

Constraints & Business Rules

- **Tables:**

- **Role:**

- **Role_id** : PK, begins from 1 and incremental by 1
 - **Role_name**: not Null

- **User:**

- **User_id**: PK, begins from 1 and incremental by 1
 - **email**: Unique, not Null
 - **password**: not Null
 - **Constraints:**
 - **FK_User_Role**: role_id references role_id in table Role

- **Student:**

- **F_name & L_name**: not null
 - **Constraints:**
 - **CHK_Student_Gender**: check (gender in ('M', 'F'))
 - **FK_Student_User**: student_id references user_id in User
 - **FK_Student_Track**: track_id references track_id in Track

- **Instructor:**

- **instructor_name**: not Null
 - **Constraints:**
 - **FK_Instructor_User**: instructor_id references user_id in User

- **Training_Manager:**

- **manager_name:** not Null
- **Constraints:**
- **FK_Manager_User:** manager_id references user_id in User

- **Track:**

- **track_id:** PK, begins from 1 and incremental by
- **track_name:** not Null
- **Constraints:**
- **FK_Track_Branch:** branch_id references branch_id in table Branch

- **Branch:**

- **branch_id:** PK, begins from 1 and incremental by 1
- **branch_name:** not Null

- **Course:**

- **course_id:** PK, begins from 1 and incremental by 1
- **course_name:** not Null
- **Constraints:**
- **CHK_Course_Degrees:** check (max_degree >= min_degree)
- **CHK_Course_Positive_Degrees:** check min_degree >= 0

- **Instructor_Course:**

- **PK:** Composite (instructor_id, course_id, year)
- **Constraints:**
- **FK_InstCourse_Instructor:** instructor_id references instructor_id in table Instructor
- **FK_InstCourse_Course:** course_id references course_id in table Course
- **CHK_InstCourse_Year:** check (year between 1000 and 9999)

- **Question:**

- **question_id:** PK, begins from 1 and incremental by 1
- **question_text:** not Null
- **question_type:** not Null
- **Constraints:**
- **FK_Question_Course:** course_id references course_id in table Course
- **CHK_Question_Type:** check (question_type in ('MCQ', 'TF', 'Text'))

- **Question_MC:**

- **question_id:** PK
- **Constraints:**
- **FK_QuestionMC_Question:** question_id references question_id in table Question

- **Exam:**

- **exam_id:** PK, begins from 1 and incremental by 1
- **exam_type:** not Null
- **Constraints:**
- **FK_Exam_Course:** course_id references course_id in table Course
- **FK_Exam_Instructor:** instructor_id references instructor_id in table Instructor
- **CHK_Exam_Type:** check (exam_type in ('Exam', 'Corrective'))
- **CHK_Exam_Time:** check (end_time > start_time)
- **CHK_Exam_Year_4Digits:** check (year between 1000 and 9999)
- **CHK_Exam_TotalTime:** check total_time > 0

- **Exam_Options:**

- **PK:** Composite (exam_id, option_name)
- **Constraints:**
- **FK_ExamOptions_Exam:** exam_id references exam_id in table Exam

- **Exam_Question:**

- **PK:** Composite (exam_id, question_id)
- **question_degree:** check > 0
- **sequence_number:** check > 0
- **Constraints:**
- **FK_ExamQuestion_Exam:** exam_id references exam_id in table Exam

- **FK_ExamQuestion_Question:** question_id references question_id in table Question

- **Student_Exam:**

- **PK:** Composite (student_id, exam_id)
- **Is_reviewd:** bit ,default 0
- **Total_score:** derived attribute
- **Constraints:**
- **FK_StudentExam_Student:** student_id references student_id in table Student
- **FK_StudentExam_Exam:** exam_id references exam_id in table Exam
- **CHK_StudentExam_Time:** check submit_time > start_time