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SEMESTER S3

PROGRAMMING IN PYTHON LAB

Course Code	PCITL307	CIE Marks	50
Teaching Hours/Week (L: T:P: R)	0:0:3:0	ESE Marks	50
Credits	2	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	UCEST105: Algorithm Thinking With Python	Course Type	Lab

Course Objectives:

1. Students will be able to develop skills in text processing, advanced function handling, and exception handling.
2. Students will be able to provide hands-on experience with image processing techniques and object-oriented programming principles.

SYLLABUS

Experiment No.	Experiments
1	a) Creation of List & List Operations b) Advanced List Comprehension c) Tuple and Tuple operations d) Creation of Dictionary and Operations
2	Text Processing Sample Program a) Given an input file which contains a list of names and phone numbers separated by spaces in the following format: "Phone Number contains a 3- or 2-digit area code and a hyphen followed by an 8-digit number". Find all names having phone numbers with a 3-digit area code using regular expressions. b) Write a Python program to check the validity of a password given by the user. c) Write a Python program to validate mobile number

3	<p>Working with functions</p> <p>Sample Program:</p> <p>a) Write a program to solve a classic ancient Chinese puzzle: Get the input from the user for the number of heads (eg: 35 heads) and legs (eg: 94 legs) among the chickens and rabbits in a farm. Display the number of rabbits and chickens we have. Use the function solve(heads, legs). Hint: Use for loop to iterate all possible solutions.</p> <p>b) You are given an array A of size N. Your friend gave me an amazing task for you. Your friend likes one type of Sequence. So, he called that type of sequence a fair sequence. You should select a fair sequence of maximum length from an array. Here a fair sequence is nothing but you have to select elements in a pattern like positive element, negative element, positive element... negative element, positive element, negative element, to form a sequence. Your task is to print the maximum sum of elements possible by selecting a fair subsequence with maximum length. (Use functions).</p> <p>Ex: If array A = [-1, 18, 13, 18, 2, 16, 7, -1, -213, 11]. Here your minimum length can be 6. The fair subsequence is -1, -18, -7, -2, 7, -1, 11. The Sum is 32 which is the maximum possible. Your friend also kept a timer of 15 min. You will win, will you be able to do it?</p> <p>c) Working with Lambda function</p>
4	<p>Exception Handling and User defined exception(s)</p> <p>Sample Program:</p> <p>a) Write a python program to catch different types of exceptions</p> <p>b) Write a python program to create user defined exceptions.</p>
5	<p>File handling</p> <p>Sample Program:</p> <p>Write a Python program that manages book records using a binary file called book.dat. The program should have the following functions:</p> <ul style="list-style-type: none"> • add_record() <p>This function should prompt the user to input data for a book, including the Book Number, Book Name, Author, and Price. The data should be stored in a list format:</p>

	<p>[BookNo, Book_Name, Author, Price]. The function should then add the book data to the book.dat binary file using pickling.</p> <ul style="list-style-type: none"> ● display_records() <p>This function should display all the records stored in the book.dat file on the screen. Each record should be displayed with its corresponding attributes: Book Number, Book Name, Author, and Price.</p> <ul style="list-style-type: none"> ● books_by_author() <p>This function should ask the user to input an author's name. It should then search through the records in the book.dat file and display all the records for books written by the given author.</p> <ul style="list-style-type: none"> ● books_by_price(price) <p>This function should receive a maximum price as an argument. It should search through the records in the book.dat file and display all the records for books with a price less than the provided maximum price.</p> <ul style="list-style-type: none"> ● copy_data() <p>This function should read the contents of the book.dat file. It should copy the records of books whose price is more than \$500 to a new file named costly_book.dat using pickling. The function should return the count of records copied.</p> <ul style="list-style-type: none"> ● delete_record(book_number) <p>This function should receive book number as an argument. If a record with the given book number exists, it should be deleted from the book.dat file. If the record does not exist, display an error message.</p> <ul style="list-style-type: none"> ● update_record(book_number) <p>This function should receive a maximum price as an argument. If a record with the given book number exists, prompt the user to update the Book Name, Author, and Price for that record. If the record does not exist, display an error message.</p> <p>In the program, include a menu-based interface that allows users to choose which function to execute.</p>
6	<p>Working with data (Use of user- defined/ Built-in modules)</p> <p>Sample Program:</p> <p>a) Querying an SQL light database- insert, update, select, delete</p>

	b) Comparing data in a .CSV file and write to a new .CSV file.
7	Working with data (Use of user- defined/ Built-in modules): Getting data from Web, JSON Sample Program: a) Scrap HTML content from a page and pass the code with beautiful soup. b) Serializing/ Deserializing JSON – Access and work with data stored as JSON
8	Image Processing Sample Program: a) Reading, Saving and displaying an image using OpenCV-PyPI, matplotlib
9	Advanced Image processing Sample Program: a) Image statistics cropping, b) Converting images from RGB to Gray and Resizing the image c) Skin color detection
10	Basic Object-Oriented Sample Program: a) Write a Python class named Person with attributes name, age, weight (kgs), height (ft) and takes them through the constructor and exposes a method get_bmi_result() which returns one of "underweight", "healthy", "obese". b) Write a python program to demonstrate operator overloading.
11	Advanced Object-Oriented Sample Program: a) Write a python program to demonstrate various kinds of inheritance b) Write a python program to create abstract classes and abstract methods
12	Implement a micro project using any of the Python concepts described in experiments 1-11. For Projects, Students may be grouped with maximum of 4 persons. Evaluation shall be done on demonstration and presentation of project for maximum 10 minutes.

	Example: Creating a snake and ladder game, PageRank Algorithm implementation etc.
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Course Assessment Method
(CIE: 50 marks, ESE: 50 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Preparation/Pre-Lab Work experiments, Viva and Timely completion of Lab Reports / Record (Continuous Assessment)	Internal Examination	Total
5	25	20	50

End Semester Examination Marks (ESE):

Procedure/ Preparatory work/Design/ Algorithm	Conduct of experiment/ Execution of work/ troubleshooting/ Programming	Result with valid inference/ Quality of Output	Viva voce	Record	Total
10	15	10	10	5	50

- **Submission of Record:** Students shall be allowed for the end semester examination only upon submitting the duly certified record.
- **Endorsement by External Examiner:** The external examiner shall endorse the record

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Apply advanced list comprehensions, tuples, and dictionaries for efficient data manipulation and develop text processing scripts, including functions with advanced argument handling and lambda functions.	K3
CO2	Implement robust programs using exception handling and user-defined exceptions.	K3
CO3	Implement file operations, work with relational databases, CSV, and web-based data sources effectively.	K3
CO4	Perform basic and advanced image processing using libraries such as OpenCV and matplotlib, and demonstrate basic and advanced object-oriented programming concepts.	K3

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	3	-	-	--	-	-	3	3	-	2
CO2	3	-	3	-	-	-	-	-	3	3	-	2
CO3	3	-	3	-	-	-	-	-	3	3	-	2
CO4	3	-	3	2	3	-	-	-	3	3	-	2

Note: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

Text Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	How to think like a Computer Scientist- Learning with Python	Allen Downey, Jeffrey Elkner, Chris Meyers	Green Tea Press	1 st edition, 2002
2	Learning Python: Powerful Object-Oriented Programming	Mark Lutz	O'Reilly Media Inc.	5 th edition, 2013

Reference Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Problem Solving and PYTHON Programming	S.A.Kulkarni	Yes Dee Publishing Pvt Ltd	2 nd edition, 2008
2	Programming in Python 3: A Complete Introduction to the Python Language	Mark Summerfield	Pearson Education	2 nd edition, 2018
3	Fundamentals of Python	Kenneth A. Lambert, B. L. Juneja	Cengage Learning India Pvt. Ltd.	1 st edition, 2015
4	Let Us Python	Yashavant Kanetkar, Aditya Kanetkar	BPB Publications	1 st edition, 2019

Video Links (NPTEL, SWAYAM...)	
Link No.	Link ID
1	https://onlinecourses.nptel.ac.in/noc19_cs40/preview
2	www.https://realpython.com/
3	https://onlinecourses.nptel.ac.in/noc24_cs113/preview
4	https://docs.python.org/3/reference/

Continuous Assessment (25 Marks):

1. Preparation and Pre-Lab Work (7 Marks)

- Pre-Lab Assignments: Assessment of pre-lab assignments or quizzes that test understanding of the upcoming experiment.
- Understanding of Theory: Evaluation based on students' preparation and understanding of the theoretical background related to the experiments.

2. Conduct of Experiments (7 Marks)

- Procedure and Execution: Adherence to correct procedures, accurate execution of experiments, and following safety protocols.
- Skill Proficiency: Proficiency in handling equipment, accuracy in observations, and troubleshooting skills during the experiments.
- Teamwork: Collaboration and participation in group experiments.

3. Lab Reports and Record Keeping (6 Marks)

- Quality of Reports: Clarity, completeness and accuracy of lab reports. Proper documentation of experiments, data analysis and conclusions.
- Timely Submission: Adhering to deadlines for submitting lab reports/rough record and maintaining a well-organized fair record.

4. Viva Voce (5 Marks)

- Oral Examination: Ability to explain the experiment, results and underlying principles during a viva voce session.

Final Marks Averaging: The final marks for preparation, conduct of experiments, viva, and record are the average of all the specified experiments in the syllabus.

Evaluation Pattern for End Semester Examination (50 Marks):

1. Procedure/Preliminary Work/Design/Algorithm (10 Marks)

- Procedure Understanding and Description: Clarity in explaining the procedure and understanding each step involved.
- Preliminary Work and Planning: Thoroughness in planning and organizing materials/equipment.
- Algorithm Development: Correctness and efficiency of the algorithm related to the experiment.
- Creativity and logic in algorithm or experimental design.

2. Conduct of Experiment/Execution of Work/Programming (15 Marks)

- Setup and Execution: Proper setup and accurate execution of the experiment or programming task.

3. Result with Valid Inference/Quality of Output (10 Marks)

- Accuracy of Results: Precision and correctness of the obtained results.
- Analysis and Interpretation: Validity of inferences drawn from the experiment or quality of program output.

4. Viva Voce (10 Marks)

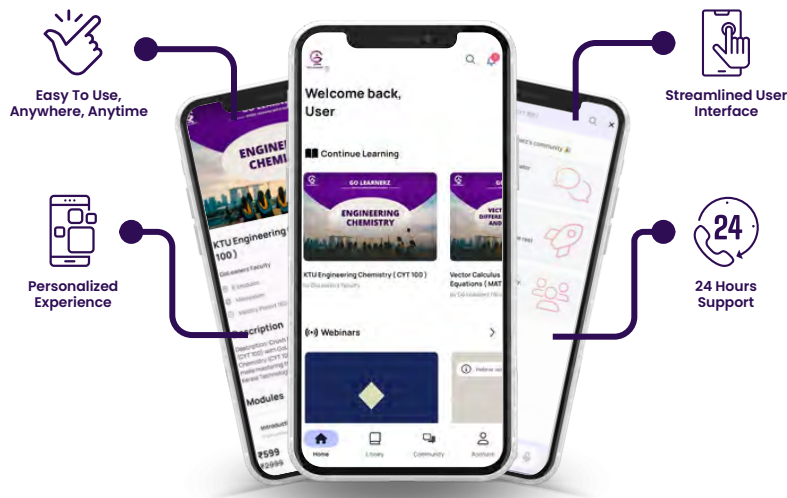
- Ability to explain the experiment, procedure results and answer related question.
- Proficiency in answering questions related to theoretical and practical aspects of the subject.

5. Record (5 Marks)

- Completeness, clarity, and accuracy of the lab record submitted



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