ISLAMIAH COLLEGE (AUTONOMOUS)

LAB MANUAL

COMPUTATIONAL LABORATORY – II

U8MSPR21

For the Candidates admitted from the academic year 2018 – 2019

By

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U8MSAP21 Computational Laboratory – II

2 Hours / Week

List of Exercises

1. Differentiation of Single variable functions.
2. Integration of Single variable functions.
3. Limits
4. Radius of Curvature.
5. GRAPHICS – Two Dimensional Plots.
6. GRAPHICS – Three Dimensional Plots.

Ex. No. 1 Differentiation of Single variable functions.

Date:

1. Find $\frac{d^2y}{dx^2}$ *and* $\frac{d^3y}{dx^3}$ for the following
   (i)$x = at^2$, $y = 2at$, (ii) $y = (x+2)(x+3)(x+4)$.

   Command:

   Output:

2. Differentiate the following
   (a) $y = e^{\sin ax}$ (b) $y = \sin 30t$ (c) $y = e^{at} + e^{bt}$ (d) y = log x.

   Command:

   Output:

3. If $y = e^{ax+b}$, find $\frac{d^2y}{dx^2}$, $\frac{d^3y}{dx^3}$ *and* $\frac{d^5y}{dx^5}$.

   Command:

   Output:

4. Find $\frac{dy}{dx}$ for the following

(a) $y = \sin x$ (b) $y = \tan x$ (c) $y = x^2$ (d) $y = x^x$

Command:

Output:

5. Find $\frac{d^3y}{dx^3}$ *and* $\frac{d^7y}{dx^7}$ for the following

(i) $y = sinx$ (ii) $y = (x+1)(x+2)$.

Command:

Output:

6. Differentiate the following with respect to x

(a) $y = e^{\cos ax}$ (b) $y = \cos 20x$ (c) $y = cos^{-1}x$.

Command:

Output:

7. Differentiate the following

(a) $y = e^{\sin ax}$ (b) $y = \sin 30t$ (c) $y = e^{at} + e^{bt}$.

Command:

Output:

8. If $y = e^{ax+b}$, find $\frac{d^2y}{dx^2}, \frac{d^3y}{dx^3}$ and $\frac{d^5y}{dx^5}$.

Command:

Output:

9. Find $\frac{dy}{dx}$ for the following

(a) $y = \sin x$ (b) $y = \tan x$ (c) $y = x^2$ (d) $y = x^x$

Command:

Output:

10. Find $\frac{dy}{dx}$ for the following

(i)$x = at^2$, $y = 2at$, (ii) $y = (x+2)(x+3)(x+4)$.

Command:

Output:

Ex. No. 2 Integration of Single variable functions.

Date:

1. Compute $\int_0^5 \sin x dx$.

   Command:

   Output:

2. Compute $\int_1^2 e^{-x^2} dx$.

   Command:

   Output:

3. Compute $\int_0^4 \cos x dx$.

   Command:

   Output:

4. Compute $\int_0^2 \frac{1}{2x^3-2x+5}\,dx$

Command:

Output:

5. Compute $\int_1^2 e^{-x^3}\,dx$.

Command:

Output:

6. Compute $\int_0^5 \frac{1}{2x^3+2x+5}\,dx$

Command:

Output:

7. Compute $\int_1^5 e^{x^5} dx$.

Command:

Output:

8. Compute $\int_0^5 \frac{1}{2x^3+2x+2} dx$

Command:

Output:

9. Compute $\int_0^\pi \sin x dx$.

Command:

Output:

10. Compute $\int_0^2 cosx dx$.

Command:

Output:

Ex. No. 3 Limits

Date:

1. Evaluate $\lim_{x\to 0} \frac{\sin 4x}{x}$

   Command:

   Output:

2. Evaluate $\lim_{x\to 0} \frac{x^2 e^x}{\cos x - 1}$

   Command:

   Output:

3. Evaluate $\lim_{x\to 0} \frac{x^2}{\cos x - 1}$

   Command:

   Output:

4. Evaluate $\lim_{x \to a} \frac{x^n - a^n}{x - a}$.

Command:

Output:

5. Evaluate $\lim_{n \to \infty} \left(1 + \frac{x}{n}\right)^n$.

Command:

Output:

6. Evaluate $\lim_{x \to 0} \frac{1 - \cos x}{x^2}$.

Command:

Output:

7. Evaluate $\lim_{x \to 0} \frac{e^x - 1}{x^2}$.

Command:

Output:

8. Evaluate $\lim_{x\to 0}(1+x)^{\frac{1}{x}}$.

Command:

Output:

9. Evaluate $\lim_{x\to 0}\frac{\sqrt{1+x}-\sqrt{1-x}}{x}$.

Command:

Output:

10. Evaluate $\lim_{x\to\frac{\pi}{2}}\ (\sec x-\tan x)$.

Command:

Output:

Ex. No. 4 Radius of Curvature.

Date:

1. Find the radius of curvature of $y = \cos t$

Command:

Output:

2. Find the radius of curvature of $y = \sin t$.

Command:

Output:

3. Find the radius of curvature of $y = x^4 \cos^2 t$.

Command:

Output:

4. Find the radius of curvature of $y = at^2$.

Command:

Output:

5. Find the radius of curvature of $y = \cos t$.

Command:

Output:

6. Find the radius of curvature of $y = t\cos x$.

Command:

Output:

7. Find the radius of curvature of $y = x^4 \cos^2 t$.

Command:

Output:

8. Find the radius of curvature of $y = at^2$

Command:

Output:

9. Find the radius of curvature of $y = \cos t$

Command:

Output:

10. Find the radius of curvature of $y = 4\sin t - \sin t$.

Command:

Output:

Ex. No. 5 GRAPHICS – Two Dimensional Plots.

Date

1. Plot a straight line for the following data.

x	-3	-2	-1	0	1	2	3
y	27	8	1	0	1	8	27

Command:

Output:

2. Plot a graph for the function $y=\cos x$ ranges from π to 2π (taking interval $\pi/50$)

Command:

Output:

3. Draw a graph for a following data.

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

Command:

Output:

4. Draw a graph for the function $y=\cos x$ ranges from 0 to 2π (taking interval $\pi/50$)

Command:

Output:

5. Plot a straight line for the following data.

X	1	2	3	4	5	6
Y	$\sqrt{1}$	$\sqrt{2}$	$\sqrt{3}$	$\sqrt{4}$	$\sqrt{5}$	$\sqrt{6}$

Command:

Output:

6. Plot a graph for the function $y=\cos x$ ranges from π to 2π (taking interval $\pi/50$).

Command:

Output:

7. Draw a graph for a following data.

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

Command:

Output:

8. Draw a graph for the function $y=\cos x$ ranges from 0 to 2π (taking interval $\pi/50$)

Command:

Output:

9. Plot a straight line for the following data.

x	-3	-2	-1	0	1	2	3
y	9	4	1	0	1	4	9

Command:

Output:

10. Plot a graph for the function $y=\cos x$ ranges from π to 2π (taking interval $\pi/50$)

Command:

Output:

Ex. No. 6 GRAPHICS – Three Dimensional Plots.

1. Plot the surface of z = $\frac{-5}{1+x^2+y^2}$.

   Command:

   Output:

2. Plot a graph of the function $y = \log x$ if $x = 1:1:10$.

   Command:

   Output:

3. Plot the surface of z = $\frac{5}{1+2x+y^2}$.

   Command:

   Output:

4. Plot the surface of z = $x^2 + y^2$.

   Command:

   Output:

5. Plot a unit sphere centered by three matrices *x*, *y*, *z* of size 21 x 21 each.
   Command:

   Output:

6. Plot the surface of z = x^2 - y^2.

   Command:

   Output:

7. Plot the surface of z = $\frac{-5}{1+2x+y^2}$.

   Command:

   Output:

8. Plot a unit sphere centered by three matrices *x*, *y*, *z* of size 60 x 60each.

   Command:

   Output:

9. Plot a cylinder generated by $r = \sin(3\pi z) + 2$, $0 \le z \le 1$, $0 \le \theta \le 2\pi$.

Command:

Output:

10. Plot the surface of $z = \sin^2 x + \sin^2 y$, $|x| \le \frac{\pi}{2}$, $|y| \le \frac{\pi}{2}$.

Command:

Output: