

M.Sc. First Semester End Examination, 2022

**Applied Mathematics with Oceanology
and Computer Programming**

PAPER-MTM-197

Full Marks: 25

Time: 02 Hrs

*The figures in the right hand margin indicate marks
Candidates are required to give their answers in their own words as
far as practicable*

Illustrate the answers wherever necessary

[COMPUTATIONAL METHODS: USING MATLAB (Practical)]

**Answer one question from each of the three following groups on
lottery basis.**

GROUP – A

(6)

1. Write a script file in MATLAB to draw a graph of $y = \sin(\pi x)$, $0 < x < 1$ mentioning title of the graph with green star marker.
2. Write a script file in MATLAB to draw a graph of $y = \sin^2 t + 2 \cos t + 1.5$, $-1 < t < 1$ mentioning label of the graph with blue dotted line.

(2)

3. Write a MATLAB script to evaluate a sequence of Fibonacci numbers in a given range.
4. Write a MATLAB script to calculate the factorial of an integer and hence find ${}^n P_r$.
5. Write an m-file to check a number is Armstrong or not.
6. Write a script file in MATLAB to draw a histogram of the following average marks of four subjects in a class mentioning the name of the subject against each bar.

Physics	Chemistry	Mathematics	Biology
43	71	53	58

7. Write a script file in MATLAB to draw a Pie chart about the following expenditure for establishing a computer lab with label.

Machine	Software	Furniture	Transport
20 lakhs	10 lakhs	3 lakhs	10 lakhs

8. Write a MATLAB script to find $A+B$, $A-B$, $A*B$ where A and B are square matrices.
9. Write a MATLAB script to calculate the characteristic polynomial and characteristic roots of a random 4×4 matrix.

(3)

GROUP – B

(8)

10. Write a script in MATLAB to find the real root of the equation $f(x) = 0$ by Newton-Raphson method and using this find a real root of the equation $x^3 + 2x - 5 = 0$.
11. Write a script file in MATLAB to draw a histogram of the following average temperature of a year of 2012 in Midnapore mentioning the name of the month against each bar and title of the graph.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
17°C	19°C	24°C	30°C	40°C	39°C	33°C	31°C	28°C	28°C	25°C	22°C

12. Write a script in MATLAB to find the real root of the equation $x^2 - 7x + 6 = 0$ by Bisection method.
13. Write a script in MATLAB to find the value of $\int_a^b f(x)dx$ by Trapezoidal rule and using this find the value of the integral $\int_0^1 x dx$ by dividing 100 sub-intervals.
14. Write a script in MATLAB to find the value of $\int_{1.2}^{3.4} (4x^2 - 3)dx$ by Simpson 1/3 rule.

GROUP – C

(6)

15. Write a script in MATLAB to draw the following function in the interval $[-1,4]$

$$f(x) = \begin{cases} x^2 + 1, & -1 \leq x < 0 \\ 0, & x = 0 \\ x^3 + 2x + 5, & x > 0 \end{cases}$$

(4)

16. Write a script file in MATLAB to check a number is palindrome or not.
 17. Write a script in MATLAB to find the root of the equation $f(x)=0$ by Newton Raphson method.
 18. Write a script in MATLAB to find the root of the equation $f(x)=0$ by iteration method.
 19. Write a script in MATLAB to draw the function $y = x \sin \frac{1}{x}$ in $[-0.5, 0.5]$.
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