School of Computing Science and Engineering

Bachelor of Technology in Computer Science and Engineering
Semester End Examination - Jun 2024

Duration : 180 Minutes
Max Marks : 100

Sem IV - C1UC422T - Mathematical Puzzles and Games

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	Using the Euclidean algorithm, find HCF of 196 and 38220.	K1(3)
2)	Find the remainder when 3^{247} is divided by 17.	K2(4)
3)	If $^nC_9 = {}^nC_8$, find the value of $^nC_{17}$.	K2(6)
4)	What is φ(ab) if a and b are relatively prime, φ denotes the Euler Phi function.	K3(6)
5)	Determine the solution of the following system: (i) x ≡ 3 (mod 5) (ii) x ≡ 5 (mod 7)	K3(6)
6)	Using Wilson's Theorem, Find the remainder when 568! is divided by 569.	K3(9)
7)	Show that $(4^{36} - 4)$ is divisible by 11.	K3(9)
8)	Use Mathematical induction to show that 1+3+5+…+$(2n - 1) = n^2$	K4(8)
9)	Verify the following:	K4(12)

(i) φ(9)=6
(ii) φ(10)=4
(iii) φ(11)=10
(iv) φ(12)=4

where φ is Euler Phi function.

10)	By using mathematical induction prove that the given equation is true for all positive integers. 2 + 4 + 6 + …. + 2n = n(n+1).	K5(10)
11)	Show that $1^2 + 2^2 + ... + n^2 = n(n + 1)(2n + 1)/6$ for every positive integer n	K5(15)

OR

A committee of 3 persons is to be constituted from a group of 2 men and 3 women. In how many ways can this be done? How many of these committees would consist of 1 man and 2 women?

K5(15)

12) A box contains 6 red, 8 green, 10 blue, 12 yellow and 15 white balls. What is the minimum no. of balls we have to choose randomly from the box to ensure that we get 9 balls of the same colour?

K6(12)

OR

The sum and LCM of two positive integers x, y are given to be 40 and 48 respectively. Find the two integers.

K6(12)