ER Modelling Exercise -SMCSE

The School of Mathematics, Computer Science and Engineering is composed of several departments. Each department is identified by a code, has a departmental office (office number) and a departmental administrator (administrator name). Each department has teaching staffs that teach modules. Each teaching staff member has a staff number, a name, and a salary. Teaching staff are either Academics or Teaching Assistants. Academics have grades, while Teaching Assistants have contracts (Contract Number). Most Academics are responsible for one or more modules (module number, module name, topic), and a module is the responsibility of only one Academic. Teaching Assistants must assist with teaching one or more modules. Module can have several Teaching Assistants. In each department, one of the Academics acts as the Head of Department, and they have a special responsibility allowance. Design an E-R diagram for the above database. Derive a corresponding relational scheme from your E-R diagram

Entities and Attributes:

1. **Department**
    - Attributes:
        - DepartmentCode (Primary Key)
        - OfficeNumber
        - AdministratorName
    - Relationships:
        - Has teaching staff (Academics and Teaching Assistants).
        - One Academic is the Head of Department.
2. **Staff**
    - Attributes:
        - StaffID (Primary Key)
        - Name
        - Salary
        - DepartmentCode (Foreign Key references Department)
    - Specializations:
        - **Academic**
            - Attributes:
                - Grade
                - SpecialResponsibilityAllowance (for Head of Department)
            - Relationships:
                - Responsible for one or more modules (1-to-many).
                - Can act as Head of Department (1-to-1 in the Department).
        - **Teaching Assistant**
            - Attributes:

        - ContractNumber
    - Relationships:
        - Assists in teaching one or more modules (many-to-many).
3. **Module**
    - Attributes:
        - ModuleID (Primary Key)
        - ModuleName
        - Topic
        - AcademicInCharge (Foreign Key references Academic)
    - Relationships:
        - Taught by one Academic and assisted by one or more Teaching Assistants.

Relationships:

1. **Department** --(Has)-- **Staff** (1-to-many)
2. **Academic** --(Heads)-- **Department** (1-to-1)
3. **Academic** --(Teaches)-- **Module** (1-to-many)
4. **Teaching Assistant** --(Assists)-- **Module** (many-to-many)

ER Diagram:

- **Department** --(Has Teaching Staff)-- **Staff** (Generalization to **Academic** and **Teaching Assistant**)
    - **Academic** --(Heads)-- **Department**
    - **Academic** --(Teaches)-- **Module**
    - **Teaching Assistant** --(Assists)-- **Module**

Relational Schema (in 3NF):

1. **Department (DepartmentCode, OfficeNumber, AdministratorName, HeadOfDepartmentID)**
    - DepartmentCode is the primary key.
    - HeadOfDepartmentID is a foreign key referencing Academic(StaffID).
2. **Staff (StaffID, Name, Salary, DepartmentCode)**
    - StaffID is the primary key.
    - DepartmentCode is a foreign key referencing Department(DepartmentCode).
3. **Academic (StaffID, Grade, SpecialResponsibilityAllowance)**
    - StaffID is a foreign key referencing Staff(StaffID) (inherits general attributes from Staff).

- SpecialResponsibilityAllowance is optional (only for Head of Department).

4. **TeachingAssistant (StaffID, ContractNumber)**
   - StaffID is a foreign key referencing Staff(StaffID) (inherits general attributes from Staff).
5. **Module (ModuleID, ModuleName, Topic, AcademicInCharge)**
   - ModuleID is the primary key.
   - AcademicInCharge is a foreign key referencing Academic(StaffID).
6. **ModuleTeachingAssistants (ModuleID, StaffID)**
   - Composite primary key: (ModuleID, StaffID).
   - ModuleID is a foreign key referencing Module(ModuleID).
   - StaffID is a foreign key referencing TeachingAssistant(StaffID)

Incomplete ER diagram :(