**Q#01:**

* ***Assumptions:***
* Each customer has only one shopping cart at a time.
* Payments are made using credit cards only.
* Each order is shipped to a single address.
* Customer cannot place an order without items in their cart.
* Payment must be verified before shipping.
* Customer can have more than one order.
* Shopping Cart is treated separately from Order like users can add items without immediately purchasing them.
* A customer can have multiple credit cards, but the system only requires one per payment.
* Shipping details are generated only after successful payment.
* Restriction on duplicate items in cart.
* Customer have address mandatory, but an address is independent of customer same assumption for company address.
* Order\_Item Entity has many-to-many relationship between Order and Item.
* The Shopping Cart entity is separate from the Order entity to allow customers to add items to their cart before placing an order.

**Q#03:**

* ***Generalization & Specialization:***
* ATM\_Staff (Superclass)
* ATM\_Technician (Subclass) → Specialized role of ATM staff.
* ATM\_Operator (Subclass) → Another specialized role of ATM staff.
* Transaction (composite attribute)
* Withdrawal (Sub-attribute of transaction)
* Deposit (Sub-attribute of transaction)
* Transfer (Sub-attribute of transaction)
* ***Assumptions:***
* Every ATM staff must either be an ATM Technician or ATM Operator.
* A staff member can be both a technician and an operator.
* Each Card is linked to only one Customer.
* Customer have address mandatory, but an address is independent of customer same assumption for ATM Address and for Branch Address.
* Customer\_Account is composed of Savings\_Account and Current\_Account.
* The ATM\_Operator entity is optional, as not all ATMs have operators.
* The Service\_Areas attribute in ATM\_Technician is modeled as a composite attribute to store multiple service areas.
* The Transaction entity records both the card used and the account affected to ensure traceability.
* Each ATM is either located at a branch or is standalone. If standalone, the Branch\_ID attribute in ATM\_Machine can be null.
* A customer can have multiple cards, but each card is linked to only one customer.
* The expiry date of a card must be greater than the current date, which is a constraint that cannot be directly represented in the ERD.

**Q#05:**

* ***Generalization & Specialization:***
* Student has Subclasses: Undergraduate, Graduate, Special Student
* Graduate has further Specialization: Teaching Assistant, Graduate Assistant (Overlapping Specialization).
* Faculty composed of Tenured, Non-Tenured (Disjoint Specialization).
* ***Assumptions:***
* Assume special students do not have a graduation year.
* Assume faculty members must have at least one degree.
* Each faculty can teach multiple courses, but each course is taught by only one faculty.
* Each student can enroll in multiple courses, and each course can have multiple students enrolled.
* Each faculty can own only one car.
* Student can only belong to one subclass (Disjoint).
* Every student must belong to one of the subclasses.
* A graduate student can be both a teaching assistant and a graduate assistant (Overlapping).
* Not all graduate students need to belong to a subclass (Partial Specialization).
* Faculty member can only be tenured or non-tenured (Disjoint).
* Every faculty member must belong to one of the subclasses (Total Specialization).