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| **P.V.P SIDDHARTHA INSTITUTE OF TECHNOLOGY** |
| **BRANCH: Common to All Branches** | **REGULATION: PVP23** |
| **Course: B. Tech** | **SUBJECT: ADVANCED PYTHON PROGRAMMING** |
| **Subject Code:** 23CS6421 | **Year and Semester: II Year-II Sem** |
| **QUESTION BANK**  |

**UNIT I**

**Short Answer Questions (2 Marks Each)**

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| **Q. NO.** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | Define functional programming and its significance in Python. | CO1 | L2 | 2M |
| 2 | Illustrate the difference between map(), filter(). | CO1 | L2 | 2M |
| 3 | Explain the importance of generators and iterators in Python. | CO1 | L2 | 2M |
| 4 | Compare JSON and XML in terms of data storage and structure. | CO1 | L2 | 2M |
| 5 | Explain the working of regular expressions in Python with an example. | CO1 | L2 | 2M |
| 6 | Explain the difference between list and tuple with a suitable example. | CO1 | L2 | 2M |
| 7 | Describe list comprehensions and their advantages. | CO1 | L2 | 2M |
| 8 | Explain lambda functions with a simple example. | CO1 | L2 | 2M |
| 9 | Define Python iterators with a suitable example. | CO1 | L2 | 2M |
| 10 | Define decorators and their use in Python. | CO1 | L2 | 2M |

**Long Answer Questions (10 Marks Each)**

**(Can have Sub Questions also)**

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| **Q. NO.** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | (a)Explain functional programming concepts in Python. | CO2 | L2 | 5M |
| (b) Develop a Python program using map(), filter(), and reduce() functions. | CO2 | L3 | 5M |
| 2 | (a) Explain different types of functions in Python with examples. | CO2 | L2 | 5M |
| (b) Develop a Python script to find the Fibonacci series in a given range using recursion. | CO2 | L3 | 5M |
| 3 | (a)Explain various methods in regular expression with suitable examples | CO2 | L2 | 5M |
| (b) Build a program to validate phone numbers using regular expressions. | CO2 | L3 | 5M |

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| 4 | (a) Describe file handling in JSON . | CO2 |  L2 | 5M |
| (b) Develop a Python program to convert a Dictionary to a JSON object. | CO2 | L3 | 5M |
| 5 | (a) Identify the differences between list comprehension and traditional looping techniques in Python. | CO2 | L3 | 5M |
| (b) Develop a Python program to generate a list of squares of numbers from 1 to 10 using list comprehension. | CO2 | L3 | 5M |
| 6 | (a) Analyze the role of higher-order functions? | CO2 | L3 | 5M |
| (b) Build a Python program where a function takes another function as input | CO2 | L3 | 5M |
| 7 | (a) Explain JSON Methods with suitable examples. | CO2 |    L2 |  5M |
| (b) Develop a program to save data into a JSON file, read it back, and modify it. | CO2 | L3 | 5M |
| 8 | Develop a program to extract all phone numbers from a given text string. A valid phone number should be in the format (XXX) XXX-XXXX. Given the input: "Call me at (123) 456-7890 or (987) 654-3210.", output the extracted phone numbers.* Input: "Call me at (123) 456-7890 or (987) 654-3210."
	+ Output: "Extracted phone numbers: (123) 456-7890, (987) 654-3210"
* Input: "My number is 123-456-7890 and my office number is (987) 654-3210."
	+ Output: "Extracted phone numbers: (987) 654-3210"
 | CO2 |  L3 |  10M |
| 9 | (a) Explain XML Methods with suitable examples. | CO2 | L2 | 5M |
| (b) Develop a program to save data into a JSON file, read it back, and modify it. | CO2 | L3 | 5M |
| 10 | (a) Illustrate lazy evaluation in Python ? | CO2 | L2 |  5M |
| (b) Build a Python program using generators to implement lazy evaluation. | CO2 | L3 |  5M |

 **UNIT II**

**Short Answer Questions (2 Marks Each)**

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| **Q. NO.** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | Define NumPy arrays? How do they differ from Python lists? | CO1 | L2 | 2M |
| 2 | Explain different ways to create NumPy arrays with examples. | CO1 | L2 | 2M |
| 3 | Describe datatypes in NumPy. | CO1 | L2 | 2M |
| 4 | Explain universal functions (ufuncs) in NumPy? | CO1 | L2 | 2M |
| 5 | Explain array slicing and indexing in NumPy. | CO1 | L2 | 2M |
| 6 | Differentiate between structured and unstructured NumPy arrays. | CO1 | L2 | 2M |
| 7 | Illustrate use of NumPy’s `astype()` function? | CO1 | L2 | 2M |
| 8 | Explain the difference between one-dimensional and two-dimensional arrays. | CO1 | L2 | 2M |
| 9 | Describe how to perform matrix multiplication in NumPy. | CO1 | L2 | 2M |
| 10 | Explain NumPy’s file input and output operations. | CO1 | L2 | 2M |

**Long Answer Questions (10 Marks Each)**

**(Can have Sub Questions also)**

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| **Q. NO.** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | (a) Define how to create a NumPy ndarray | CO3 | L2 | 5M |
| (b) Build a method to check the shape of a NumPy ndarray. | CO3 | L3 | 5M |
| 2 | (a) Develop an example to assign a datatype to a NumPy array. | CO3 | L3 | 5M |
| (b) Build a method to change the datatype of an existing ndarray. | CO3 | L3 | 5M |
| 3 | (a) Define how to index a NumPy array. | CO3 | L2 | 5M |
| (b) Build an example using slicing to extract elements from a NumPy array | CO3 | L3 | 5M |
| 4 | (a) Develop an example of using a universal function (ufunc) in NumPy. | CO3 | L3 | 5M |
| (b) Define how to perform element-wise multiplication using ufuncs. | CO3 | L2 | 5M |
| 5 | (a) Develop a simple example of array-oriented programming with NumPy. | CO3 | L3 | 5M |
| (b) Build a method to apply a mathematical operation across an entire array. | CO3 | L3 | 5M |
| 6 | (a) Define how to read an array from a file in NumPy | CO3 | L2 | 5M |
| (b) Develop a Python Program to save a NumPy array to a file. | CO3 | L3 | 5M |
| 7 | (a) Develop a Programe to perform matrix multiplication using NumPy. | CO3 | L3 | 5M |
| (b) Develop a method to transpose a NumPy array. | CO3 | L3 | 5M |
| 8 | Illustrate arithmetic operations in matrices using NumPy arrays and generate a program for matrix addition and matrix subtraction | CO3 | L2 |  10M |
| 9 | (a) Identify the role of NumPy structured arrays. | CO3 | L3 | 5M |
| (b) Build a Python script to store and retrieve structured records. | CO3 | L3 | 5M |
| 10 | (a) Illustrate the concept of masked arrays in NumPy. | CO3 | L2 | 5M |
| (b) Develop a Python program that replaces all negative values with zero. | CO3 | L3 | 5M |

**UNIT III**

**Short Answer Questions (2 Marks Each)**

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| **Q. NO.** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | Outline the key data structures in Pandas? | CO1 | L2 | 2M |
| 2 | Explain different types of indexing in Pandas. | CO1 | L2 | 2M |
| 3 | Explain data cleaning in Pandas? | CO1 | L2 | 2M |
| 4 | Illustrate the difference between merge (), concat (), and join () in Pandas. | CO1 | L2 | 2M |
| 5 | Explain pivot tables in Pandas. | CO1 | L2 | 2M |
| 6 | Describe Pandas DataFrame methods for handling missing values. | CO1 | L2 | 2M |
| 7 | How do you read a CSV file into a Pandas DataFrame? | CO1 | L2 | 2M |
| 8 | Explain how to filter rows in a Pandas DataFrame based on a condition. | CO1 | L2 | 2M |
| 9 | Define the use of `group by () ` in Pandas? | CO1 | L2 | 2M |
| 10 | Differentiate between loc and iloc in Pandas. | CO1 | L2 | 2M |

**Long Answer Questions (10 Marks Each)**

**(Can have Sub Questions also)**

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| **Q. NO.** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | (a) Explain the different types of indexing available in Pandas. | CO3 | L2 | 5M |
| (b) Develop a Python program to filter and retrieve rows from a Pandas DataFrame containing missing values. | CO3 | L3 | 5M |
| 2 | (a) Compare merge(), concat(), and join() functions in Pandas with examples. | CO3 | L3 | 5M |
| (b) Build a Python program to create a pivot table and analyze sales data. | CO3 | L3 | 5M |
| 3 | (a) Illustrate Pandas DataFrame operations such as sorting and filtering. | CO3 | L2 | 5M |
| (b) Develop a Python script to find the top 5 most occurring values in a column using `value counts ()`. | CO3 | L3 | 5M |
| 4 | (a) Explain Pandas data wrangling techniques. | CO3 | L2 | 5M |
| (b) Develop a Python program to clean and preprocess a dataset. | CO3 | L3 | 5M |
| 5 | (a) Demonstrate how to visualize data using Pandas and Matplotlib. | CO3 | L2 | 5M |
| (b) Develop a program to generate a line plot of a dataset using Pandas. | CO3 | L3 | 5M |
| 6 | (a) Explain the significance of MultiIndex in Pandas. | CO3 | L2 | 5M |
| (b) Develop a Python program to create and access a MultiIndex DataFrame. | CO3 | L3 | 5M |
| 7 | (a) Describe the process of reshaping data using stack and unstack. | CO3 | L2 | 5M |
| (b) Build a Python script to reshape a DataFrame using these methods. | CO3 | L3 | 5M |
| 8 | (a) Illustrate the importance of categorical data handling in Pandas. | CO3 | L2 | 5M |
| (b) Develop a Python program to convert categorical data into numerical values. | CO3 | L3 | 5M |
| 9 | (a) Explain how to merge and concatenate Data Frames efficiently. | CO3 | L2 | 5M |
| (b) Develop a Python script demonstrating different merging techniques. | CO3 | L3 | 5M |
| 10 | (a) Describe how to perform mean, average, mode statistics on the dataset using Pandas | CO3 | L2 | 5M |
| (b) Build a Python program to calculate the average of a dataset. | CO3 | L3 | 5M |

**UNIT IV**

**Short Answer Questions (2 Marks Each)**

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| **Q. NO.** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | Define multithreading in Python? | CO1 | L2 | 2M |
| 2 | Explain the role of Global Interpreter Lock (GIL) in Python multithreading. | CO1 | L2 | 2M |
| 3 | Differentiate between TCP and UDP. | CO1 | L2 | 2M |
| 4 |  Define daemon threads in Python? | CO1 | L2 | 2M |
| 5 | Explain thread synchronization with an example. | CO1 | L2 | 2M |
| 6 | Define socket programming in Python? | CO1 | L2 | 2M |
| 7 | Explain the purpose of the threading module in Python. | CO1 | L2 | 2M |
| 8 | Compare the difference between synchronous and asynchronous programming? | CO1 | L2 | 2M |
| 9 | How do you create a simple client-server application using sockets? | CO1 | L2 | 2M |
| 10 | Explain the concept of deadlocks in multithreading. | CO1 | L2 | 2M |

**Long Answer Questions (10 Marks Each)**

**(Can have Sub Questions also)**

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| **Q. NO.** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | (a) Explain the impact of the Global Interpreter Lock (GIL) on Python multithreading. | CO4 | L2 | 5M |
| (b) Develop a Python program to implement a producer-consumer model using threading and synchronization. | CO4 | L3 | 5M |
| 2 | (a) Compare synchronous and asynchronous socket programming in Python. | CO4 | L2 | 5M |
| (b) Develop a Python program to implement a simple multi-client chat server using TCP sockets. | CO4 | L3 | 5M |
| 3 | (a) Illustrate how Python handles thread safety. | CO4 | L2 | 5M |
| (b) Build a Python script demonstrating the use of threading. Lock. | CO4 | L3 | 5M |
| 4 | (a) Explain how sockets facilitate network communication. | CO4 | L2 | 5M |
| (b) Build a Python program to send messages between a client and server using UDP. | CO4 | L3 | 5M |
| 5 | (a) Describe the concept of multithreading in Python with an example. | CO1 | L2 | 5M |
| (b) Develop a Python program to demonstrate multithreading using the threading module. | CO4 | L3 | 5M |
| 6 | (a) Explain the purpose of the threading barrier in Python. | CO1 | L2 | 5M |
| (b) Develop a Python program demonstrating the use of a threading barrier. | CO4 | L3 | 5M |
| 7 | (a) Explain how to detect and resolve deadlocks in threading. | CO4 | L2 | 5M |
| (b)Develop a Python program demonstrating deadlock prevention. | CO4 | L3 | 5M |
| 8 | (a) Explain the purpose of the threading barrier in Python. | CO4 | L2 | 5M |
| (b) Develop a Python program demonstrating the use of a threading barrier. | CO4 | L3 | 5M |
| 9 | Create a basic Python program to establish a connection between a client and server using TCP and UDP | CO4 | L3 | 10M |
| 10 | Build a Program to demonstrate the use of threading and synchronization with a shared resource. | CO4 | L3 | 10M |

**UNIT V**

**Short Answer Questions (2 Marks Each)**

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| **Q. NO.** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | Define the role of Tensors in TensorFlow? | CO1 | L2 | 2M |
| 2 | Explain different data types in TensorFlow. | CO1 | L2 | 2M |
| 3 | Explain eager execution mode in TensorFlow? | CO1 | L2 | 2M |
| 4 | Differentiate between the Sequential API and Functional API in Keras. | CO1 | L2 | 2M |
| 5 | Illustrate activation functions in deep learning? | CO1 | L2 | 2M |
| 6 | Explain how to load and save models in TensorFlow. | CO1 | L2 | 2M |
| 7 | Analyze backpropagation in neural networks? | CO1 | L2 | 2M |
| 8 | Describe the purpose of optimizers in TensorFlow. | CO1 | L2 | 2M |
| 9 | Explain the concept of overfitting and how to prevent it. | CO1 | L2 | 2M |
| 10 | Contrast the key differences between TensorFlow and PyTorch? | CO1 | L2 | 2M |

**Long Answer Questions (10 Marks Each)**

**(Can have Sub Questions also)**

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| **Q. NO.** | **QUESTION** | **CO** | **LEVEL** | **MARKS** |
| 1 | (a) Explain the structure of a computational graph in TensorFlow. | CO5 | L2 | 5M |
| (b) List the normalization and standardization techniques to apply feature scaling in TensorFlow  | CO5 | L4 | 5M |
| 2 | (a) Compare and contrast the difference between the Sequential API and Functional API in Keras. | CO5 | L2 | 5M |
| (b) Analyze the steps involved in creating, training, evaluating, saving, and reloading a Keras model using TensorFlow. Identify the key components in each stage and how they interact to form a complete workflow. | CO5 | L4 | 5M |
| 3 | (a) Describe the steps involved in training a deep learning model using Keras. | CO5 | L2 | 5M |
| (b) Analyze the process of defining and training a neural network using the Sequential API in Python. | CO5 | L4 | 5M |
| 4 | (a) Explain the concept of loss functions and optimizers in deep learning. | CO5 | L2 | 5M |
| (b) Analyze the process of visualizing loss and accuracy graphs during model training using Matplotlib in Python. | CO5 | L4 | 5M |
| 5 | (a) Illustrate how to perform image classification using a pre-trained TensorFlow model. | CO5 | L2 | 5M |
| (b) Examine the process of classifying images using MobileNetV2 in TensorFlow.. | CO5 | L4 | 5M |
| 6 | (a) Explain how TensorFlow handles distributed training. | CO5 | L2 | 5M |
| (b) Examine the process of multi-GPU training in TensorFlow | CO5 | L4 | 5M |
| 7 | (a) Describe how to visualize neural networks using TensorBoard. | CO5 | L2 | 5M |
| (b) Assess the process of logging and displaying model performance in Python | CO5 | L4 | 5M |
| 8 | (a) Illustrate the effect of different optimizers in training models. | CO5 | L2 | 5M |
| (b) Compare the performance of SGD and Adam optimizers in Python. | CO5 | L4 | 5M |
| 9 | (a) Explain how to fine-tune a pre-trained deep learning model. | CO5 | L2 | 5M |
| (b) Investigate the process of using transfer learning with MobileNet in Python | CO5 | L4 | 5M |
| 10 | (a) Describe how to deploy a trained TensorFlow model. | CO5 | L2 | 5M |
| (b) Explore the process of converting a model to TensorFlow Lite for mobile deployment in Python | CO5 | L4 | 5M |

**Course Coordinator Module Coordinator HOD**