

**Enrollment No.....**  
**Faculty of Engineering**  
**End Sem (Odd) Examination Dec-2022**  
**RA3CO20 Python for Robotics Engineers**  
 Programme: B.Tech. Branch/Specialisation: RA


**Duration: 3 Hrs.****Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. Which of these is not a core data type? **1**  
 (a) Lists (b) Dictionary (c) Tuples (d) Class
- ii. What will be the output of the following Python code? **1**  
`x=['ab','cd']`  
`for i in x:`  
`i.upper()`  
`print(x)`  
 (a) ['ab', 'cd'] (b) ['AB', 'CD']  
 (c) [None, None] (d) None of these
- iii. To display histogram with well-defined edge we can write- **1**  
 (a) `df.plot(type = 'hist', edge = 'red')`  
 (b) `df.plot(type = 'hist', edgecolor = 'red')`  
 (c) `df.plot(type = 'hist', line = 'red')`  
 (d) `df.plot(type = 'hist', linecolor = 'red')`
- iv. What does the `eye()` function in the NumPy package return? **1**  
 (a) A diagonal matrix  
 (b) An identity matrix  
 (c) A symmetric matrix with only 1s and 0s  
 (d) A null matrix
- v. SciPy stands for \_\_\_\_\_. **1**  
 (a) Scientific Python (b) Science in Python  
 (c) Seconds in Python (d) None of these
- vi. SciPy is a collection of mathematical algorithms and convenience functions built on \_\_\_\_\_. **1**  
 (a) Pandas (b) Matplotlib (c) NumPy (d) All of these
- vii. Which one of the following is used to plotting Diesel cycle in Python? **1**  
 (a) Math (b) Matplotlib  
 (c) NumPy (d) All of these

- viii. In diesel cycle heat addition occurs at \_\_\_\_\_. **1**  
 (a) Reversible constant volume process  
 (b) Irreversible constant pressure process  
 (c) Irreversible constant volume process  
 (d) Reversible constant pressure process
- ix. In Newton Raphson method if the curve of  $f(x)$  is constant then- **1**  
 (a)  $f'(x)=0$  (b)  $f(x)=0$  (c)  $f''(x)=0$  (d)  $f'(x)=C$
- x. Point out the correct combination with regards to find keyword for graph plotting. **1**  
 (a) 'hist' for histogram (b) 'box' for box plot  
 (c) 'area' for area plots (d) All of these
- Q.2 i. Write down steps to be followed to install Python. **2**  
 ii. Write a program for printing a table of four. **8**  
 OR iii. Write a short note on: **8**  
 (a) While loop (b) Functions in Python
- Q.3 i. What is the utility of NumPy library? **2**  
 ii. Write a complete procedure to demonstrate an arrangement of 3X3 matrix. **8**  
 OR iii. Write a program to draw four graphs as subplot for these four functions. **8**  
 (a)  $y=2x$  (b)  $y=4x$  (c)  $y=7x^2$  (d)  $y=9x^3$
- Q.4 i. Which two libraries will be necessary to plot the locus of a point moving in projectile motion. **2**  
 ii. Write a program for plotting von-mises failure curve. **8**  
 OR iii. Write a program for plotting Shear force and Bending moment diagram for a simply supported beam having a point load at centre. **8**
- Q.5 i. Write the one-dimensional heat equation. **2**  
 ii. Write a program for plotting streamlines of fluid flow. **8**  
 OR iii. Write a program for plotting Diesel cycle analysis. **8**
- Q.6 i. Define data interpretation. **2**  
 ii. Write a program for applying Newton Raphson method. **8**  
 OR iii. Write a program for applying Linear Differential problem. **8**

## Scheme of Marking

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Note: The Paper Setter should provide the answer wise splitting of the marks in the scheme below.

Q.1	i) Which of these is not a core data type? <b>d) Class</b>	<b>1</b>
	ii) What will be the output of the following Python code? <b>a) ['ab', 'ed']</b>	<b>1</b>
	iii) To display histogram with well defined edge we can write <b>b) df.plot(type = 'hist', edgecolor = 'red')</b>	<b>1</b>
	iv) What does the eye() function in the NumPy package return? <b>b) An identity matrix</b>	<b>1</b>
	v) SciPy stands for _____. <b>a) Scientific Python</b>	<b>1</b>
	vi) SciPy is a collection of mathematical algorithms and convenience functions built on _____. <b>c) NumPy</b>	<b>1</b>
	vii) Which one of the used to plotting Diesel cycle in Python? <b>d) All of the mentioned above</b>	<b>1</b>
	viii) In diesel cycle heat addition occurs at _____. <b>d) Reversible constant pressure process</b>	<b>1</b>
	ix) In Newton Raphson method if the curve $f(x)$ is constant then <b>c) <math>f'(x)=0</math></b>	<b>1</b>
	x) Point out the correct combination with regards to kind keyword for graph plotting. <b>c) all of the above</b>	<b>1</b>
Q.2	i. All steps 2 Marks	
	ii. Program Steps 4 Marks Output 4 Marks	
OR	iii. While loop 4 Marks Functions in Python 4 Marks	

Q.3	i. Utilities of NumPy Library 2 Marks	
	ii. Program Steps 4 Marks Output 4 Marks	
OR	iii. a) Program Steps 1 Mark Output 1 Mark b) Program Steps 1 Mark Output 1 Mark c) Program Steps 1 Mark Output 1 Mark d) Program Steps 1 Mark Output 1 Mark	
Q.4	i. Each Library 1 Mark (1+1=2Marks)	
	ii. Mathematical Expression 1 Marks Program Steps 4 Marks Output 3 Marks	
OR	iii. Mathematical Expression 1 Marks Program Steps 4 Marks Output 3 Marks	
Q.5	i. Heat Equation 2 Marks	
	ii. Mathematical Expression 1 Marks Program Steps 4 Marks Output 3 Marks	
OR	iii. Mathematical Expression 1 Marks Program Steps 4 Marks Output 3 Marks	
Q.6	i. Definition 2 Marks	
	ii. Mathematical Expression 1 Marks Program Steps 4 Marks Output 3 Marks	
	iii. Mathematical Expression 1 Marks Program Steps 4 Marks Output 3 Marks	

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