

NAME :

The exam is closed book, no notes and no computer.

All your answers to the questions below must be submitted on paper.

Write your name on this sheet and submit it with your answers.

Please do not ask questions during the exam.

1. A company operates a train service between major cities in a country. In setting up the software for posting the train schedules and selling the tickets, there are two possible ways to organize the modules.
 - (a) For each train line between two cities, there is a scheduling and a ticking department. There are as many modules as there are connections between the cities.
 - (b) There are two modules: scheduling and ticketing. The scheduling module handles all train schedules, while the ticketing module arranges reservations and the selling of the tickets for train seats.

Which of the two designs is best?

Justify your choice by application of the key principles of good modular design.

2. What is whitebox static testing? Give an example of such testing.
3. Write a function to prompt the user for a natural number in the format `d,ddd` where `d` is a decimal representation of a natural number in the range from 0 to 9, 0 and 9 included. As long as the user fails to enter this amount, the user is asked to retry. The function returns the entered number as an integer.
4. Consider the `BallotBox` class which represents the number of votes in favor or against a certain motion. There are two types of users of the `BallotBox`: `Voter` and `Clerk`. `Voters` vote, after identifying themselves with a login. After voting, a voter logs off. A clerk initializes the `BalloxBot` and retrieves the tally of the votes, in favor or against the motion. Draw the use case diagram for the `BalloxBot`.
5. As a sponsor, one can donate funds at the bronze, silver, and gold level. To model certificates to honor the sponsors, define a class `Sponsor`. An object of this class stores the name and the level of the sponsor. The `string` method of the class provides the certificate, stating that the named sponsor donated at the bronze, silver, or gold level. Write Python code for the constructor and the `string` method.
6. A bar wants to install a ticket vending machine for alcoholic drinks. A ticket costs \$5 and the machine will dispense at most 4 tickets at a single time. Draw a GUI for such a ticket dispenser. For each widget, write one complete sentence to explain its working.
7. Explain the difference between concurrent and parallel execution. Illustrate with an example.