(iv) $\{a\} \subset \{\{a\}, b\}$ (v) $\{b, c\} \subset \{a, \{b, c\}\}$ (vi) $\{a, b\} \subset \{a, \{b, c\}\}$
(vii) $\phi \in \{a, b\}$ (viii) $\phi \subset \{a, b, c\}$ (ix) $\{x : x + 3 = 3\} = \phi$

6. Let $A = \{a, b, \{c, d\}, e\}$. Which of the following statements are false and why?
(i) $\{c. d\} \subset A$ (ii) $\{c, d\} \in A$ (iii) $\{\{c, d\}\} \subset A$
(iv) $a \in A$ (v) $a \subset A$ (vi) $\{a, b, e\} \subset A$
(vii) $\{a, b, e\} \in A$ (viii) $\{a, b, c\} \subset A$ (ix) $\phi \in A$
(x) $\{\phi\} \subset A$

7. Let $A = \{\{1, 2, 3\}, \{4, 5\}, \{6, 7, 8\}\}$. Determine which of the following is true or false:
(i) $1 \in A$ (ii) $\{1, 2, 3\} \subset A$ (iii) $\{6, 7, 8\} \in A$
(iv) $\{\{4, 5\}\} \subset A$ (v) $\phi \in A$ (vi) $\phi \subset A$

8. Let $A = \{\phi, \{\phi\}, 1, \{1, \phi\}, 2\}$. Which of the following are true?
(i) $\phi \in A$ (ii) $\{\phi\} \in A$ (iii) $\{1\} \in A$
(iv) $\{2, \phi\} \subset A$ (v) $2 \subset A$ (vi) $\{2, \{1\}\} \not\subset A$
(vii) $\{\{2\}, \{1\}\} \not\subset A$ (viii) $\{\phi, \{\phi\}, \{1, \phi\}\} \subset A$ (ix) $\{\{\phi\}\} \subset A$.

9. Write down all possible subsets of each of the following sets:
(i) $\{a\}$ (ii) $\{0, 1\}$ (iii) $\{a, b, c\}$
(iv) $\{1, \{1\}\}$ (v) $\{\phi\}$

10. Write down all possible proper subsets each of the following sets:
(i) $\{1, 2\}$ (ii) $\{1, 2, 3\}$ (iii) $\{1\}$

11. What is the total number of proper subsets of a set consisting of n elements?

12. If A is any set, prove that: $A \subseteq \phi \Leftrightarrow A = \phi$.

13. Prove that: $A \subseteq B$, $B \subseteq C$ and $C \subseteq A \Rightarrow A = C$.

14. How many elements has $P(A)$, if $A = \phi$?

15. What universal set (s) would you propose for each of the following:
(i) The set of right triangles. (ii) The set of isosceles triangles.

LEVEL-2

16. If $X = \{8^n - 7n - 1 : n \in N\}$ and $Y = \{49(n-1) : n \in N\}$, then prove that $X \subseteq Y$.

ANSWERS

1. (i) F, $A = \{1, 2, 3\}$, $B = \{a, b\}$ (ii) F, $A = \{1, 2\}$ is a finite subset of N.
(iii) T (iv) F, ϕ does not have a proper subset
(v) F, Given set $= \{a, b\}$ (vi) T (vii) F

2. (i) T (ii) F (iii) F (iv) T (v) F **3.** $D \subset A \subset B \subset C$

4. (i) T (ii) T (iii) F (iv) T (v) F (vi) T

5. (i) $a \in \{a, b, c\}$ (ii) $\{a\} \subset \{a, b, c\}$ (iii) $\{a\} \in \{\{a\}, b\}$
(iv) $\{\{a\}\} \subset \{\{a\}, b\}$ (v) $\{b, c\} \in \{a, \{b, c\}\}$ (vi) $\{a, b\} \not\subset \{a, \{b, c\}\}$
(vii) $\phi \subset \{a, b\}$ (viii) $\phi \subset \{a, b, c\}$ (ix) $\{x : x + 3 = 3\} \neq \phi$

6. (i) F (ii) T (iii) T (iv) T (v) F (vi) T
(vii) F (viii) F (ix) F (x) F

7. (i) F (ii) F (iii) T (iv) T (v) F (vi) T

8. (i) T (ii) T (iii) F (iv) T (v) F (vi) T (vii) T
(viii) T (ix) T

9. (i) $\phi, \{a\}$ (ii) $\phi, \{0\}, \{1\}, \{0, 1\}$ (iii) $\phi, \{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}, \{a, c\}, \{a, b, c\}$
(iv) $\phi, \{1\}, \{\{1\}\}, \{1, \{1\}\}$ (v) $\phi, \{\phi\}$.

10. (i) $\phi, \{1\}, \{2\}$ (ii) $\phi, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{2, 3\}, \{1, 3\}$ (iii) ϕ

11. $2^n - 1$ **14.** 1

15. (i) The set of all triangles in a plane. (ii) The set of all triangles in a plane.