# 2015

## M.Sc.

### 1st Semester Examination

### APPLIED MATHEMATICS WITH
### OCEANOLOGY AND COMPUTER PROGRAMMING

**(Lab1 : Computational Methods : Using MATLAB)**

**PAPER—MTM-106 (Unit–II)**

**( Practical )**

*Full Marks : 25*

*Time : 2 Hour*

*The figures in the right-hand margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

*Illustrate the answers wherever necessary.*

Answer *four* questions on lottery basis :    4×5

1. Write a user defined function in MATLAB to calculate the factorial of an integer number and using this find $^nC_r$.

2. Write a user defined function in MATLAB to calculate the roots of a quadratic equation using this find the roots of the equation $x^2 + 5x + 6 = 0$.

3. Write a user defined function in MATLAB to test a number is prime or not and using this conclude 29 is a prime number.

4. Write a user defined function in MATLAB to test a number is prime or not and using this generates all prime numbers between two specified numbers.

5. Write a user defined function in MATLAB to calculate mean of a set of numbers and using this find the mean of the following numbers : 7, 8, 9, 6, 3, 9, 8, 5, 7, 11.

6. Write a user defined function in MATLAB to calculate median of a set of numbers and using this find the median of the following numbers : 7, 8, 9, 6, 3, 9, 8, 5, 7, 11.

7. Write a user defined function in MATLAB to calculate standard deviation of a set of numbers and using this find the standard deviation of the following numbers : 7, 8, 9, 6, 3, 9 , 8, 5, 7, 11.

8. Write a user defined function in MATLAB to generate Fibonacci sequence and using this find the Fibonacci numbers between two specified numbers.

9. Write a user defined function in MATLAB to calculate sum of a set of numbers and using this find the sum of all natural numbers between two specified numbers.

**10.** Write a user defined function in MATLAB to test a number is divisible by another number or not and using this conclude for the numbers 9999 and 11.

**11.** Write a user defined function 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 :

$$x_3 + 2x - 5 = 0.$$

**12.** Write a user defined function in MATLAB to find the real root of the equation $f(x) = 0$ by bisection method and using this find a real root of the equation $x_3 + 2x - 5 = 0$.

**13.** Write a user defined function in MATLAB to calculate correlation coefficient of two set of numbers and using this find the correlation coefficient of the following sets numbers : $\{7,8,9,6,3,9,8,5,7,11\}$ and $\{5,6,7,1,7,6,3,5,9\}$.

**14.** Write a user defined function 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 $\int_0^1 xdx$ by dividing 100 sub-intervals.

*(Turn Over)*

15. Write a user defined function in MATLAB to find the value

    of $\int_a^b f(x)dx$ by Simpson's $\frac{1}{3}$rd rule and using this find the

    value of the integral $\int_0^1 x^2 dx$ by dividing 100 sub-intervals.

16. Write a user defined function in MATLAB to find the trace of a matrix and using this find the trace of a square matrix.

17. Write a user defined function in MATLAB to find the product of two matrices and using this find the product of two compatible matrices.

18. Write a user defined function in MATLAB to test a number is palindrome or not and using this conclude 1234321 is a palindrome number.

19. Write a script in MATLAB to calculate the ${}^nC_r$.

20. Write a script in MATLAB to calculate the roots of the cubic equation $x^3 + 5x + 6 = 0$.

21. Write a script in MATLAB to test a number is prime or not prime.

**22.** Write a script in MATLAB to generate all prime numbers between two specified numbers.

**23.** Write a script in MATLAB to find the mean of the following numbers : 7, 8, 9, 6, 3, 9, 8, 5, 7, 11.

**24.** Write a script in MATLAB to this find the median of the following numbers : 7, 8, 9, 6, 3, 9, 8, 5, 7, 11.

**25.** Write a script in MATLAB to find the standard deviation of the following numbers : 7, 8, 9, 6, 3, 9, 8, 5, 7, 11.

**26.** Write a script in MATLAB to generate the Fibonacci numbers between two specified numbers.

**27.** Write a script in MATLAB to find the sum of all natural numbers between two specified numbers.

**28.** Write a script in MATLAB to test a number is divisible by another number or not.

**29.** Write a script in MATLAB to find the real root of the equation $x^3 + 2x - 5 = 0$ by Newton-Raphson method.

**30.** Write a script in MATLAB to find the real root of the equation $x^3 + x - 5 = 0$ by bisection method.

**31.** Write a script in MATLAB to find the correlation coefficient of the following sets numbers :

{7, 8, 9, 6, 3, 9, 8, 5, 7, 11} and {5, 6, 7, 4, 1, 7, 6, 3, 5, 9}.

**32.** Write a script in MATLAB to find the value of $\int_0^1 x\,dx$ by

dividing 100 sub-intervals using Trapezoidal rule.

**33.** write a script in MATLAB to find the value of $\int_0^1 x^2\,dx$ by

dividing 100 sub-intervals using Simpson's $\frac{1}{3}$rd rule.

**34.** Write a script in MATLAB to find the trace of a square matrix.

**35.** Write a script in MATLAB to find the product of two compatible matrices.

**36.** Write a script in MATLAB to test a number is palindrome or not palindrome.

**37.** Write a script in MATLAB to generate Pascal triangle.

**38.** Write a script in MATLAB to fit a polynomial curve of any degree to the following data :

$$\{(x_i, y_i) : i = 1, 2, ..., n\}.$$

**39.** Write a script in MATLAB to find the prime factors of some given number.

**40.** Write a script in MATLAB to find the histogram of the following set of data :

$$\{(x_i, y_i, z_i) : i = 1, 2, ..., n\}.$$

**41.** Write a script in MATLAB to find the pie diagram of an M.Sc. 1st semester student of the following marks :

$$35, 42, 25, 36, 38, 15.$$

**42.** Write a script in MATLAB to draw $\sin t$ and $\cos t$ in the interval $[0, 4\pi]$ in the same figure with different line specification.

**43.** Write a script in MATLAB to draw $\sin t$ in the interval $[0, 4\pi]$ with mentions title, axes and different line specification.

**44.** Write a script in MATLAB to draw following parametric equations $x = \sin t$ and $y = \cos t$ in the interval $[0, 2\pi]$.

**45.** Write a script in MATLAB to draw $y = |x|$ in the interval $[-4, 4]$ with mentions title, axes and axes limits.

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

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

**47.** Write a script in MATLAB to draw the following function in the interval $[-\pi, \pi]$ :

$$f(x) = \begin{cases} \sin x, & -\pi \le x < 0 \\ 0, & x = 0 \\ \tan x, & x > 0 \end{cases}$$

**48.** Write a script in MATLAB to draw the surface of the equation $z = x^2 + y^2$ in the range $-3 \le x \le 3$ and $-3 \le y \le 3$.

**49.** Write a script in MATLAB to draw the surface of the equation $z = xe^{-x^2-y^2}$ in the range $-3 \le x \le 3$ and $-3 \le y \le 3$.

**50.** Write a script in MATLAB to draw the contour of the equation $z = \sin x + \cos y$ in the range $-2\pi \le x \le 2\pi$ and $0 \le y \le 4\pi$.

**Note Book + Viva — 5 Marks**

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