



End (Odd) Semester Theory Examination November 2025

Roll no.....

Name of the Program and semester: B.Tech CSE, III Sem.

Name of the Course: Python Programming

Course Code: TCS 346

Time: 3 hours

Maximum Marks: 100

Note:

- (i) All the questions are compulsory.
- (ii) Answer any two sub questions from a, b and c in each main question.
- (iii) Total marks for each question are 20 (twenty).
- (iv) Each sub-question carries 10 marks.

Q1.

(2X10=20 Marks)

- a. Create a Python module named mathops.py containing functions for:

isprime() - which can check whether given number is prime or not.
generate_fib() - for generating Fibonacci series

Import this module in another Python file and call all functions. Also include exception handling for invalid inputs. (CO2)

- b. Explain different types of function parameters (positional, keyword, default, variable-length) with examples. Also describe the concept of return values. (CO2)
- c. i) Explain different primitive data-types supported in Python.
ii) Write a Python program that reads a sentence from the user and performs the following operations:
 - Count the number of vowels
 - Count digits and special characters
 - Convert sentence into title case

(CO1)

Q2.

(2X10=20 Marks)

- a. Explain lists, tuples, and dictionaries in Python with suitable examples. Compare their mutability, performance, and common use cases. Also, provide two built-in methods for each data type. (CO3)
- b. Write a program to read a text file and:
 - (i) Count the frequency of each word and store them using a dictionary.
 - (ii) Write the result to another text file

Also explain file handling functions such as open, read, write and close. (CO3)



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c. Write a Python program that:

- a) Takes a list of integers from the user
- b) Removes duplicates
- c) Sorts the list in descending order
- d) Prints even and odd numbers in separate lists

(CO3)

Q3.

(2X10=20 Marks)

- a. Explain encapsulation in Python. How are private and public members declared and accessed? Write a suitable example demonstrating accessibility of private attributes. (CO4)
- b. Create a program for a vehicle rental company. Implement a base class *Vehicle* with attributes:
 - *brand* – Name of the vehicle company
 - *model* – Model name
 - *rent_per_day* – Base rental cost per day

Define a method *calculate_rent(days)* that returns the rental amount for the given number of days.

Create subclasses *Car* and *Truck*, each overriding *calculate_rent(days)* to apply different pricing formulas as follows:

1. Cars have an additional insurance charge of ₹300 per day.
2. Trucks include a load tax of ₹500 per day.

Demonstrate polymorphism by calling *calculate_rent()* using different vehicle objects. (CO4)

c. A bank wants to create a program to manage different customer accounts using inheritance.

Base Class – *Account*

Attributes: *account_number*, *holder_name*, *balance*

Methods:

deposit(amount) – Add money to the account

withdraw(amount) – Deduct money if balance is sufficient

show_balance() – Display current account balance

Derived Class – *SavingsAccount*

Additional Attribute: *interest_rate*

Method:

add_interest() – Calculate interest using *interest_rate* and add it to the balance

Write a Python program that:

- (i) Creates an object of *SavingsAccount*.
- (ii) Performs deposit and withdrawal operations.



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- (iii) Adds interest using the method in SavingsAccount.
- (iv) Displays the updated balance after each operation. (CO4)

Q4.

(2X10=20 Marks)

a. Using NumPy, develop a python program that:

- (i) Creates a 2-D array
- (ii) Prints its shape, size and dimension
- (iii) Performs slicing
- (iv) Computes row-wise and column-wise sum and mean.
- (v) Reshapes the array into a 1-D array (CO5)

b. Write Python program using Pandas to:

- (i) Create a dataset have details of four employees with columns EmployeeID, Department and Salary.
- (ii) Find the total number of employees.
- (iii) Find the average salary of employees in each department.
- (iv) Merge this DataFrame with another DataFrame containing EmployeeID and PerformanceScore.

(CO5)

c. Predict output of the code snippets given below.

(i)
nums = [5, 4, 9]
nums.append([-1, -2])
nums.extend([8, 0])
print(nums)

(ii)
data = (50, 60, 70, 80, 90, 100)
print(data[1:4])
print(data[-5:-2])
print(data[::-2])

(iii)
import numpy as np
arr = np.array([5, 15, 25, 35, 45])
print(arr * 2)
print(arr[2:5])

(iv)
import pandas as pd
df=pd.DataFrame([5,7,1,2,3])
fun= lambda x: x+2
print(fun(df))

(CO3, CO5)



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Q5.

(2X10=20 Marks)

- a. What is Exploratory Data Analysis? Explain its need and steps in detail. Describe how histograms and scatter plots help in identifying distribution and correlation. (CO6)
- b. With the help of a diagram, explain the key parts of a boxplot. How does a boxplot help in identifying outliers? (CO6)
- c. Assume you are working with a customer dataset containing CustomerID, Age, AnnualIncome, and SpendingScore. Some values are missing or duplicated. Write Python program to:
 - (i) Handle missing values (mean imputation for Age).
 - (ii) Remove duplicate rows.
 - (iii) Perform correlation analysis between AnnualIncome and SpendingScore and interpret the result.
 - (iv) Print data records where Age is greater than 25. (CO6)