Saitech Informatics

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SETS

Class 11 - Mathematics

Time Allowed: 1 hour and 30 minutes **Maximum Marks: 45**

1. Write the set in the set-builder form: {2, 4, 8, 16, 32} **[1]**

2. Is B = {x : x ∈ N and x is an even prime number} finite or infinte set? Justify. **[1]**

3. Is A = {3, 4, 5, 6} and B = {2, 5, 7, 9} sets are pairs of disjoint sets? Justify your answer. **[1]**

4. Given an example of three sets A, B, C such that $A \cap B \neq \phi$, $B \cap C \neq \phi$, $A \cap C \neq \phi$ and $A \cap B \cap C = \phi$. **[1]**

5. Write the correct form if the statement is incorrect: {b, c} ⊂ {a, {b, c}}. **[1]**

6. Find a and b if (a -1, b + 5) = (2, 3) **[1]**

7. State whether A ⊂ B or A ⊄ B: A ={0,1, 2, 3}, B = {1, 2, 3, 4, 5} **[1]**

8. Express the set as an interval: C = {x : x ∈ R, 2 < x ≤ 6} **[1]**

9. Determine whether the statement is true or false. If it is true, prove it. If it is false, give an example: If $A \not\subset C$ and $B \not\subset C$ then $A \not\subset C$ **[1]**

10. If A = {2, 4, 6, 8, 10, 12} and B = {3, 4, 5, 6, 7, 8, 10}, find: (B - A) **[1]**

11. If A = $\{\frac{1}{x} : x \in N \text{ and } x < 8\}$ and B = $\{\frac{1}{2x} : x \in N \text{ and } x \leq 4\}$, find: A ∩ B **[1]**

12. Write the interval in set builder form [-23, 5) **[1]**

13. Out of 100 students; 15 passed in English, 12 passed in Mathematics, 8 in Science, 6 in English and Mathematics, 7 in Mathematics and Science, 4 in English and Science, 4 in all the three. Find how many passed **[3]**

    i. in English and Mathematics but not in Science

    ii. in Mathematics and Science but not in English

    iii. in Mathematics only

    iv. in more than one subject only

14. Let A = {1, 2, 4, 5} B = {2, 3, 5, 6} C = {4, 5, 6, 7}. Verify : A ∩ (B ∪ C) = (A ∩ B) ∪ (A ∩ C). **[3]**

15. Using properties of set prove the statement. For all sets A and B, prove that $A \cup (B - A) = A \cup B$. **[3]**

16. In a class, 18 students took Physics, 23 students took Chemistry and 24 students took
Mathematics of these 13 took both Chemistry and Mathematics, 12 took both Physics and Chemistry and 11 took both Physics an Mathematics. If 6 students offered all the three subjects, find: **[3]**

    i. The total number of students.

    ii. How many took Maths but not Chemistry.

    iii. How many took exactly one of the three subjects.

17. Let A and B be two sets. If $A \cap X = B \cap X = \phi$and $A \cup X = B \cup X$ for some set X, prove that A = B. **[3]**

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19. If U = {a, b, c, d, e, f} , A = {a, b,c}, B = {c, d, e, f} , C = {c, d, e} and D = {d, e, f}, then tabulate the following sets: **[5]**

    i. A ∩ D

    ii. A ∩ C

    iii. U ∩ D

    iv. $A \cup \phi$

    v. $(U \cap \phi)'$

    vi. (U ∪ A)'

20. A college awarded 38 medals in Football, 15 in Basketball and 20 in Cricket. If these medals went to a total of 58 men and only three men got medals in all three sports, then how many received medals in exactly two of the three sports. **[5]**

21. If A = {4, 5, 6, 7, 8, 10}, B = {4, 5, 9} and C = {1, 4, 6, 9}, then verify that **[5]**

    i. $(A \cap B) \cap C = A \cap (B \cap C)$

    ii. $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

    iii. $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$