ISLAMIAH COLLEGE(AUTONOMOUS)

LAB MANUAL

ALLIED COMPUTATIONAL MATHEMATICAL PRACTICAL– II

U8CCAP21

For the Candidates admitted from the academic year 2018 – 2019

By

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U8CCAP21

ALLIED COMPUTATIONAL MATHEMATICAL PRACTICAL – II

2 Hours / Week

List of Exercises

1. Matrix Manipulation
2. Testing Consistency of system of equations
3. Integration of single variable functions
4. Applications of integration to Area and Volume.
5. Plotting of 2D and 3D objects

Ex. No. 1 Matrix manipulation

Date:

(a) Create matrices of order 5×5 and 10×10.

Command:

Output:

(b) Create 6×6 identity matrix.

Command:

Output:

(c) Compute $A + B$ and $A - B$, given $A = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 6 & 7 & 8 & 9 & 0 \\ 1 & 2 & -2 & 3 & 2 \\ 5 & -4 & 3 & 7 & 10 \end{bmatrix}$ and$B = \begin{bmatrix} 5 & 6 & 7 & 8 & 9 \\ -6 & 7 & -8 & 0 & 9 \\ -1 & 2 & -2 & -3 & 2 \\ 5 & 4 & 3 & 7 & 10 \end{bmatrix}$.

Command:

Output:

(d) Compute $A\,B$, given $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 1 & 2 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 5 & -1 & 0 \\ -1 & 0 & 7 & 3 \\ 9 & -5 & 4 & 8 \end{bmatrix}$.

Command:

Output:

(e) Compute A^{-1}, where $A = \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$.

Command:

Output:

(f) Solve $x + y + z = 6;\ \ x + 2y + 3z = 14;\ -x + y - z = 2$, using inversion method.

Command:

Output:

(g) If $A = \begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & -1 \\ 1 & 0 & 1 \end{bmatrix}$, show that $A^3 - 3A^2 + 3A - 2I = 0$ and also find A^{-1}.

Command:

Output:

(h) Prove that $\frac{1}{2}\begin{bmatrix} 1+i & -1+i \\ 1+i & 1-i \end{bmatrix}$ is unitary.

Command:

Output:

(i) Prove that $\begin{bmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{bmatrix}$ is orthogonal.

Command:

Output:

(j) If $A = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 6 & 2 & 3 & 4 & 1 \\ 1 & 3 & 3 & 4 & 0 \\ 1 & 2 & 6 & 4 & 3 \end{bmatrix}$, then compute

(i) Maximum of 3rd column.

(ii) Minimum of 2nd row.

(iii) Sum of the elements of the 1st column.

(iv) Mean of first and fourth row.

Command:

Output:

(k) If $A = \begin{bmatrix} 1 & 2 \\ 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix}$, then compute (i) A^T, (ii) B^T, (iii) $(AB)^T$, (iv) $B^T A^T$, (v) $(A + B)^T$, (vi) $(A - B)^T$.

Command:

Output:

Ex. No. 2 Testing Consistency of system of equations

Date:

1. Examine the consistency of the equation

$$x + y + z = 1;\ 3x + 4y + 5z = 1;2x + 3y + 4z = 1.$$

Command:

Output:

2. Find whether the following equations are consistent

$$x + 2y + 2z = 2;$$
$$3x - 2y - z = 5;$$
$$2x - 5y + 3z = -4\ ;$$
$$x + 4y + 6z = 0$$

Command:

Output:

3. Find whether the following equations are consistent

$$x + y + z = 6;\ x + 2y + 3z = 10\ ;x + 3y + 5z = 14$$

Command:

Output:

4. Examine the consistency of the equations

$$x + y + z = 6;$$
$$x - y + 2z = 5;$$
$$3x + y + z = 8;$$
$$2x - 2y + 3z = 7.$$

Command:

Output:

5. Discuss the consistency of the following system of equations.

$4x + 3y + 6z = 25;\ x + 5y + 7z = 13\ ;\ 2x + 9y + z = 1$

Command:

Output:

Ex. No. 3Integration of single variable functions

Date:

1. Evaluate $\int \sqrt{\sin x}\, dx$.

   Command:

   Output:

2. Evaluate $\int (x+a)^5 dx$.

   Command:

   Output:

3. Evaluate $\int \left(a + \frac{bx}{c} + dx^2\right)^{\frac{1}{2}} dx$.

   Command:

   Output:

4. Evaluate.

$$\int (e^{-nx} + x^n + cosx + \sin^{-1} x + coshx + 2^x) dx$$

Command:

Output:

5. Evaluate $\int \sqrt{sinx + cosx}\, dx$

   Command:

   Output:

Ex. No. 4 Applications of integration to Area and Volume.

Date:

1. Find the value of $\int_0^1 \int_0^2 (x+6y^2)\, dx\, dy$

Command:

Output:

2. Find the value of $\int_0^2 \int_0^4 x^2y^2\, dx\, dy$.

Command:

Output:

3. Find the value of $\int_0^a \int_x^a (x^2 + y^2)\, dx\, dy$

Command:

Output:

4. Find the value of $\int_0^1 \int_0^{\sqrt{1-x^2}} \int_{\sqrt{x^2+y^2}}^1 \frac{1}{\sqrt{x^2+y^2+z^2}}\, dx\, dy\, dz$.

Command:

Output:

5. Find the value of $\int_0^a \int_0^x \int_0^y xyz\, dx\, dy\, dz$.

Command:

Output:

Ex. No. 5 Plotting of 2D and 3D objects

Date:

1. Plot a graph of a function y =e^x, where $0 \leq x \leq 5$.

Command:

Output:

2. Plot a straight line for the following data

x:	1	2	3	4	5
y:	2	4	6	8	10

Command:

Output:

3. Plot a graph of the function y = log x, if x = 1:1:10

Command:

Output:

4. Plot a graph of the function y = sin x, where x ranges from $-\pi$ to 2π.

Command:

Output:

5. Plot a straight line for the following data.

x	1	2	3	4	5	6	7	8	9	10
y=f(x)	2	4	6	8	10	12	14	16	18	20

Command:

Output: