}{2 - x^2}$ **(ii)** $f(x) = 1 - |x - 2|$

(iii) $f(x) = |x - 3|$ **(iv)** $f(x) = 1 + 3\cos 2x$

29. **Range of** $f(x) = \dfrac{1}{1 - 2\cos x}$ **is**

30. If f(x)= y = ax – b/ cx–a then prove that f (y) = x
31. If [x]2 – 5[x] + 6 = 0, where [ ] denote the greatest integer function, then

    (a) x ∈ [3,4] (b) x∈ (2, 3] (c) x∈ [2, 3] (d) x ∈ [2, 4)

32.

The domain of the function f defined by $f(x) = \sqrt{4-x} + \frac{1}{\sqrt{x^2-1}}$ is equal to

(a) $(-\infty, -1) \cup (1, 4]$ (b) $(-\infty, -1] \cup (1, 4]$

(c) $(-\infty, -1) \cup [1, 4]$ (d) $(-\infty, -1) \cup [1, 4)$

33. Let f= {(2,4), (5,6), (8, -1), (10, -3)} and g = {(2, 5), (7,1), (8,4), (10,13), (11, 5)} be two real functions. Then match the following:

Column I		Column II	
(a)	$f-g$	(i)	$\left\{\left(2,\frac{4}{5}\right),\left(8,\frac{-1}{4}\right),\left(10,\frac{-3}{13}\right)\right\}$
(b)	$f+g$	(ii)	{(2, 20), (8, –4), (10, –39)}
(c)	$f \times g$	(iii)	{(2, –1), (8, –5), (10, –16)}
(d)	$\frac{f}{g}$	(iv)	{(2, 9), (8, 3), (10, 10)}

34. Find the radius of the circle in which a central angle of 60° intercepts an arc of length 37.4 cm (use π = 22/7).

35. A wheel makes 360 revolutions in one minute. Through how many radians does it turn in one second?

36. The angles of a triangle are in AP and the greatest angle is double the least. Find measure of the largest angle in radian.

37. The angles of a quadrilateral are in AP and the greatest angle is double the least. Find measure of the largest angle in radian.

38. If cos x + sec x = 2, then find the value of $\cos^{2024}x + \sec^{2024}x$.

39. If A lies in second quadrant and 3tanA + 4 = 0, then find the value of 2cotA – 5cosA + sinA.

40. Find the value of $\tan1^0\tan2^0\tan3^0\ldots\ldots\ldots\tan89^0$.

41. Find the value of $\cos1^0\cos2^0\cos3^0\ldots\ldots\ldots\cos179^0$

42. Find the value of $\sin765^0$

43. Find tan 19π/3

44. Find cot(-15π/4)

45. Find sin(-11π/3)