1. Fill in the blanks in the following Data Flow Diagram (Figure 1.1) of the sales information system of a company called Bookland, only by using the words in **Boldface** in the description given below.

Bookland is a book store that specializes in selling rare books, which are usually not available from other sources. As a practice, Bookland maintains just a one copy of any book at a time due to the higher price of rare books.

Typically, a customer makes a **book enquiry** over the phone from the **Sales Assistant** at Bookland. She then goes through **book details** in the **Inventory** file to check whether such a book is in their stock. If the details of the book is found in the Inventory file, the Sales Assistant then refers to the **Hold-on Requests** tray to make sure that the **book status** is 'available' and makes a **reply to the enquiry**. If the book status is 'available' and the **customer** wishes to reserve the book, she then takes customer's **personal details** and places a **hold-on request** against that book in the Hold-on Requests tray making the book no longer available.

When the customer comes to make the payment and collect the book, the **Cashier** at Bookland refers to the Hold-on Requests tray and finds the relevant hold-on request made by the customer. If there is a valid hold-on request, she then accepts the **payment** from the customer, issues a **payment receipt** to the customer and finalizes the sale. The customer is then allowed to take away the book. The Cashier also files the **copy of the payment receipt** in the **Sales** file, uses it at the end of the day to compile a **sales report** and sends it to the **Owner** of the Bookland. After every sale, the Cashier updates the book details in the Inventory file and keeps the stock up to date. When the Owner supplies books to Bookland, he sends **details of books** to Cashier and the Cashier adds them one by one to the Inventory file.
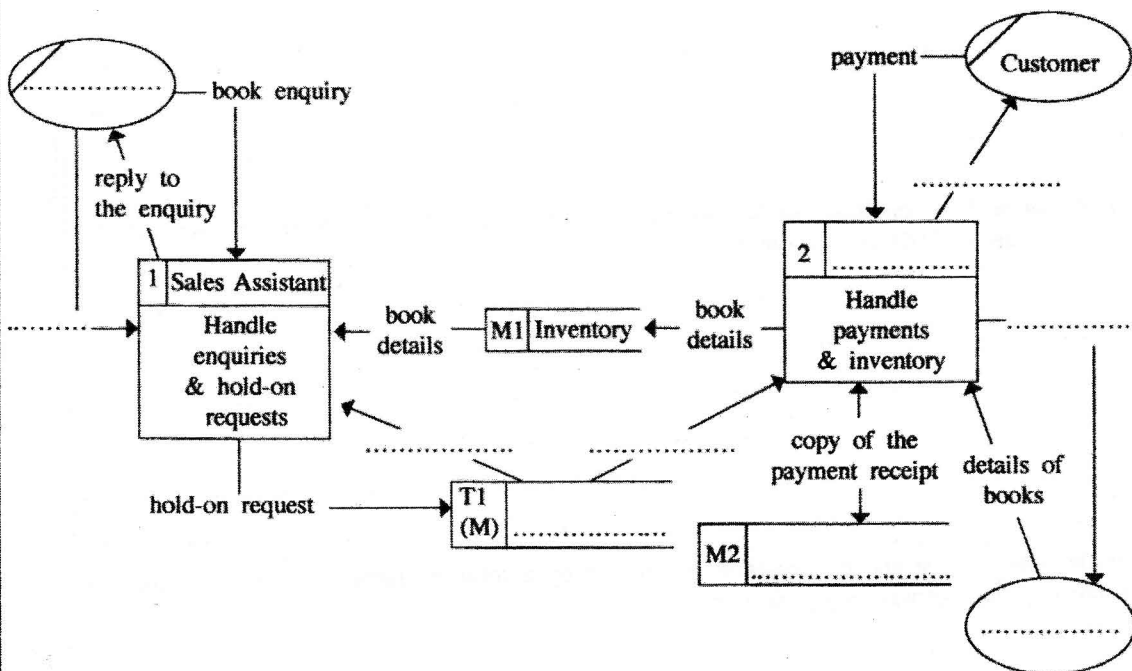

Figure 1.1: Level 1 Data Flow Diagram of Sales Information System of Bookland

2. (a) In an operating system, what are the events that change the state of a process in the 'running' state?

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(b) Explain the main actions performed by an operating system during context switching.

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(c) Explain what will happen during the booting process of a computer.

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3. (a) (i) Write **three** key conditions to be satisfied in order to classify a transaction/service between two persons as B2B in e-commerce.

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(ii) If the seller in the above transaction is replaced by a software agent, state the key proactive behaviour that software agent shall have.

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(b) The following SQL statement has been used to create a table in a database.

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create table student(
student_no char(5),
name char(30),
address char(100),
primary key (student_no)
)
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(i) Write a query in SQL to add the following data to the student table.
Student number – 10001
Name   – Saman Kumara
Address   – 78, Mahara road, Maharagama

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(ii) If the address of the student entered in the (i) above should be changed to 13, School Lane, Jaffna, write a query in SQL to update the relevant record in the student table.

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4. (a) (i) The Figure 4.1 represents an open system. Using the basic components: input, process, output and system boundary as given in the figure, draw a diagram to represent a closed system.
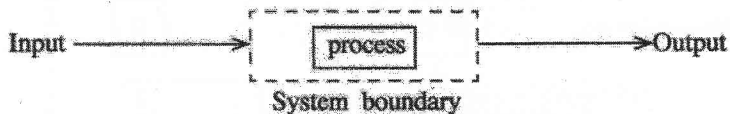
Input ⟶ [process] ⟶ Output
System boundary

Figure 4.1: An open system

(ii) Explain the reason for drawing the diagram which you drew for (i) above.

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(b) A person can own one or more mobile phones. One mobile phone belongs to a single person only. Assume that a mobile phone can be uniquely identified by its telephone number. National Identity Card number (NIC No) is used to identify a person uniquely.

Above statements are represented by the ER diagram in Figure 4.2.
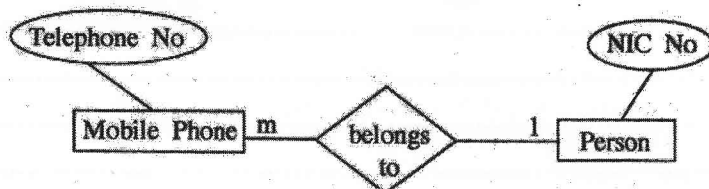

Figure 4.2: ER diagram

Convert the above ER diagram into 3rd Normal Form relations to be implemented in relational database.

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