ERD & Schema

1- Exam

Attributes

- **ID** (PK)
- **Name**
- **Duration**
- **Date**
- **Degree**
- **courseId** (FK)

Relationships

- **(Student) Take (Exam)** (M-M)
- **(Exam) Contain (Question)** (M-M)
- **(Exam) Has (Course)** (1t-1p)

Table Result from Mapping (M-M

- **ExamQuestion**
- **ExamStudent → attribute on relation called** result

2- Question

Attributes

- ID *(PK)*
- Content
- Type
- Correct
- Answer
- Mark
- courseId *(FK)*

Relationships

- **Course Has Questions** (1p-Mt)
- **Question Contain Choices** (1p-Mt)

Table Result from Mapping (M-M)

- Ternary relation between ⇒ StudentAnswer (Student_ID, Exam_ID, Question_ID, Stu_Answer (Char)) ⇒ relationship **Answers** with attribute stu_answer on relation

Choice

- QuestionId (FK)
- Text
- Option

⇒ PK(QuestionID,Text) ⇒ PK

3- Course

Attributes

- **ID**
- **Name**
- **Description**
- **InstructorId** (FK)

Relationships

- **Track Include Courses**
- **Student Take Courses**
- **Instructor Teach Courses** (1t - Mt)
- **Course Include Topics** (1t - Mt)

Table Result from Mapping (M-M)

- CourseTrack (M-M) ⇒ **start_date on Relatoin**
- CourseStudent (M-M)

4- Topic

Attributes

- ID
- Name
- CourseID (FK)

Relationships

- **Include (Done Above)**

Table Result from Mapping (M-M)

5- Department

Attributes

- **ID**
- Name

Relationships

- Department register Tracks `(1t - Mt)`
- Student assign to a Department `(1t Dep - Mt Students)`
- Instructor assign to a Department `(1t Dep - Mt Instructors)`

Table Result from Mapping (M-M)

6- Track

Attributes

- **ID**
- Name
- DepId (`fk)`

Relationships

Table Result from Mapping (M-M)

7- Student

Attributes

- **ID**
- SSN
- Name (**First_Name & Last_Name**)
- Gender
- Email
- Password

- Age
- Address (City, Governorate)
- PhoneNo (multi-valued)
- TrackId (FK)

Relationships

- **Track Enroll Students** (1t - Mt)

Table Result from Mapping (M-M)

8- Instructor

Attributes

- ID
- SSN
- Name (**First_Name & Last_Name**)
- Gender
- Email
- PhoneNo (multi-valued)
- Salary
- Age
- Address (City, Governorate)
- TrackId (FK)

Relationships

Table Result from Mapping (M-M)

Notes in ERD

1. **Modify the relationship between Course & Exam**
   Course has only one Exam and Exam is assigned only to one Course ⇒ Exam total - Course Partial (فيه كورسات ملهاش امتحان)

2. **According for that not all courses have Question so it should be partial Course ⇒ total Exam so we need to modify that in ERD**
   and According for Mapping rules if it is total total so i will make one table called CourseQuestions according to what explained from Dr.Ramy

3. **Modify the relationship to be ONE TO MANY ⇒ partial - total as the question of true and false will not need for choices**

4. **In Enroll between Track And Students ? do u think that should be total for track as there is no track without students?**

Suggested Names for relationships

From Entity	To Entity	Current Name	Semantic Name (Proposal)	Notes
Student	Exam	Take	**Attempts**	Student **attempts** an Exam, أكثر وضوحًا من “Take”
Exam	Question	Contain	**Includes**	Exam **includes** Questions
Exam	Course	Has	**AssignedTo**	Exam **is assigned to** a Course (1–1)
Course	Question	Has	**Contains**	Course **contains** Questions
Question	Choice	Contain	**Offers**	Question **offers** multiple choices (MCQ)
Course	Track	Include	**AvailableIn**	Course **available in** Track(s)
Student	Course	Take	**EnrolledIn**	Student **enrolled in** Courses
Instructor	Course	Teach	**Teaches**	Instructor **teaches** Courses
Course	Topic	Include	**Covers**	Course **covers** Topics
Department	Track	Register	**Offers**	Department **offers** Tracks
Student	Department	Assign	**BelongsTo**	Student **belongs to** Department
Instructor	Department	Assign	**BelongsTo**	Instructor **belongs to** Department
Student	StudentAnswer / Question / Exam	DO	**Answers**	Student **answers** a Question in a specific Exam

Dummy Data for Correction

Question

Id	Content	QuestionType	CorrectAnswer	Mark
1	What is the capital of Egypt?	MCQ	A	5
2	2 + 2 = ?	MCQ	C	3
3	OOP supports inheritance	TF	A	2

Choice

QuestionId	option	Text
1	A	Cairo

QuestionId	option	Text
1	B	Alexandria
1	C	Giza
1	D	Luxor

QuestionId	Option	Text
2	A	1
2	B	2
2	C	4
2	D	5

QuestionId	Option	Text
3	A	True
3	B	False

Exam

Id	Name
1	Final Exam

ExamStudent

ExamId	StudentId	Result
1	1	NULL
1	2	NULL

StudentAnswer

StudentId	ExamId	QuestionId	StudentAnswer
1	1	1	A
1	1	2	C
1	1	3	A

StudentId	ExamId	QuestionId	StudentAnswer
2	1	1	B
2	1	2	C
2	1	3	B

Correction Concept Comparison

Student 1

Question	Student	Correct	Result
Q1	A	A	✅ 5
Q2	C	C	✅ 3
Q3	A	A	✅ 2

Student 2

Question	Student	Correct	Result
Q1	B	A	❌ 0
Q2	C	C	✅ 3
Q3	B	A	❌ 0