Q.22 (i) Find the Mean for the following data: 3, 6, 9, 12, 15. (CO4)

(ii) Write any three basic differences between SciLab and MATLAB. (CO5)

SECTION-D

Note: Long answer type questions. Attempt any two questions out of three questions. (2x8=16)

Q.23 Find all the points of Maxima & Minima and their corresponding maximum and minimum values of the function $f(x) = 10 - 9x + 6x^2 - x^3$. (CO2)

Q.24 Apply Simpson's rule to evaluate $\int_0^6 (x^2 + 4)dx$ by taking 6 equal subintervals of $0 \le x \le 6$. (CO2)

Q.25 Find the Standard Deviation for the following data: 6, 7, 10, 12, 13, 4, 8, 12 (CO4)

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2nd Sem. / Automation & Robotics

Subject : Applied Mathematics-II

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SECTION-A

Note: Multiple choice questions. Attempt any four questions out of six questions. (4x1=4)

Q.1 If $g(x) = 4\sin x + 3\cos x$, then $g\left(\frac{\pi}{2}\right) =$ ____ (CO2)

a) 1 b) 4

c) 7 d) None of these

Q.2 Fill in the blank: $\lim_{x \to 0} \frac{a^x - 1}{x} =$ _____ (CO2)

a) a^x b) 0

c) $\log_e a$ d) None of these

Q.3 $\int_1^3 dy =$ _____ (CO2)

a) 2 b) 4

c) 5 d) None of these

Q.4 $\int \sec x \tan x \, dx =$ _____ (CO2)

a) $-\sec x + c$ b) $\text{cosec } x + c$

c) $\tan x + c$ d) $\sec x + c$

Q.5 What is the degree of the differential equation $\left(\frac{dy}{dx}\right)^3 + y = \left(\frac{d^2y}{dx^2}\right)$? (CO1)

a) 4 b) 3

c) 1 d) 2

Q.6 Which of the following is/are case sensitive language/s? (CO5)

a) SciLab b) MATLAB

c) Both of these d) None of these

SECTION-B

Note: Objective type questions. Attempt any four questions out of six questions. (4x1=4)

Q.7 Define function with an example. (CO2)

Q.8 Fill in the blank: (CO2)

$$\frac{d}{dx}(\log x) = \_\_\_\_\_$$

Q.9 Fill in the blank: $\int \sin 2x \, dx = \_\_\_\_\_$ (CO2)

Q.10 Give an example of linear ordinary differential equation. (CO1)

Q.11 Fill in the blank: (CO2)

$$\frac{d}{dx}(x^3 - 1) = \_\_\_\_\_$$

Q.12 Write the brief introduction about SciLab in 15-25 words. (CO5)

SECTION-C

Note: Short answer type questions. Attempt any six questions out of ten questions. (6x6=36)

Q.13 Evaluate the following limit : (CO2)

$$\lim_{x \to 0} \frac{2^x - 5^x}{\sin x}$$

Q.14 Find the derivative of $y = e^x$ with respect to x by 1st principle method. (CO2)

Q.15 Differentiate $(\sin x)^x$ with respect to x. (CO2)

Q.16 If $y = x^2 \cos x$, find $\frac{d^2y}{dx^2}$ at $x = 0$. (CO2)

Q.17 Use substitution method to evaluate $\int \frac{1}{x + x \log x} dx$. (CO2)

Q.18 Evaluate the following: (CO2)

$$\int_0^{\frac{\pi}{2}} \sin^3 x \cos^7 x \, dx$$

Q.19 Find the area bounded by the curve $x = 8y^2$, between y = 1, y = 5 and the y-axis. (CO3)

Q.20 Form a differential equation representing the family of curves $y = e^x (A \cos x + B \sin x)$ by eliminating arbitrary constants A and B. (CO1)

Q.21 The following table shows the ages of the patients admitted in a hospital during an year: (CO4)

Age (in year)	0-10	10-20	20-30	30-40	40-50	50-60
Number of Patients	10	35	52	61	38	29

Find the Mode of the data given above