

(vii)  $f[i\_j]:=i^2+j^3;$   
 $(g=Array[f,\{3,2\}])//MatrixForm$   
 $(h=Array[Min,\{3,2\}])//MatrixForm$   
 $g+h//MatrixForm$  (5×2=10)

4. Provide the Syntax of any **four** from the following :

(i) Write the manipulate command in the plotting of  $f(x) = x^2 + \sin x$  using directive and blend commands.

(ii) Write the command to sketch the graph of  $f(x) = \frac{1}{x^2}$  and then evaluate the definite integral of  $f(x)$  from  $x=1$  to  $x=3$ .

(iii) Write the command to enter a matrix with the integers 1 through 5 on the diagonal, 0 below the diagonal, and 5 above the diagonal.

(iv) Write the syntax for finding eigenvalues and eigenvectors of any  $3 \times 3$  lower triangular matrix.

(v) Write the command to get  $f'(0)$  and  $f''(1)$ , where  $f(x) = \frac{x^2}{1+x^3}$ .

(vi) Graph the functions  $y = x \sin(1/x)$  and  $z = \frac{xy}{x^2 + y^2}$ . (4×2.5=10)

(300)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3262

IC

Unique Paper Code : 62353424

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Name of the Paper : Computer Algebra Systems

Name of the Course : **B.A. (Prog.) Mathematics : Skill Enhancement Course**

Semester : IV

Duration : 2 Hours

Maximum Marks : 38

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Using any one of the CAS :=Mathematica/Maple/Maxima/any other to answer the questions.
3. This question paper has **four** questions in all.
4. **All** questions are compulsory.

1. Fill in the blanks : (8×1=8)

(i) The \_\_\_\_\_ operator is to be used while assigning value 2 to a variable x.

(ii) The output given on input  $\pi$  is \_\_\_\_\_.

P.T.O.

- (iii) The command which undoes the effect of Factor command is the \_\_\_\_\_ command.
- (iv) The most recognized CAS \_\_\_\_\_ was created by Stephen Wolfram.
- (v) The command \_\_\_\_\_ returns the nth derivative of  $f$  with respect to  $x$ .
- (vi) The \_\_\_\_\_ brackets are used to group terms in algebraic expressions.
- (vii) The command \_\_\_\_\_ is used to find the quotient when one polynomial is divided by another.
- (viii) The option \_\_\_\_\_ causes the left hand limits to be computed by the 'Limit' command.
2. Write a short note on any **four** from the following :  
( $4 \times 2.5 = 10$ )
- (i) How to find the limit of a function at a point in any CAS?
- (ii) How to find maxima and minima of a function in any CAS?
- (iii) How to differentiate a function in any CAS?

- (iv) How to find eigenvalues and eigenvectors of a given  $3 \times 3$  matrix in any CAS?
- (v) Differentiate between the commands 'Solve' and 'NSolve'.
- (vi) Differentiate between the commands 'AxesLabel' and 'PlotLabel'.
3. Write the output of any **five** from the following :
- (i)  $\text{Limit}[\text{Sin}[x], x \rightarrow \text{Infinity}]$   
 $\text{Limit}[\frac{\text{Sin}[x]}{x}, x \rightarrow \text{Infinity}]$
- (ii) Solve  $[a x + b y = c, d x + e y = f, \{x, y\}]$   
 $\text{Solve}[x == 0] // \text{Grid}$
- (iii)  $x = \text{RandomInteger}[ ];$   
 $\{2 x, 2 x\}$
- (iv)  $\text{Plot}[x^{1/3}, \{x, -8, 8\}]$   
 $\text{Plot}[\text{Cos}[x], \{x, 0, \text{Pi}\}, \text{Ticks} \rightarrow \{\text{Range}[0, \text{Pi}, \text{Pi}/2], \text{Automatic}\}]$
- (v)  $g[x_] := x^3 - 9x + 5$   
 $\text{Solve}[g'[x] == 0, x]$   
 $\text{extrema} = \{x, g[x]\} /. \%$
- (vi)  $\text{'diff}(f(x) * g(x), x, 2) = \text{diff}(f(x) * g(x), x, 2);$   
 $\text{'diff}(\text{diff}(x^6, x), x) = \text{diff}(\text{diff}(x^6, x), x);$