Tutorial Sheet – I

Department: Department of Computer Engineering & Applications

Course: B. Tech (CSE) **Year/Semester:** II/ IV **Session:** 2017-18

Subject Name & Code: Discrete Mathematics (CSE-4005)

Max. Marks: **Time allowed:**

Note/Instruction (If any)

Q.1. Write the following sets in roster form:

(a) $A =$ set of all factors of 12 which are not prime (b) $A = \{x \in \mathbb{R} \mid x^2 = -1\}$
(c) $F = \{x : x = n/(n+1), n \in N \text{ and } n \leq 4$

Q.2. Write the following sets in set builder form:

(a) $A = \left\{\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}\right\}$ (b) $A = \left\{\frac{1}{5}, -\frac{2}{10}, \frac{3}{17}, -\frac{4}{26}, \ldots\right\}$
(c) $E = \{4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, \ldots\ldots, 52\}$

Q.3. Show that (a) $(A - B) \cap B = \emptyset$ (b) $(A \cup B) - (A \cap B) = (A - B) \cup (B - A)$.

Q.4. Two finite sets have m and n elements. The total number of subsets of the first set is 56 more the total number of subsets of the second set. Find the values of m and n .

Q.5. If $S, T \subseteq U$. Then show that S and T are disjoint if and only if $S \cup T = S \triangle T$.

Q.6. For any universe U and any sets $A, B \subseteq U$, the following statements are equivalent:
(a) $A \subseteq B$ (b) $A \cup B = B$ (c) $A \cap B = A$

Q.7. Using the laws of set theory, Mentioning the laws used in each step, show that :

(a) $\overline{\overline{(A \cup B) \cap C} \cup \bar{B}} = B \cap C$. (b) $(A \cap \bar{B}) \cup (\bar{A} \cap B) \cup (\bar{A} \cap \bar{B}) = (\bar{A} \cup \bar{B})$

Q.8. In a class of 25 students, 12 have taken mathematics, 8 have taken mathematics but not biology. Find the number of students, who have
(a) taken biology but not mathematics. (b) taken biology and mathematics.
Assume that all the 25 students have at least one of the subjects.

Q.9. Draw the Venn diagram showing the following:
(a) $A \cup B \subseteq A \cup C$ but $B \not\subseteq C$ (b) $A \cap B \subseteq A \cap C$ but $B \neq C$

Q.10. Using Venn diagram, test the validity of the following arguments:
(a) All guilty people will be arrested. All thieves are guilty people. Therefore all thieves will be arrested.
(b) All arrested people are thieves. All thieves are guilty people. Therefore all guilty people are arrested.

Q.11. In a group of 200 people, each of whom is atleast accountant or management consultant or sales manager, it was found that 80 are accountants, 110 are management consultants and 130 are sales managers, 25 are accountants as well as sales managers, 70 are management consultants as well as sales managers, 10 are accountants, management consultants and sales managers. Find the number of people who are accountants as well as management consultants but not sales managers.

Q.12. Determine the number of integers between 1 and 250 that are divisible by any of the integers 2, 3, 5 and 7.