PG/IS/MTM - 106/14(Pr.)

M.Sc. 1st Semester Examination, 2014

APPLIED MATHEMATICS WITH OCEANOLOGY AND COMPUTER PROGRAMMING

(Lab 1 : *Computational Methods : Using MATLAB*)

(Practical)

PAPER– MTM - 106

Unit – 1I

Full Marks : 25

Time : 2 hours

Answer any **four** questions on lottery basis

The questions are of equal value

1. Write a program to calculate the factorial of an integer number and the find $^{n}P_{r}$.

2. Write a program to check a number is palindrome or not.

3. Write a program to calculate the inverse of a square matrix.

4. Write a program to calculate the value of a determinant.

5. Write a m-file in MATLAB to solve a linear system. Test using the following

$$8x + 2y + 3z = 13$$
$$2x + 11y + z = 14$$
$$x + y + 19z = 21$$

6. Write a program to calculate the roots of a quadratic equation -

$$ax^2 + bx + c = 0$$

7. Write a program to calculate the roots of a cubic equation

$$ax^3 + bx^2 + cx + d = 0$$

8. Write a program to calculate a number is prime or not.

9. Write a program to calculate prime numbers between two specified interval and display them in the screen.

10. Write a program to calculate mean of a set of data.

11. Write a program to calculate median of a set of data.

12. Write a program to calculate standard deviation of a set of data.

13. Write a program to draw π chart diagram for a set of data.

14. Write a program to draw histogram for a set of data.

15. Write a program to draw $\sin(t)$ and $\cos(t)$ in the interval $[0, 2\pi]$ in the same figure with different line specification.

16. Write a program to evaluate sum of the natural numbers between 1 and 100.

17. Write a program to calculate sum of numbers between two specified numbers.

18. Write a program to check a numbers is divisible by another number or not.

19. Write a program to evaluate sequence of Fibonacci number between a range.

20. Write a program to generate Pascal triangle.

21. Write a program to plot the function

$$y = 5x^2 + 15.$$

22. Write a program to plot $y = |x|$ and $z = \log(x)$ in a same figure.

23. Write a program to display three dimensional surface plot.

24. Write a program to find the roots of an equation $f(x) = 0$ by bisection method.

25. Write a program tofind the roots of an equation by Newton-Raphson method.

26. Write a m-file in MATLAB to compute correlation co-efficient of two sets of data.

27. Write a m-file in MATLAB to find the value of

$$\int_a^b f(x)dx,$$

by trapezoidal rule. Test using the following by taking $n = 50$.

$$\int_0^1 x^2 dx$$

28. Write a program to calculate the addition and multiplication of two matrices.

29. Write a program to find the sum of the squares of the first 100 natural numbers.

30. Write a program to fit a polynomial curve of any degree to the data $(x_i, y_i, i = 1, 2, ..., n)$.

31. Write a script m-file that does the following :

(i) Use the plot command to draw the square with vertices (1, 2), (3, 2) , (3, 4) and (1, 4). The quare should be drawn in red (at least your script m-file should show that).

32. Write a script that uses the plot command to draw the two diagonal of the square (1, 2), (3, 2) (3, 4) and (1, 4) in blue with a dotted line.

33. Write a script M-file that use the axis command to change the plotting window region and add a title "A square by your name".

34. Write a script M-file using MATLAB to create a 2-D plot of a given function $f(x)$ and its derivative $f'(x)$ over a given interval $a \leq x \leq b$.

35. Create a 2-D plot of the function $f(x) = x\sin(x^2)$ and its derivative $f'(x)$ on the same set of axes over the interval $-\pi \leq x \leq \pi$.

36. Write a script M-file that Display the graph of the ellipse with parametric equation

$x = 4\cos(t), y = 3\sin(t)$ for t in the interval $0 \le t \le 2\pi$.

The cargen-circle that can be inscribed in the ellipse above. The ellipse should be drawn is a solid line style and the circle in a dotted style.

37. Write a M-file that display the graph of polar curve $r = 10\cos(4\theta)$ with $0 \le \theta \le 2\pi$ (use t instead of θ in your matlab code). This curve should be drawn with a solid line style using the parametric representation $x = r\cos(\theta) = f(\theta)\cos(\theta)$ and $y = r\sin(\theta) = f(\theta)\sin(\theta)$. where $r = f(\theta)$.

38. Plot the expression $y = \sqrt{1-x^2}$ and $y = -\sqrt{1-x^2}$ on an interval $(-1, 1)$. The two graph should form the unit circle $x^2 + y^2 = 1$.

39. Write a script file in MATLAB to find the prime factors of some given numbers.

40. Write a script file in MATLAB to check a number is palendrome or not.

[*Notebook* + *Viva* : 05 Marks]
