School of Basic Sciences
Department of Basic Sciences
Mid Term Examination

Sem V - C1UC503T - Number Theory and Game Theory
Your answer should be specific to the question asked
Draw neat labeled diagrams wherever necessary

1) Estimate $\phi(1105)$, where ϕ is Euler-phi function. — K2 (2)

2) Find the number of positive integers ≤ 3076 and not divisible by 24. — K1 (3)

3) Show if 1601 is a prime number — K2 (4)

4) Explain that $f(x) = 1/(1-x)^2$ is the generating function for 1, 2, 3, 4, ... — K2 (6)

5) Applying Wilson's theorem, find is the remainder when 100! is divided by 97^2 — K3 (6)

6) Develop a generating function for each of the following sequences — K3 (9)
(a) 2, 4, 6, 8, 10, ...
(b) 1, 5, 25, 125, ...

7) For two integers 540 and 168, examine the gcd (greatest common divisor) of both and write gcd as linear combination of these two integers using Euclidean algorithm. — K4 (8)

8) Analyse and solve the recurrence relation $a_n = 3a_{n-1} - 2a_{n-2}$ with initial conditions $a_0 = 1$ and $a_1 = 3$ — K4 (12)

OR

Consider the recurrence relation 3,6,12,24,48….. Analyse it in terms of initial condition, solution and general solution. — K4 (12)