

SVKM's NMIMS  
MUKESH PATEL SCHOOL OF TECHNOLOGY MANAGEMENT & ENGINEERING /  
SCHOOL OF TECHNOLOGY MANAGEMENT & ENGINEERING

Academic Year: 2022-23

Programme: B. Tech (CSBS)

Year: IV

Semester: VII

Subject: IT Workshop Skylab / Matlab

Date: 18 November 2022

Marks: 100

Time: 2.00 pm - 5.00 pm

Durations: 3 (Hrs)

No. of Pages: 03

**Final Examination**

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer Book, which is provided for their use.

- 1) Question No.1 is compulsory.
- 2) Out of remaining questions, attempt any 4 questions.
- 3) In all 5 questions to be attempted.
- 4) All questions carry equal marks.
- 5) Answer to each new question to be started on a fresh page.
- 6) Figures in brackets on the right hand side indicate full marks.
- 7) Assume Suitable data if necessary.

- |     |   | Marks |
|-----|---|-------|
| Q1/ | A MATLAB has a large library of Mathematical functions. Name 2 such kinds of inbuilt mathematical libraries. What do you mean by "Toolbox"? Give 4 toolboxes majorly used in MATLAB   | 5     |
|     | B Write the MATLAB command to convert $\pi/2$ radians to degree and store in a variable $\theta$ . What is the output of the relationship " $x^2 + y^2$ " when $x = r \cdot \cos(\theta)$ and $y = r \cdot \sin(\theta)$ , given that $r = 5$ , $\theta = \pi/2$ ?  | 5     |
|     | C Explain about length and size function using example.   | 5     |
|     | D What do you mean by tracing of a program? Explain with example.   | 5     |
| Q2/ | A (i) Explain the difference in command <b>round(rand*10)</b> and <b>round(rand(10))</b> ?<br>(ii) In special relativity, the Lorentz factor is a number that describes the effect of speed on various physical properties when the speed significantly relative to the speed of light. Given that the Lorentz factor, $\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$ and $c = 3 \times 10^8$ m/s. Write well commented Matlab script to create a variable $c$ and $v$ . Further create a variable <b>lorentz</b> to find the Lorentz factor. (Note- Assume $v=76$ ) | 10    |
|     | B A company is calibrating some measuring instrumentation and has measured the radius and height of one cylinder in 8 different observations; they are in vector variables $r$ and $h$ . Write well commented Matlab script to find the volume from each observation which is given by $(\pi) \cdot r^2 \cdot h$ . Also write Matlab statement to find observation number that have maximum and minimum value of volume. (Note: create a vector of random values for variable $r$ and $h$ )   | 10    |

- Q3 A Write Matlab statement as per the following instruction 10
- Generate a random real number in the range (0 , 20)
  - Generate an integer in the inclusive range from 50 to 100.
  - Create a vector [1.10 1.30 1.50 1.70] using colon operator.
  - Create a vector with 5 values linearly spaced between 3 and 15 (including 3 and 15).
  - Create a 3x3 matrix of all ones using built-in function.
- B If the lengths of two sides of a triangle and the angle between them are known, the length of the third side can be calculated. Given the lengths of two sides b and c of a triangle, and the angle between them theta in degrees, the third side a is calculated as follows: 10
- $$a^2 = b^2 + c^2 - 2bc \cos(\theta)$$
- Write a well commented Matlab script "thirdside.m" that will prompt the user and read in values for b, c, and theta [in degrees], and then calculate and print the value of a , with 3 decimal places.
- Q4 A In aerodynamics, the Mach number is a critical quantity. It is defined as the ratio of the speed of an object (e.g., an aircraft) to the speed of sound. If the Mach number is less than 1, the flow is subsonic; if the Mach number is equal to 1, the flow is transonic; and if the Mach number is greater than 1, the flow is supersonic. Write a well commented Matlab script that will prompt the user for the speed of an aircraft and the speed of sound at the aircraft's current altitude and will print whether the condition is subsonic, transonic, or supersonic. 10
- B What is Breakpoint? Explain any three commands used for debugging of MATLAB function. 10
- Q5 A (i) What would happen if you use the name of a function, **abs**, as a variable name? 10
- (ii) What will MATLAB give result of following expressions :
- 'b' >= 'c' - 1
  - 3 == 2 + 1;
  - (3 == 2) + 1
  - result = 3^2 - 20
- (B) Write a function that will receive a matrix as an input argument, and will calculate and return the overall average of all numbers in the matrix. Use loops, not built-in functions, to calculate the average. 10
- Q6 A Describe the following functions with appropriate syntax and example: 10
- xlim
  - xlabel
  - title
  - subplot
  - bar
- (B) Write a well commented Matlab function mytens that will receive two input arguments n and m and will return an nxm matrix of all tens. Do NOT use any built-in functions. 10

Q7

- A Write a well commented Matlab function that receives a vector  $x$  that have a minimum value and a maximum value as input argument and plots  $\sin(x)$  from the specified minimum to the specified maximum. 10
- B Write a well commented Matlab function "prodby2" that will receive a value of a positive integer  $n$  as input argument and will calculate and return the product of the odd integers from 1 to  $n$  [or from 1 to  $n-1$  if  $n$  is even]. 10
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