Semester – I : 060090107 – GE1 Principle of Scientific Computing

Question Bank

Unit-1	Basic elements of the language
[A]	**2 – Mark Questions**
1.	What is the purpose of Console window in Scilab?
2.	What is the diffrerence between mathematical operator " * " and " .* " ?
3.	Determine the result of the following calculation & Boolean statement is true or false using SCILAB. If a = 2.3, b = -2.3, c= π/2, and x = 2/π: 1) (a2 +bc+x) 2) (2a+b)/x2 < 1
4.	Determine the result of the following calculation & Boolean statement is true or false using SCILAB. If a = 5, b = -2.5, c= π/3, x = 3/π, and y = √3: a) (a+c)/(x+y) b) 2ac = 2cb
5.	Determine the result of the following calculation & Boolean statement is true or false using SCILAB. If a = -3, b = -3.5, c= π/2, x = 2/π, and y = √3: a) (a+c)3/b b) x+2ab+b2 + y2 ≤23
6.	Is it possible to create variable “x%” ? Justify your answer.
7.	How to make comment in Scinotes?
8.	State difference between arithmetical operator / and \ .
9.	What will be displayed on console when following command executed by user? ‘whos -name A’
10.	Write use of pwd command.
[B]	**3 – Marks Questions**
1.	Briefly discuss sparse matrix with example.
2.	Briefly discuss difference between a*b and a.*b with example where a and b are matrices of order n×n.
3.	Write short note on Interpreter.
4.	Find the output of A.*.B where A = $\begin{bmatrix}1 & 2\\3 & 4\end{bmatrix}$ and B = $\begin{bmatrix}3 & 4\\5 & 6\end{bmatrix}$
5.	Write short note on logical operators.
6.	Write a Scilab command to create polynomial by roots of the given polynomial: 5 – 2z + z2.
[C]	**5 – Marks Questions**
1.	Discuss ‘$’ operator, write command to print the following string in reverse order. ‘I am student of Integrated M.Sc. (Mathematics)’.
2.	Discuss list and tlist with appropriate example.
3.	Explain conjugate transpose and non-conjugate transpose.

4.	What is Scilab? Discuss any three features of Scilab.
5.	Discuss matrix transpose and matrix conjugate transpose with appropriate example of each.
6.	Explain following relational operators. <, <=, >=, ==, <>.
7.	Let matrix A, B , C are given respectively $\begin{bmatrix}1&4&7\\2&5&8\\3&6&9\end{bmatrix}$ $\begin{bmatrix}1+i&5+i&3+i\\8+i&2+i&4+i\\7+i&6+i&9+i\end{bmatrix}$ $\begin{bmatrix}2&3&5\\4&5&1\\6&3&8\end{bmatrix}$ what will be the output in Scilab of A', A.', B.' and c.'.
8.	Explain use of ':' and '$' operators in Scilab.
9.	Discuss input & output methods in Scilab.
10.	Define String. How to create string? Apply following commands on the string 'What is your name?' stored in variable x and write output when these commands will be executed in Scilab. a) strindex(x,'y') b) strindex(x,'a') c) part(x,2:7) d) part(x,$:-1:1) e) part(x,1:3:15)
Unit-2	**Matrices**
[A]	**1 – Mark Questions**
1.	Create a matrix of order 3 X 4 using scilab command.
2.	Create a row matrix of having elements 5 to 15 using scilab command.
3.	Create a column matrix of having elements 1 to 10 using scilab command.
4.	Obtain transpose of a matrix A = $\begin{bmatrix}2&3&5\\-2&4&9\end{bmatrix}$ using scilab command.
5.	Create a unit matrix of order 4 X 4 using scilab command.
6.	Create a diagonal matrix of order 3 X 3 using scilab command
7.	Create a diagonal matrix of order 5 X 5 whose diagonal elements are the vector [1 2 3 4 5] using scilab command.
8.	Extract the diagonal elements of matrix A = $\begin{bmatrix}1&3&5\\3&1&2\\2&3&7\end{bmatrix}$ using scilab command.
9.	Create a matrix of order 4 X 4, whose all elements are equal to zero.
10.	What is the size of empty matrix a = [ ]?
11.	Create a matrix having all elements are equal to 1 using scilab command.
12.	Create a matrix of order 6 X 5 having all elements is equal to 4using scilab command.
13.	Create a matrix of order 3 X 3 whose diagonal elements are equal to 9 using scilab command.
14.	Find the size of matrix A = $\begin{bmatrix}1&3&2&2&1\\1&1&2&3&2\\4&1&3&5&1\\6&2&6&4&2\end{bmatrix}$ using scilab command.
15.	Obtain number of rows of matrix A = $\begin{bmatrix}2&3&6\\-2&4&8\end{bmatrix}$ using scilab command.
16.	Obtain number of columns of matrix A = $\begin{bmatrix}2&1&6&5\\3&2&1&3\end{bmatrix}$ using scilab command.
17.	Find the length of matrix A = $\begin{bmatrix}2&6&2&1\\3&2&8&3\end{bmatrix}$ using scilab command.

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18.	Convert a matrix A = $\begin{bmatrix}1 & 5 & 2 & 1\\3 & 5 & 2 & 3\end{bmatrix}$ in a column vector using scilab command.
19.	Reshape the matrix A = $\begin{bmatrix}2 & 5 & 6 & 1\\3 & 2 & 2 & 3\\2 & 6 & 7 & 9\end{bmatrix}$ in to the order of 6 x 2 using scilab command.
20.	Extract a second row of a matrix A = $\begin{bmatrix}2 & 1 & 1 & 8\\4 & 2 & 3 & 5\\2 & 1 & 6 & 9\end{bmatrix}$ using scilab command.
21.	Write a scilab command to extract last row of matrix: A = $\begin{bmatrix}1 & 8 & 5 & 2\\2 & 4 & 2 & 8\\9 & 7 & 6 & 7\end{bmatrix}$
22.	Write a scilab command to extract last to second row of matrix: A = $\begin{bmatrix}2 & 1 & 1 & 4\\5 & 2 & 3 & 3\\2 & 1 & 7 & 9\\3 & 5 & 6 & 1\end{bmatrix}$
23.	Extract a third column of a matrix A = $\begin{bmatrix}2 & 1 & 3 & 3\\4 & 2 & 3 & 5\\1 & 1 & 2 & 8\end{bmatrix}$ using scilab command.
24.	Write a scilab command to extract last column of matrix: A = $\begin{bmatrix}3 & 1 & 4 & 2\\4 & 4 & 5 & 5\\6 & 1 & 5 & 6\end{bmatrix}$
25.	Write a scilab command to extract last to second column of matrix: A = $\begin{bmatrix}2 & 1 & 5 & 1\\4 & 1 & 3 & 6\\2 & 1 & 3 & 8\\1 & 1 & 6 & 5\end{bmatrix}$
26.	Using scilab command extract a sub-matrix B = $\begin{bmatrix}2 & 4\\3 & 8\end{bmatrix}$ from the matrix A = $\begin{bmatrix}3 & 4 & 5 & 3\\9 & 1 & 3 & 6\\2 & 5 & 2 & 4\\1 & 9 & 3 & 8\end{bmatrix}$
27.	Interchange first and third row of matrix A = $\begin{bmatrix}2 & 2 & 5 & 3\\4 & 3 & 1 & 1\\6 & 1 & 8 & 1\end{bmatrix}$ using scilab command.
28.	Interchange second and third column of matrix A = $\begin{bmatrix}2 & 1 & 5 & 3\\4 & 1 & 2 & 4\\6 & 1 & 2 & 9\end{bmatrix}$ using scilab command.
29.	Using scilab command, create a matrix vector [1, 2, 3, 4, 5].
30.	Using scilab ' : ' operator create a row of numbers from 6 to 14 having increment 1.
31.	Using scilab ' : ' operator create a row vector [1, 3, 5, 7, 9, …..... 21]
32.	Using scilab ' : ' operator create a row vector [0.1, 0.4, 0.7, 1.0 ……. 0.26]
33.	Using scilab ' : ' operator generate a row of numbers from 20 to 10 having decrement 1.
34.	Using scilab ' : ' operator create a row vector [18, 16 ,14, 12, 10, 8].
35.	Using scilab ' : ' operator create a row vector [0.25, 0.21, 0.17, 0.13, 0.09, 0.05, 0.01].
36.	Using scilab command find A+B for the input matrices A = $\begin{bmatrix}2 & 5\\1 & 2\\-1 & 7\end{bmatrix}$ and B = $\begin{bmatrix}1 & 2\\-2 & -5\\3 & -1\end{bmatrix}$

37.	Using scilab command find A-B and B-A for the input matrices; $A = \begin{bmatrix} 1 & 6 & 9 \\ -2 & 5 & -2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -3 & -1 \\ 2 & 1 & -2 \end{bmatrix}$
38.	Using scilab command to perform matrix multiplication for the input matrices: $A = \begin{bmatrix} 4 & -1 & 2 \\ -2 & 6 & -3 \\ 8 & 12 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & -2 & -4 \\ 5 & -1 & 8 \end{bmatrix}$
39.	For the given matrices $A = \begin{bmatrix} 1 & 1 & 2 \\ 7 & 2 & 4 \\ 1 & 4 & 9 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & -1 & 5 \\ 4 & 2 & 9 \\ 6 & 0 & -1 \end{bmatrix}$ perform element wise multiplication using scilab command.
40.	For the given matrices $A = \begin{bmatrix} 4 & 3 & 1 \\ 8 & -1 & 9 \\ 1 & 2 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 4 & 5 \\ 4 & 7 & 9 \\ 2 & 2 & -2 \end{bmatrix}$ perform element wise division using scilab command.
41.	Obtain left division A\B for the given matrices $A = \begin{bmatrix} 5 & 3 \\ 2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 8 \\ 3 & 9 \end{bmatrix}$ using scilab command.
42.	Obtain right division A/B for the given matrices $A = \begin{bmatrix} 3 & 1 \\ 12 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 8 \\ 5 & 3 \end{bmatrix}$ using scilab command.
43.	Obtain trace of matrix $A = \begin{bmatrix} 4 & 5 & 2 \\ 1 & -3 & 2 \\ 3 & 1 & 9 \end{bmatrix}$ using scilab command.
44.	Obtain conjugate of matrix $A = \begin{bmatrix} 3+i & 4-3i \\ i & 7 \end{bmatrix}$ using scilab command.
45.	Find transpose of a conjugate for matrix $A = \begin{bmatrix} 1+i & -3i \\ 2-i & i \end{bmatrix}$ using scilab command.
46.	Find the transpose of a complex matrix $A = \begin{bmatrix} 1+i & 1-5i \\ 2+i & 6-i \end{bmatrix}$ using scilab command.
47.	Find the mean of the matrix $A = \begin{bmatrix} 2 & 3 & 2 \\ 1 & -3 & 3 \\ 1 & 7 & 9 \end{bmatrix}$ using scilab command.
48.	Find the mean of each row of the matrix $A = \begin{bmatrix} 2 & 6 & 2 \\ 2 & -1 & 4 \\ 4 & 2 & 1 \end{bmatrix}$ using scilab command.
49.	Find the mean of third row of matrix $A = \begin{bmatrix} 1 & 4 & 2 \\ -2 & 4 & -4 \\ 4 & 2 & 1 \end{bmatrix}$ using scilab command.
50.	Find the mean of each column of the matrix $A = \begin{bmatrix} 1 & 2 & 4 \\ 1 & 3 & 2 \\ 8 & 1 & 5 \end{bmatrix}$ using scilab command.
51.	Find the mean of second column of matrix $A = \begin{bmatrix} 2 & 3 & 3 \\ 9 & 2 & -4 \\ -3 & 7 & 1 \end{bmatrix}$ using scilab command.
52.	Convert a matrix $A = \begin{bmatrix} 2 & 1 & 5 \\ 9 & 2 & 3 \\ 5 & 1 & 2 \\ 1 & 4 & 1 \end{bmatrix}$ in ascending column vector using scilab command.
53.	Find the median of the matrix $A = \begin{bmatrix} 2 & 5 & 3 \\ 6 & 4 & 2 \\ 2 & 3 & 4 \end{bmatrix}$ using scilab command.

54.	Find the median of each row of the matrix A = $\begin{bmatrix} 3 & 5 & 2 \\ 1 & 3 & 2 \\ 4 & 2 & 4 \end{bmatrix}$ using scilab command.
55.	Find the median of third row of matrix A = $\begin{bmatrix} 2 & 2 & 2 \\ 3 & 1 & 4 \\ 4 & 1 & 9 \end{bmatrix}$ using scilab command.
56.	Find the median of each column of the matrix A = $\begin{bmatrix} 1 & 2 & 4 \\ 1 & 1 & 7 \\ 2 & 4 & 2 \end{bmatrix}$ using scilab command.
57.	Find the median of second column of matrix A = $\begin{bmatrix} 2 & 2 & 1 \\ 3 & 5 & 3 \\ 5 & 6 & 2 \end{bmatrix}$ using scilab command.
[C]	**5 – Marks Questions**
1.	Explain the following matrix operations with suitable examples in scilab. ▪ Matrix addition. ▪ Matrix multiplication. ▪ Matrix element wise multiplication. ▪ Matrix division. ▪ Matrix element wise division.
2.	Explain the following scilab commands with suitable examples: ▪ Conversion of matrix in column vector. ▪ Reshaping of matrix. ▪ Swapping of rows and columns in matrix
3.	Discuss the following matrix operation with suitable example in scilab. ▪ Determinant of a matrix. ▪ Inverse of a matrix. ▪ Trace of matrix. ▪ Conjugate of a matrix. ▪ Transpose of a complex matrix.
4.	Discuss the following matrix operation with suitable example in scilab. ▪ Mean of a matrix. ▪ Row mean of a matrix. ▪ Column mean of matrix. ▪ Row median of a matrix. ▪ Column median of a matrix.
5.	Explain the following types of matrix in the context of Scilab programming language. ▪ Row matrix ▪ Column matrix ▪ Trace of a matrix ▪ Size of a matrix ▪ Length of a matrix
6.	Discuss the various uses of " : " (Colon) operator in scilab.
7.	Explain the following terms of matrix in the context of Scilab language: ▪ Transpose of matrix ▪ Unit matrix ▪ Null matrix

	▪ Ones matrix ▪ Scalar matrix
8.	Explain the following scilab commands with suitable examples: ▪ Extraction of row, column and a sub matrix from given matrix. ▪ Swapping of rows and columns.
Unit-3	**Looping and Branching**
[A]	**1 – Mark Questions**
1.	What is the reason of using loops in programming?
2.	x=3 y=2 z=4 if x+y<z then disp(x+y) else end What will be the output?
3.	What is the use of mathematical function modulo in Scilab?
4.	Which Scilab statement is used to skip loop during execution?
5.	Write the Scilab arithmetic expression for following mathematical expression. $\frac{a.b+b.c+c.d}{\frac{a+b+c}{a.b.c}}$
6.	What is loop?
7.	Which statement is used in Scilab to interrupt a loop?
8.	Define Break statement.
9.	Define While statement.
10.	State a difference between break and continue statement.
[B]	**3 – Marks Questions**
1.	Write program to get following sequence: 5, 10, 17, 26, 37, 50, 65, 82, 101.
2.	Write scilab program to get following sequence: 2, 6, 12, 20, 30 42, 56, 72, 90, 110.
3.	Write scilab program to get following sequence: 2, 5, 10, 17, 26, 37, 50, 65, 82, 101.
4.	Write Scilab program to derive following sequence: 4, 8, 14, 22, 32, 44, 58, 74, 92, 112.
5.	Briefly discuss break statement.
6.	Write Scilab program to display all number that are multiple of either 3 or 5, between 1 and 100.
7.	Briefly discuss use of while statement.
8.	Briefly discuss about use of continue command in loop with example.
9.	Write Scilab program to display all the numbers that are multiple of 5 and 4, between 1 and 50 using while loop.
10.	Write Scilab program to display numbers that are divisible by 75 between 1 and 1000.
11.	Write a Scilab program to display the average of all odd numbers from 25 to 75 using

	while loop.
[C]	**5 – Marks Questions**
1.	Explain while statement with example
2.	Write a program to check whether two linear lines are parallel or not.
3.	Write program that will print following pattern. a a b a b c a b c d a b c d e
4.	Write Scilab program that will print following pattern. * ** *** **** *****
5.	Write Scilab program that will print following pattern. 1 1 2 1 2 3 1 2 3 4 1 2 3 4 5
6.	Write algorithm to arrange three numbers inputted by user into ascending order.
7.	Discuss select statement with example.
8.	Write algorithm to convert given number of days by user into month and days, assume that each month is of 30 days. For example:-If user gives input 69 than output will be 2 month and 9 days.
9.	Write algorithm to find roots of quadratic equation.
10.	Explain 'for' statement with appropriate example.
11.	Explain if/elseif with example.
12.	Write scilab program to print Pascal's triangle.
13.	Describe break and continue statement with example.
14.	Write scilab program to print Floyd's triangle.
15.	Write algorithm to arrange three numbers inputted by user into descending order.
16.	Write an algorithm which takes input from user as follows: Today's date: Age years: Age months: Age for expected year: Age for expected month: Which will give output of age of user on the expected month and year. For example: Input: Today's date: 15/11/2016 Age year: 22 Age month: 07 Age for expected year: 2016 Age for expected month: 12 Output: Expected on the given month and year is 22 years 08 months.

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Unit-4	Functions & plotting
[A]	**1 – Mark Questions**
1.	Define function in scilab.
2.	How to create a customize function in scilab.
3.	Explain the scilab coded function with suitable example.
4.	Write a header of scilab coded function.
5.	Which formats are available to save scilab coded function file.
6.	Which command is used to call the scilab coded function?
7.	If a function file named "myfunction" and a script are in same directory than write a command to load function in scilab.
8.	Define inline function.
9.	Which scilab command is used to create an in line function.
10.	What is the use of scilab command "return"?
11.	Which is the scilab command for 2D plot?
12.	Which is the scilab command for 3D plot?
13.	Which is the scilab command to export the plot in file?
[B]	**3 – Marks Questions**
1.	Explain the scilab coded function with suitable example.
2.	Explain the restoration of scilab coded function.
3.	Explain the execution of scilab coded function.
4.	Explain inline function with suitable example.
5.	Explain the scilab command "return" with suitable example.
6.	Explain "xset" Scilab Command
7.	Explian the following scilab Commands. ▪ plot ▪ surf ▪ contour
8.	Explian the following scilab Commands. ▪ plot 3 ▪ mesh ▪ contour
[C]	**5 – Marks Questions**
1.	Explain debugging function with pause in scilab.
2.	Explain level in the call stack.
3.	Explain the following functions in Scilab: ▪ pie ▪ histplot ▪ bar ▪ barh ▪ hist3d
4.	Explain the following functions in Scilab: ▪ polarplot ▪ Matplot ▪ Sgrayplot ▪ grayplot
5.	Explain the following functions in Scilab: ▪ linspace

	▪ xlabel ▪ legend ▪ title ▪ barh
6.	Explain the following functions in Scilab: ▪ linspace ▪ feval ▪ legend ▪ title ▪ xtitle
7.	Explain 2D Ploting in scilab.
8.	Explain 3D Ploting in scilab.
9.	Discuss about different types of 3D plots with example of each.
10.	Explain Interactive Graphics Utilities under scilab.