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| P.V.P SIDDHARTHA INSTITUTE OF TECHNOLOGY |
| BRANCH: Computer Science & Engineering |
| REGULATION: PVP23 |
| Course: B. Tech |
| SUBJECT: ADVANCED PYTHON PROGRAMMING |
| Subject Code: 20CS6421/20CS6521 |
| Year and Semester: II B. Tech – II Sem |

# QUESTION BANK

## UNIT I - Functional Programming & Regular Expressions

### 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(). | CO2 | L2 | 2M |
| 3 | Explain the importance of generators and iterators in Python. | CO2 | L2 | 2M |
| 4 | Compare JSON and XML in terms of data storage and structure. | CO2 | L2 | 2M |
| 5 | Explain the working of regular expressions in Python with an example. | CO2 | L2 | 2M |
| 6 | Explain the difference between list and tuple with a suitable example. | CO2 | L2 | 2M |
| 7 | Describe list comprehensions and their advantages. | CO1 | L2 | 2M |
| 8 | Explain lambda functions with a simple example. | CO2 | L2 | 2M |
| 9 | Define Python iterators with a suitable example. | CO1 | L2 | 2M |
| 10 | Define decorators and their use in Python. | CO2 | L2 | 2M |

### Long Answer Questions (10 Marks Each)

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| Q. NO. | QUESTION | CO | LEVEL | MARKS |
| 1 | (a) Explain functional programming concepts in Python. (b) Develop a Python program using map(), filter(), and reduce() functions. | CO2 | L3 | 10M |
| 2 | (a)Analyze various methods in regular expression with suitable examples. (b) Build a program to validate phone numbers using regular expressions. | CO2 | L3 | 10M |
| 3 | (a) Explain different types of functions in Python with examples. (b) Develop a Python script to find Fibonacci series in a given range using recursion. | CO2 | L3 | 10M |
| 4 | (a) Describe file handling in JSON. (b) Develop a Python program to convert a Dictionary to a JSON object. | CO2 | L3 | 10M |
| 5 | (a) Compare list comprehension with traditional looping techniques in Python. (b) Develop a Python program to generate a list of squares of numbers from 1 to 10 using list comprehension. | CO1 | L3 | 10M |
| 6 | (a) Analyze the role of higher-order functions? (b) Create a Python program where a function takes another function as input. | CO2 | L3 | 10M |
| 7 | (a) Explain JSON Methods with suitable examples.  (b) Develop a program to save data into a JSON file, read it back, and modify it. | CO2 | L3 | 10M |
| 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.  (b) Develop a program to save data into a JSON file, read it back, and modify it. | CO2 | L3 | 10M |
| 10 | (a) Illustrate lazy evaluation in Python. (b) Build a Python program using generators to implement lazy evaluation. | CO2 | L3 | 10M |

## UNIT II - NumPy & Array Operations

### 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? | CO3 | L2 | 2M |
| 2 | Explain different ways to create NumPy arrays with examples. | CO3 | L2 | 2M |
| 3 | Describe datatypes in NumPy. | CO3 | L2 | 2M |
| 4 | Explain universal functions (ufuncs) in NumPy? | CO3 | L2 | 2M |
| 5 | Explain array slicing and indexing in NumPy. | CO3 | L2 | 2M |
| 6 | Differentiate between structured and unstructured NumPy arrays. | CO3 | L2 | 2M |
| 7 | Illustrate use of NumPy’s `astype()` function? | CO3 | L2 | 2M |
| 8 | Explain the difference between one-dimensional and two-dimensional arrays. | CO3 | L2 | 2M |
| 9 | Describe how to perform matrix multiplication in NumPy. | CO3 | L2 | 2M |
| 10 | Explain NumPy’s file input and output operations. | CO3 | L2 | 2M |

### Long Answer Questions (10 Marks Each)

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

## UNIT III - Pandas & Data Wrangling

### Short Answer Questions (2 Marks Each)

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| Q. NO. | QUESTION | CO | LEVEL | MARKS |
| 1 | Outline the key data structures in Pandas? | CO3 | L2 | 2M |
| 2 | Explain different types of indexing in Pandas. | CO3 | L2 | 2M |
| 3 | Explain data cleaning in Pandas? | CO3 | L2 | 2M |
| 4 | Illustrate the difference between merge(), concat(), and join() in Pandas. | CO3 | L2 | 2M |
| 5 | Explain pivot tables in Pandas. | CO3 | L2 | 2M |
| 6 | Describe Pandas DataFrame methods for handling missing values. | CO3 | L2 | 2M |
| 7 | How do you read a CSV file into a Pandas DataFrame? | CO3 | L2 | 2M |
| 8 | Explain how to filter rows in a Pandas DataFrame based on a condition. | CO3 | L2 | 2M |
| 9 | Define the use of `group by()` in Pandas? | CO3 | L2 | 2M |
| 10 | Differentiate between loc and iloc in Pandas. | CO3 | L2 | 2M |

### Long Answer Questions (10 Marks Each)

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

## UNIT IV - Multithreading & Networking

### Short Answer Questions (2 Marks Each)

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| Q. NO. | QUESTION | CO | LEVEL | MARKS |
| 1 | Define multithreading in Python? | CO4 | L2 | 2M |
| 2 | Explain the role of Global Interpreter Lock (GIL) in Python multithreading. | CO4 | L2 | 2M |
| 3 | Differentiate between TCP and UDP. | CO4 | L2 | 2M |
| 4 | Define daemon threads in Python? | CO4 | L2 | 2M |
| 5 | Explain thread synchronization with an example. | CO4 | L2 | 2M |
| 6 | Define socket programming in Python? | CO4 | L2 | 2M |
| 7 | Explain the purpose of the threading module in Python. | CO4 | L2 | 2M |
| 8 | Compare the difference between synchronous and asynchronous programming? | CO4 | L2 | 2M |
| 9 | How do you create a simple client-server application using sockets? | CO4 | L2 | 2M |
| 10 | Explain the concept of deadlocks in multithreading. | CO4 | L2 | 2M |

### Long Answer Questions (10 Marks Each)

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

## UNIT V - Machine Learning Libraries: TensorFlow & Keras

### Short Answer Questions (2 Marks Each)

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| Q. NO. | QUESTION | CO | LEVEL | MARKS |
| 1 | Define the role of Tensors in TensorFlow? | CO5 | L2 | 2M |
| 2 | Explain different data types in TensorFlow. | CO5 | L2 | 2M |
| 3 | Explain eager execution mode in TensorFlow? | CO5 | L2 | 2M |
| 4 | Differentiate between the Sequential API and Functional API in Keras. | CO5 | L2 | 2M |
| 5 | Illustrate activation functions in deep learning? | CO5 | L2 | 2M |
| 6 | Explain how to load and save models in TensorFlow. | CO5 | L2 | 2M |
| 7 | Analyze backpropagation in neural networks? | CO5 | L2 | 2M |
| 8 | Describe the purpose of optimizers in TensorFlow. | CO5 | L2 | 2M |
| 9 | Explain the concept of overfitting and how to prevent it. | CO5 | L2 | 2M |
| 10 | Contrast the key differences between TensorFlow and PyTorch? | CO5 | L2 | 2M |

### Long Answer Questions (10 Marks Each)

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| --- | --- | --- | --- | --- |
| Q. NO. | QUESTION | CO | LEVEL | MARKS |
| 1 | (a) Explain the structure of a computational graph in TensorFlow. (b) Develop a Python program to apply feature scaling using Min-Max normalization and standardization in TensorFlow. | CO5 | L3 | 10M |
| 2 | (a) Outline the difference between the Sequential API and Functional API in Keras. (b) Create a Python script to create, train, evaluate, save, and reload a Keras model using TensorFlow. | CO5 | L3 | 10M |
| 3 | (a) Describe the steps involved in training a deep learning model using Keras. (b) Develop a Python program to define a neural network using the Sequential API and train it on sample data. | CO5 | L3 | 10M |
| 4 | (a) Explain the concept of loss functions and optimizers in deep learning. (b) Build a Python program to visualize loss and accuracy graphs using Matplotlib during model training. | CO5 | L3 | 10M |
| 5 | (a) Illustrate how to perform image classification using a pre-trained TensorFlow model. (b) Create a Python script to classify images using MobileNetV2 in TensorFlow. | CO5 | L3 | 10M |
| 6 | (a) Explain how TensorFlow handles distributed training. (b) Write a Python script demonstrating multi-GPU training in TensorFlow. | CO5 | L3 | 10M |
| 7 | (a) Describe how to visualize neural networks using TensorBoard. (b) Write a Python script to log and display model performance. | CO5 | L3 | 10M |
| 8 | (a) Illustrate the effect of different optimizers in training models. (b) Write a Python script comparing SGD and Adam optimizers. | CO5 | L3 | 10M |
| 9 | (a) Explain how to fine-tune a pre-trained deep learning model. (b) Write a Python script using transfer learning with MobileNet. | CO5 | L3 | 10M |
| 10 | (a) Describe how to deploy a trained TensorFlow model. (b) Write a Python script to convert a model to TensorFlow Lite for mobile deployment. | CO5 | L3 | 10M |