GALGOTIAS UNIVERSITY

ADMISSION NUMBER												

School of Basic Sciences

Bachelor of Science Honours in Mathematics
Semester End Examination - Jun 2024

Duration : 180 Minutes
Max Marks : 100

Sem IV - C1UC401B - Computational Mathematics

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) Explain the odd integer from 1 to 10. K1 (3)

2) Create Sage code that find prime factorization of all the integers strictly between 2000 and 2030. K2 (4)

3) Write a program to find function is even which returns True. Use if else loop. K2 (6)

4) Evaluate the general solution of the following second order ODE: d^2y/dt^2 + 8 dy/dt + 16y = 0. K3 (6)

5) Create Sage code that will calculate the following $\sum_{i=7}^{2015} \frac{1}{i^7}$. K3 (6)

6) Find the singular value decomposition of a matrix A=[1 2 -1;3 1 2;2 -1 3]. K3 (9)

7) Find the singular value decomposition of a matrix A=[-4 -7;1 4]. K3 (9)

8) Write sagemath code by using Euler's method to determine value of y corresponding to x=2, given that $\frac{dy}{dx} = x + 2y$ and $y(1) = 1$. K4 (8)

9) Write a sagemath code to examine the following equations by using Gauss elimination method: K4 (12)
$2x + 2y + z = 6$, $4x + 2y + 3z = 4$, $x - y + z = 0$.

10) Write the sagemath code to calculate the values of the system of equations: K5 (10)
$45x + 2y + 3z = 58$,
$-3x + 22y + 2z = 47$,
$5x + y + 20z = 67$
using the Gauss-Seidel iteration method.

11) Solve the following equations by using Crammer's rule: $2x + 2y + z = 6$, $4x + 2y + 3z = 4$, $x - y + z = 0$. K5 (15)

OR

Evaluate the values of x, y and z from the following equations by Crammer's rule: $4x + 2y + z = 5, x + y - z = 4, x + 2y - z = 7.$ K5 (15)

12) Write a sagemath code to determine the root of a equation $f(x) = 0$ by Newton Raphson method. K6 (12)

OR

Write a sagemath code to find the root of a equation $f(x) = 0$ by Secant method. K6 (12)