Distinguish between System Design and Object Design with the help of real life example? What are the steps involved during the methodology of Object Design to prepare documentation? Explain in detail using ATM example?

### ****Part 1: Distinguish between System Design and Object Design (with real-life example)****

| Feature | ****System Design**** | ****Object Design**** |
| --- | --- | --- |
| **Focus** | Overall structure of the system | Designing individual components (objects/classes) |
| **Goal** | How system components work together | How each object works and interacts |
| **Level** | High-level design | Detailed design |
| **Real-life ATM Example** | Describes all major parts: ATM machine, bank server, database, network | Describes objects like Card, Account, ATM, Transaction, and their behaviors |

#### Real-life ATM Example:

**System Design:**

* Identify major components: ATM machine, Card reader, Keypad, Screen, Bank server, Database.
* Decide how these components interact.
* Example: When a user inserts a card, ATM talks to bank server to verify.

**Object Design:**

* Focus on individual objects:
  + Card object: has card number, expiry date.
  + ATM object: has methods like authenticateUser(), performTransaction().
  + Account object: has attributes like account number, balance, and methods like withdraw(), deposit().

### ****Part 2: Steps involved in Object Design methodology to prepare documentation (using ATM example)****

Here are the steps explained simply:

#### ****Step 1: Identify the Objects****

Find out what real-world things (nouns) need to be represented in the system.

* For ATM: Card, User, ATM, Account, Transaction

#### ****Step 2: Define Classes and Objects****

Define classes for those objects and their attributes (variables) and methods (functions).

* class ATM → attributes: location, methods: verifyCard(), dispenseCash()
* class Account → attributes: accountNumber, balance, methods: withdraw(), deposit()

#### ****Step 3: Establish Relationships between Classes****

Define how objects are related:

* An ATM accesses a BankServer
* A User has a Card
* A Transaction involves an Account

#### ****Step 4: Define Interfaces****

Specify how objects will interact.

* ATM asks User to enter PIN → Interface between ATM and User
* ATM sends details to bank server → Interface between ATM and Server

#### ****Step 5: Design Class Diagrams****

Draw class diagrams showing classes, attributes, methods, and relationships.

* This helps in documentation and coding later.

#### ****Step 6: Design Algorithms/Methods****

Write logic inside each method.

* ATM.performTransaction() checks balance and updates account
* Account.withdraw(amount) reduces balance if enough funds

#### ****Step 7: Prepare Object Design Documentation****

Final documentation includes:

* Class diagrams
* Object descriptions
* Method descriptions
* Sequence diagrams (if needed)