

This question paper contains 4 printed pages]

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S. No. of Question Paper : 2301

Unique Paper Code : 42353404

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Name of the Paper : Computer Algebra Systems

Name of the Course : B.Sc. (Prog.)/B.Sc. Math. Sciences : SEC

Semester : IV

Duration : 2 Hours

Maximum Marks : 38

(Write your Roll No. on the top immediately on receipt of this question paper.)

Using any one of the CAS := Mathematica/Maple/Maxima/Matlab
to answer the questions.

This question paper has four questions in all.

All questions are compulsory.

1. True/False (Give satisfactory Explanation/Example) : $8 \times 1 = 8$

(i) Does the suffix ".nb" stand for "notebook" ?

(ii) In Mathematica, every built-in function name begins with a small letter.

(iii) Do the commands $D[f[x]]$ and $f'[x]$ provide the same output ?

P.T.O.

- (iv) The syntax `NSolve[-1+3x-x^2=0,x,15]` is correct.
- (v) The syntax `Makelist[n^2,n,1,10,2];` is well defined.
- (vi) The output of `Factor [x^2-2]` is $(x-\sqrt{2})(x+\sqrt{2})$.
- (vii) `x := RandomInteger[10]; {x,x,x}` will give the same value of x in output.
- (viii) Can we plot $y=4x+1$, $y=-x+4$ and $y=9x-8$, for $0 \leq x \leq 2$ in a single graph ?

2. Attempt any *four* parts from the following : $4 \times 2 \frac{1}{2} = 10$

- (i) What is the significance of `simpsum` command in the simplification to sums in maxima ?
- (ii) Explain `Reduce` and `Solve` command.
- (iii) Explain the use of 'Manipulate' command.
- (iv) What is the use of command `Direction → 1` in `Limit` command ? Can we change that value 1 with any other integer ?
- (v) Define Matrix Form and `Min` command with suitable example.
- (vi) Explain the role of Aspect Ratio and Plot Style of Plot options with syntax.

3. Write the Output of any *five* from the following : $5 \times 2 = 10$

- (i) `Plot [Sin[x],{x, 0, 2Pi}, Ticks → {{0, Pi, 2Pi}, {0, 0.5, 1}}, AxesLabel → {x, y}, PlotLabel → Sin[x]].`

(ii) Solve :

$$([2*x+y-3*z=10, x+4*y+2*z=12, -x+y+z=0], [x,y,z]);$$

$$(iii) M = \begin{bmatrix} 2 & 1 & 0 \\ 3 & 1 & 2 \\ 1 & 2 & 3 \end{bmatrix}, N = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 4 & 1 & 6 \end{bmatrix}$$

$$M*N$$

- (iv) `A=DiagonalMatrix[{a,b,c},1]// MatrixForm`

$$B=Table[i+j, {i,4}, {j,4}] // MatrixForm$$

$$A+B$$

$$(v) M = \begin{bmatrix} 1 & 3 & 4 \\ -1 & 2 & 3 \\ 0 & 1 & 2 \end{bmatrix}$$

$$M_{[[2]]} = M_{[[2]]} + M_{[[1]]}$$

$$M // MatrixForm$$

$$\text{Transpose}[M] // MatrixForm$$

- (vi) `Plot[{x,x^2},{x,0,4},PlotRange→{0.5},PlotStyle→{Black,Directive[Thick,Dotted,Black]}]`

(vii) $f(x) := x + \sin(x);$

$\text{'diff'(f(x), x)=diff(f(x), x);}$

at ($\text{'diff(f(x), x), x=0}$)= at ($\text{diff(f(x), x), x=0}$);

(viii) $\text{wxplot2d(x^2,[x, 0, 4],[box,false]);}$

$\text{wxplot3d ([Cos(t), Sin(t), a], [t, 0, 2*\%pi], [a, -1,1]);}$

4. Provide the Syntax of any *four* from the following : $4 \times 2\frac{1}{2} = 10$

(i) Write the syntax for the plotting of unit sphere in any software.

(ii) Give the syntax for finding the 1st derivative and Indefinite integral of the function $f(x) = x^2 + \cos x$ using any software.

(iii) Write the commands for the solution of the following equations without using solve command.

$$x - 2y = 5 \text{ and } 4x - 3y = 4.$$

(iv) Write the command for $\lim_{x \rightarrow 0} \frac{\cos x}{x}$ and $\lim_{x \rightarrow \infty} \frac{\sin x}{x}$.

(v) Provide the syntax of piecewise command with the help of example.

(vi) Write the syntax for the addition operation for any *two* matrices of 3×3 order in the form of matrices.