

## 18MAB302T –DISCRETE MATHEMATICS FOR ENGINEERS

### UNIT-2 TUTORIAL SHEET -1

#### PART – A(5 X 4 MARKS = 20 MARKS)

1. In how many ways can 9 boys and 7 girls sit in a row?
2. From a club consisting of 6 men and 7 women, in how many ways can we select a committee of 4 men and 4 women.
3. Assuming that repetitions are not permitted, how many 5 digit numbers can be formed from the six digits 1,2,3,5,7,8.
4. If there are 5 points inside a square of side length 2, prove that two of the points are within a distance of  $\sqrt{2}$  of each other.
5. Of any points chosen within an equilateral triangle whose sides are of length 1, show that two are within a distance of  $\frac{1}{2}$  of each other.

#### PART – B (5 X 12 MARKS = 60 MARKS)

1. In how many ways can a 2 letters be selected from the set {a, b, c, d, e} when repetition of the letters is allowed if
    - (i) The order of the letter matters
    - (ii) The order does not matter.
  2. Find the number of integers between 1 and 250 both inclusive that are not divisible by any of the integers 3, 5, 7, 11.
  3. There are 350 students in an arts college of these 188 have taken a course in English, 100 have taken a course in Tamil and 35 have taken a course in History. Further 88 have taken courses in both English and Tamil, 23 have taken courses in both Tamil and History and 29 have taken courses in both English and History. If 19 of these students have taken all the three courses, How many of these 350 students have not taken a course in any of these three subjects.
  4. A total of 1232 students have taken a course in Tamil, 879 have taken a course in English and 114 have taken a course in Hindi. Further 103 have taken course in both Tamil and English, 23 have taken courses in both Tamil and Hindi, 14 have taken courses in both English and Hindi. If 2092 students have taken atleast one of Tamil, English and Hindi , how many students have taken a course in all the three languages.
  5. How many solutions does an equation  $x_1 + x_2 + x_3 = 15$  have where  $x_1, x_2, x_3$  are nonnegative such that  $x_1 \leq 3$ ,  $x_2 \leq 4$  and  $x_3 \leq 6$  ,Use the Principle of inclusion and exclusion
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**Department of Mathematics**  
**18MAB302T-Discrete Mathematics**  
**Unit – II: Combinatorics, Number Theory**  
**Tutorial Sheet - II**

S.No	Questions	Answers
<b>Part - A</b>		
1	Find the remainder when $1! + 2! + \dots + 100!$ is divided by 12.	9
2	Prove that $d n$ and $d m$ implies $d (an+bm)$	
3	Prove that the square of an integer is of the form $4m$ or $4m+1$	
4	Prove that the square of an odd integer is of the form $8m+1$	
5	If $\gcd(a, d) = 1$ , then show that $\gcd(a + b, a^2 - ab + b^2)$ is either 1 or 3.	
<b>Part - B</b>		
6	Use the Euclidean algorithm to find (i) $\gcd(2464, 7469)$ and (ii) $\gcd(6060, 9888)$	(i) 77 (ii) 12
7	Find the integers $x$ and $y$ such that (i) $154x + 260y = 3$ and (ii) $196x + 260y = 14$	No integral values of $x$ and $y$
8	Find the integers $m$ and $n$ such that (i) $423m + 198n = 9$ and (ii) $100996m + 20048n = 28$	(i) $m = -7, n = 15$ (ii) $m = -53, n = 267$
9	Find the gcd and lcm of the following pairs of integers and also verify their correctness: (i) (432, 95256) (ii) (6773760, 12902400)	(i) 216; 190512 (ii) 322560; 270950400
10	Let $a, b \in \mathbb{Z}$ and suppose $\gcd(a, b) = 1$ . Prove the following. (a) $\gcd(a + b, a - b) = 1$ or 2. (b) $\gcd(a + 2b, 2a + b) = 1$ or 3. (c) $\gcd(a^n, b^n) = 1$ for all $n \in \mathbb{N}$ .	