

Data Visualization with Python		Semester	III
Course Code	BCS358D	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0: 0: 2: 0	SEE Marks	50
Credits	01	Exam Hours	100
Examination type (SEE)	Practical		
<b>Course objectives:</b>			
<ul style="list-style-type: none"> <li>● CLO 1. Demonstrate the use of IDLE or PyCharm IDE to create Python Applications</li> <li>● CLO 2. Using Python programming language to develop programs for solving real-world problems</li> <li>● CLO 3. Implementation of Matplotlib for drawing different Plots</li> <li>● CLO 4. Demonstrate working with Seaborn, Bokeh.</li> <li>● CLO 5. Working with Plotly for 3D, Time Series and Maps.</li> </ul>			
<b>Experiments</b>			
<b>Sl. No.</b>	<b>PART A – List of problems for which student should develop program and execute in the Laboratory</b>		
1	<p>a) Write a python program to find the best of two test average marks out of three test's marks accepted from the user.</p> <p>b) Develop a Python program to check whether a given number is palindrome or not and also count the number of occurrences of each digit in the input number.</p> <p>Datatypes: <a href="https://www.youtube.com/watch?v=gCCVsvgR2KU">https://www.youtube.com/watch?v=gCCVsvgR2KU</a> Operators: <a href="https://www.youtube.com/watch?v=v5MR5JnKcZI">https://www.youtube.com/watch?v=v5MR5JnKcZI</a> Flow Control: <a href="https://www.youtube.com/watch?v=PqFKRqpHrjw">https://www.youtube.com/watch?v=PqFKRqpHrjw</a> For loop: <a href="https://www.youtube.com/watch?v=0ZvaDa8eT5s">https://www.youtube.com/watch?v=0ZvaDa8eT5s</a> While loop: <a href="https://www.youtube.com/watch?v=HZARImviDxg">https://www.youtube.com/watch?v=HZARImviDxg</a> Exceptions: <a href="https://www.youtube.com/watch?v=6SPDvPK38tw">https://www.youtube.com/watch?v=6SPDvPK38tw</a></p>		
2	<p>a) Defined as a function F as <math>F_n = F_{n-1} + F_{n-2}</math>. Write a Python program which accepts a value for N (where <math>N &gt; 0</math>) as input and pass this value to the function. Display suitable error message if the condition for input value is not followed.</p> <p>b) Develop a python program to convert binary to decimal, octal to hexadecimal using functions.</p> <p>Functions: <a href="https://www.youtube.com/watch?v=BVfCWuca9nw">https://www.youtube.com/watch?v=BVfCWuca9nw</a>  Arguments: <a href="https://www.youtube.com/watch?v=ijXMGpoMkhQ">https://www.youtube.com/watch?v=ijXMGpoMkhQ</a>  Return value: <a href="https://www.youtube.com/watch?v=nuNXiEDnM44">https://www.youtube.com/watch?v=nuNXiEDnM44</a></p>		
3	<p>a) Write a Python program that accepts a sentence and find the number of words, digits, uppercase letters and lowercase letters.</p> <p>b) Write a Python program to find the string similarity between two given strings</p> <p><b>Sample Output:</b></p> <p>Original string:  Python Exercises  Python Exercises  Similarity between two said strings:</p> <p><b>Sample Output:</b></p> <p>Original string:  Python Exercises  Python Exercise  Similarity between two said strings:1.0  0.967741935483871</p> <p>Strings: <a href="https://www.youtube.com/watch?v=ISItwlnF0eU">https://www.youtube.com/watch?v=ISItwlnF0eU</a>  String functions: <a href="https://www.youtube.com/watch?v=9a3CxJyTq00">https://www.youtube.com/watch?v=9a3CxJyTq00</a></p>		

4	<p>a) Write a Python program to Demonstrate how to Draw a Bar Plot using Matplotlib.</p> <p>b) Write a Python program to Demonstrate how to Draw a Scatter Plot using Matplotlib.</p> <p><a href="https://www.youtube.com/watch?v=RRHQ6Fs1b8w&amp;list=PLjVLYmrlmjGcC0B_FP3bkJ-JIPkV5GuZR&amp;index=3">https://www.youtube.com/watch?v=RRHQ6Fs1b8w&amp;list=PLjVLYmrlmjGcC0B_FP3bkJ-JIPkV5GuZR&amp;index=3</a></p> <p><a href="https://www.youtube.com/watch?v=7ABCuhWO9II&amp;list=PLjVLYmrlmjGcC0B_FP3bkJ-JIPkV5GuZR&amp;index=4">https://www.youtube.com/watch?v=7ABCuhWO9II&amp;list=PLjVLYmrlmjGcC0B_FP3bkJ-JIPkV5GuZR&amp;index=4</a></p>
5	<p>a) Write a Python program to Demonstrate how to Draw a Histogram Plot using Matplotlib.</p> <p>b) Write a Python program to Demonstrate how to Draw a Pie Chart using Matplotlib.</p> <p><a href="https://www.youtube.com/watch?v=Qk7caotaQUQ&amp;list=PLjVLYmrlmjGcC0B_FP3bkJ-JIPkV5GuZR&amp;index=6">https://www.youtube.com/watch?v=Qk7caotaQUQ&amp;list=PLjVLYmrlmjGcC0B_FP3bkJ-JIPkV5GuZR&amp;index=6</a></p> <p><a href="https://www.youtube.com/watch?v=PSji21jUNO0&amp;list=PLjVLYmrlmjGcC0B_FP3bkJ-JIPkV5GuZR&amp;index=7">https://www.youtube.com/watch?v=PSji21jUNO0&amp;list=PLjVLYmrlmjGcC0B_FP3bkJ-JIPkV5GuZR&amp;index=7</a></p>
6	<p>a) Write a Python program to illustrate Linear Plotting using Matplotlib.</p> <p>b) Write a Python program to illustrate liner plotting with line formatting using Matplotlib.</p> <p><a href="https://www.youtube.com/watch?v=UO98IJO3QGI&amp;list=PL-osiE80TeTvipOqomVEeZ1HRrcEvtZB">https://www.youtube.com/watch?v=UO98IJO3QGI&amp;list=PL-osiE80TeTvipOqomVEeZ1HRrcEvtZB</a></p>
7	<p>Write a Python program which explains uses of customizing seaborn plots with Aesthetic functions.</p> <p><a href="https://www.youtube.com/watch?v=6GUZXDef2U0">https://www.youtube.com/watch?v=6GUZXDef2U0</a></p>
8	<p>Write a Python program to explain working with bokeh line graph using Annotations and Legends.</p> <p>a) Write a Python program for plotting different types of plots using Bokeh.</p> <p><a href="https://www.youtube.com/watch?v=HDvxYoRadcA">https://www.youtube.com/watch?v=HDvxYoRadcA</a></p>
9	<p>Write a Python program to draw 3D Plots using Plotly Libraries.</p> <p><a href="https://www.youtube.com/watch?v=cCck7hCanpw&amp;list=PLE50-dh6JzC4onX-gkv9H3HtPbBVA8M94&amp;index=4">https://www.youtube.com/watch?v=cCck7hCanpw&amp;list=PLE50-dh6JzC4onX-gkv9H3HtPbBVA8M94&amp;index=4</a></p>

10	<p>a) Write a Python program to draw Time Series using Plotly Libraries.</p> <p>b) Write a Python program for creating Maps using Plotly Libraries.</p> <p><a href="https://www.youtube.com/watch?v=xnJ2TnrGYik&amp;list=PLE50-dh6JzC4onX-qkv9H3HtPbBVA8M94&amp;index=5">https://www.youtube.com/watch?v=xnJ2TnrGYik&amp;list=PLE50-dh6JzC4onX-qkv9H3HtPbBVA8M94&amp;index=5</a></p> <p><a href="https://www.youtube.com/watch?v=D35m2CdMhVs&amp;list=PLE50-dh6JzC4onX-qkv9H3HtPbBVA8M94&amp;index=6">https://www.youtube.com/watch?v=D35m2CdMhVs&amp;list=PLE50-dh6JzC4onX-qkv9H3HtPbBVA8M94&amp;index=6</a></p>
<p><b>Python (Full Course):</b> <a href="https://www.youtube.com/watch?v=_uQrJ0TkZlc">https://www.youtube.com/watch?v=_uQrJ0TkZlc</a></p>	
<b>Pedagogy</b>	<p>For the above experiments the following pedagogy can be considered. Problem based learning, Active learning, MOOC, Chalk &amp;Talk</p>
<p><b>Course outcomes (Course Skill Set):</b>  At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> <li>CO 1. Demonstrate the use of IDLE or PyCharm IDE to create Python Applications</li> <li>CO 2. Use Python programming constructs to develop programs for solving real-world problems</li> <li>CO 3. Use Matplotlib for drawing different Plots</li> <li>CO 4. Demonstrate working with Seaborn, Bokeh for visualization.</li> <li>CO 5. Use Plotly for drawing Time Series and Maps.</li> </ul>	

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation (CIE):**

CIE marks for the practical course are **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

**Semester End Evaluation (SEE):**

- SEE marks for the practical course are 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
- General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

- **Weightage of marks for PART A is 80% and for PART B is 20%. General rubrics suggested to be followed for part A and part B.**
- **Change of experiment is allowed only once and Marks allotted to the procedure part to be made zero (Not allowed for Part B).**
- **The duration of SEE is 03 hours**

**Rubrics suggested in Annexure-II of Regulation book****Textbooks:**

1. Al Sweigart, "Automate the Boring Stuff with Python", 1st Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at <https://automatetheboringstuff.com/>)
2. Reema Thareja "Python Programming Using Problem Solving Approach" Oxford University Press.
3. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at <http://greenteapress.com/thinkpython2/thinkpython2.pdf>)
4. Jake VanderPlas "Python Data Science Handbook" 1<sup>st</sup> Edition, O'REILLY.