Part 1

Task 1.1.A

1. Unique attributes: EmpID, SSN, Email, Phone
   Super keys: (EmpID, SSN, Email, Phone)
   (EmpID, SSN, Email)
   (EmpID, SSN, Phone)
   (EmpID, Email, Phone)
   (SSN, Email, Phone)
   (EmpID, SSN) and so on.
2. Because these 4 attributes are unique, we can create 4 different candidate keys.
   Candidate keys: (EmpID)
   (SSN)
   (Phone)
   (Email)
3. I would not choose Email and Phone attributes, because they can be changed in the future. The SSN is like ИИН, so I would not choose it for safety reasons. The best option is EmpID, which would not be changed and plays a crucial role only in the employee’s database.
4. Based on this data, two employees cannot have the same number. Also, the Phone attribute is determined as a candidate key, so in this situation it is impossible. (In theory, two workers could have the same number)

Task 1.1.B

1. (StudentID, CourseCode, Section, Semester, Year)
2. Because we need to know which Student is studying which Course Section at which Semester of which Year.
3. There are no other candidate keys, because if we delete one attribute from here, then we couldn’t identify the student.

Task 1.2

1. Student -> Department (Major -> DeptCode)
2. Student -> Professor (AdvisorID -> ProfID)
3. Professor -> Department (Department -> DeptCode)
4. Course -> Department (DepartmentCode -> DeptCode)
5. Enrollment -> Student (<-StudentID->)
6. Enrollment -> Course (<-CourseID->)

Part 2

Task 2.1

1. *Strong entities:* Patients, Doctors, Departments, Hospital rooms.
   Weak entities: Appointments, Prescriptions.
2. *Patients*: PID(simple), Name(composite), Birthdate(simple), Address(composite), Phone number(multi-valued), Insurance(composite).
   Doctors: DID(simple), Name(composite), Specialization(multi-valued), Phone number(multi-valued), Office location(composite).
   Departments: DeptCode(simple), Name(simple), Location(composite).
   Appointments: PID(simple), DID(simple), Date(composite), Purpose(simple), Notes(simple).
   Prescriptions: PID(simple), DID(simple), MedicationID(simple), Dosage(simple), Instruction(simple).
   Hospital rooms: DeptCode(simple), Room(simple).
3. Patient - Room (M:1)
   Patient - Appointment (1:M)
   Patient - Prescription (1:M)
   Doctor - Appointment (1:M)
   Doctor - Prescription (1:M)
   Doctor - Department (M:1)
   Department - Room (1:M)
4. ER diagram
5. *PID*
   DID
   DeptCode
   (DeptCode, Room)

Task 2.2

1. ER diagram
2. *Order items,* because they don’t have an ID attribute and play a role as a list of items.

Part 4

Task 4.1

1. StudentID -> StudentName
   StudentID -> StudentMajor
   ProjectID -> ProjectTitle
   ProjectID -> ProjectType
   SupervisorID -> SupervisorName
   SupervisorID -> SupervisorDept
   (StudentID, ProjectID) -> (Role, HoursWorked, StartDate, EndDate)
   ProjectID -> SupervisorID
2. StudentName and StudentMajor are being repeated in every project that the student participates in.
3. There are no multi-value attributes, so it’ is 1NF already
4. Student(StudentID, StudentName, StudentMajor)
   Project(ProjectID, ProjectTitle, ProjectType)
   Supervisor(SupervisorID, SupervisorName, SupervisorDept)
   StudentProject(StudentID, ProjectID, Role, HoursWorked, StartDate, EndDate)

Task 4.2

1. (StudentID, CourseID, TimeSlot, Room,)
   A "section" refers to a specific offering or instance of a course, which is distinguished by its unique meeting time, instructor, location, or other factors, and is identified by a combination of the course subject, meeting time, and possibly its physical room.

   By this definition, we can get the exact Section using Course, Time and Room.
   So this is the primary key.
2. StudentID -> StudentMajor
   CourseID -> CourseName
   InstructorID -> InstructorName
   Room -> Building
   (CourseID, TimeSlot, Room) -> InstructorID

3. The left side keys are not Primary Keys in this situation, so it is not BCNF.
4. Student(StudentID, StudentMajor)
   Course(CourseID, CourseName)
   Instructor(InstructorID, InstructorName)
   Room(Room, Building)
   Section(CourseID, TimeSlot, Room, Instructor)
   StudentEnrollment(StudentID, CourseID, TimeSlot, Room)