ENGINEERS WITH
SOCIAL RESPONSIBILITY

SUCCESS-SPHERE COACHING

Revolutionizing Education

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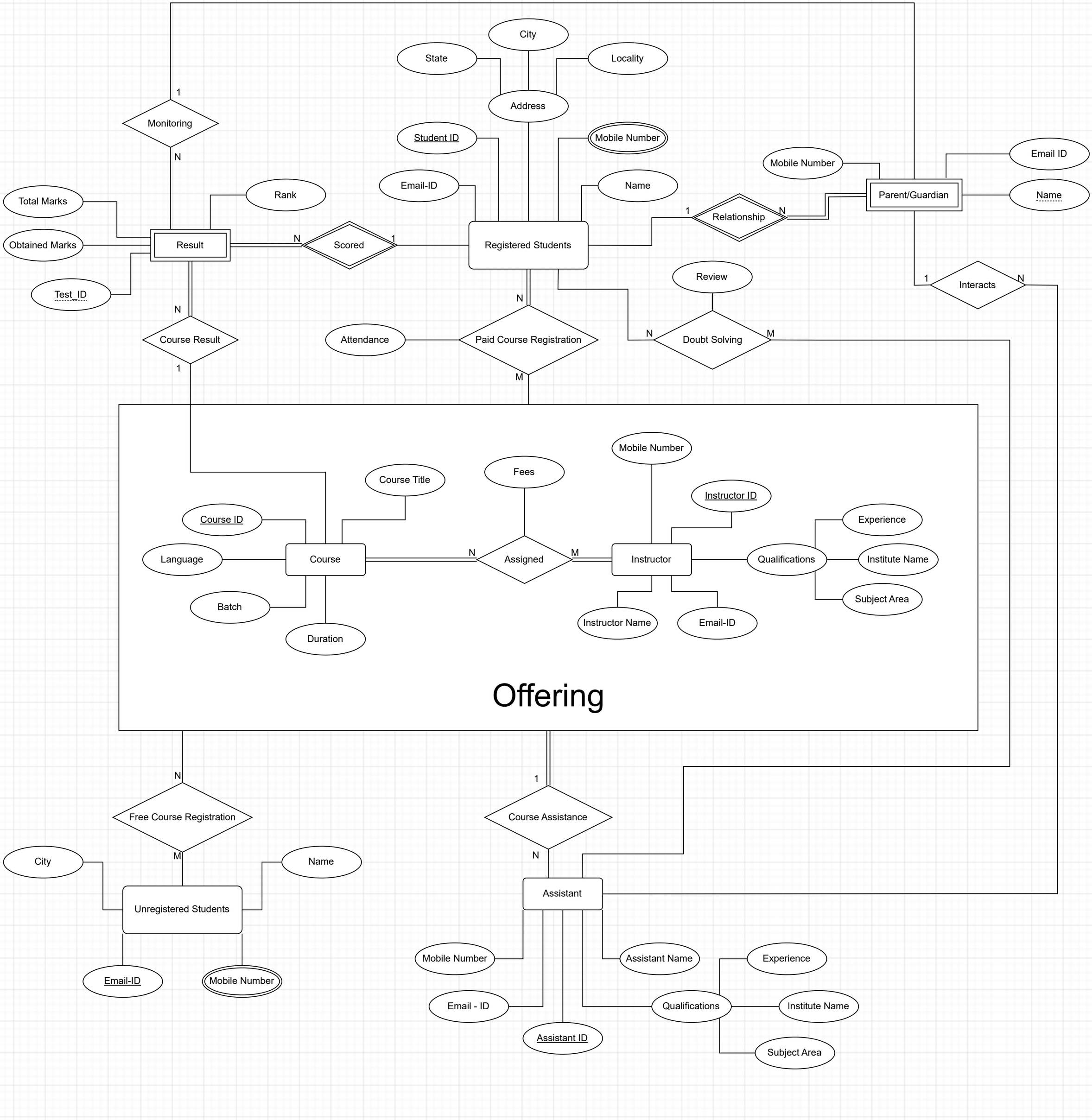
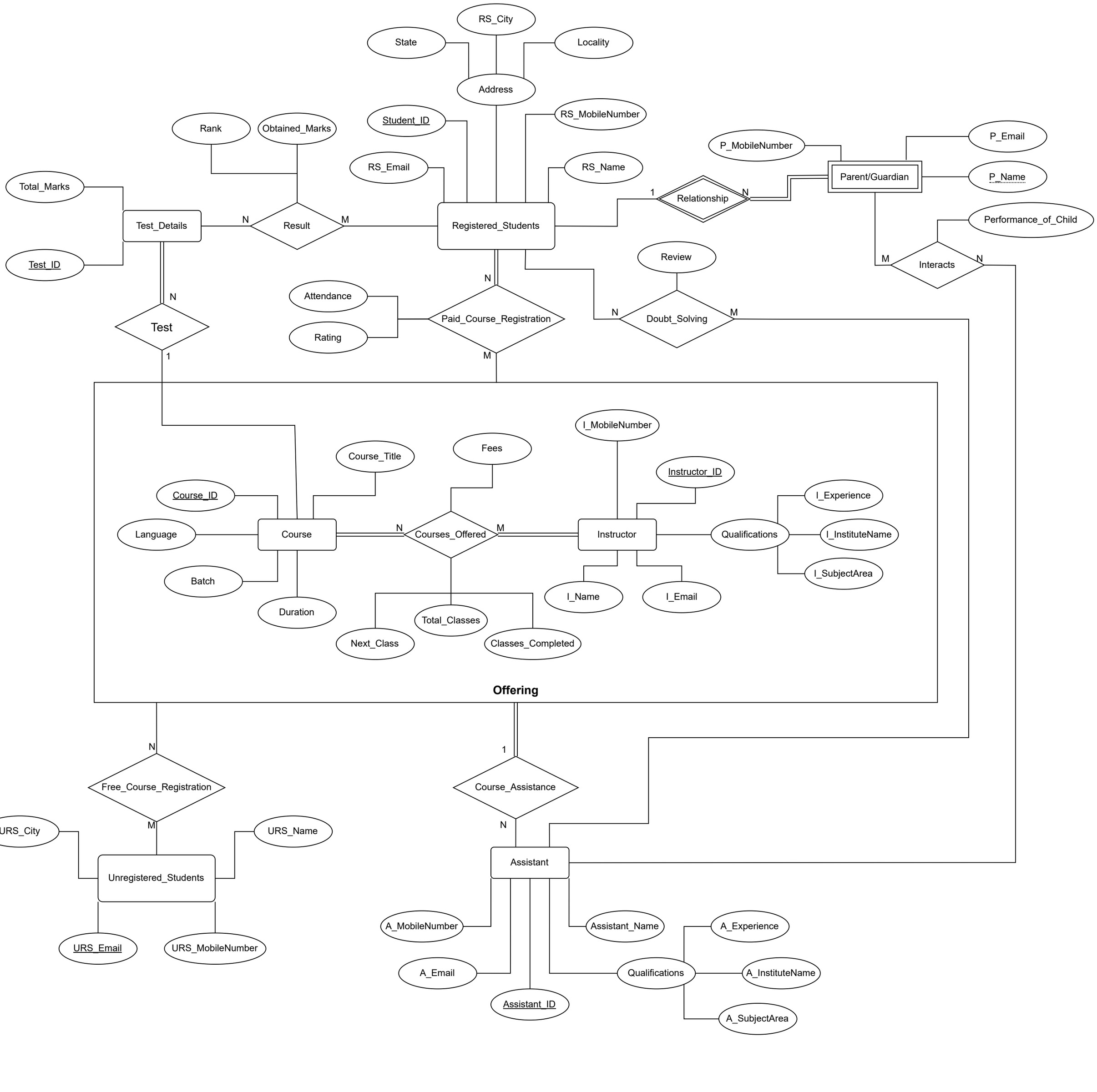
PREVIOUS ER DIAGRAM



Updated ER Diagram



Updated Relational Schema

Result

PK, FK1	Student_ID	char (10)
PK, FK2	Test_ID	char (10)
	Obtained_Marks	numeric (5,2)
	Rank	integer

Registered_Student

PK	Student_ID	char (10)
	RS_Name	varchar (30)
	RS_Email	varchar (40)
	RS_MobileNumber	numeric(10,0)
	State	varchar (20)
	RS_City	varchar (20)
	Locality	varchar (30)

Parent_Details

PK, FK1	Student_ID	char (10)
PK	P_Name	varchar (30)
	P_MobileNumber	numeric (10,0)
	P_Email	varchar (40)

Test_Details

PK	Test_ID	char (7)
FK	Course_ID	char (5)
	Total_Marks	numeric (5,2)

Paid_Course_Registration

PK, FK1	Student_ID	char (10)
PK, FK2	Instructor_ID	char (5)
PK, FK3	Course_ID	char (5)
	Attendance	numeric (5,2)
	Rating	numeric (3,1)

Interacts

PK, FK1	Student_ID	char (10)
PK, FK2	P_Name	varchar (30)
PK, FK3	Assistant ID	char (5)
	Performance	decimal (3,1)

Instructor

PK	Instructor_ID	char(5)
	I_MobileNumber	numeric (10,0)
	I_Email	varchar (40)
	I_Name	varchar (30)
	I_Experience	integer
	I_InstituteName	varchar (30)
	I_SubjectArea	varchar (30)

Courses_Offered

PK,FK1	Instructor_ID	char (5)
PK,FK2	Course_ID	char (5)
	Total_Classes	integer
	Next_Class	date
	Classes_Completed	integer
	Fees	numeric (8,2)

Course

PK	Course_ID	char(5)
	Language	varchar(15)
	Batch	integer
	Duaration	varchar(20)
	Course_Title	varchar(20)

Assistant

PK	Assistant_ID	char (5)
FK1	Course_ID	char (5)
FK2	Instructor_ID	char (5)
	A_Name	varchar (30)
	A_MobileNumber	numeric (10,0)
	A_Email	varchar (40)
	A_Experience	integer
	A_InstituteName	varchar (30)
	A_SubjectArea	varchar (30)

Free_Course_Registration

PK, FK1	URS_Email	varchar (40)
PK, FK2	Course_ID	char (5)
PK, FK3	Instructor_ID	char (5)

Doubt_Solving

PK,FK1	Assistant_ID	char (5)
PK,FK2	Student_ID	char (10)
	Review	decimal (3,1)

Unregistered_Students

PK	URS_Email	varchar (40)
	URS_Name	varchar (30)
	URS_MobileNumber	numeric (10,0)
	URS_City	varchar (30)

ALL THE FUNCTIONAL DEPENDENCIES

Course_ID	→	Course_ID
Course_ID	→	Language
Course_ID	→	Batch
Course_ID	→	Duration
Course_ID	→	Course_title
Instructor_ID	→	Instructor_ID
Instructor_ID	→	I_MobileNumber
Instructor_ID	→	I_Email
Instructor_ID	→	I_Name
Instructor_ID	→	I_Experience
Instructor_ID	→	I_InstitueName
Instructor_ID	→	I_SubjectArea
I_MobileNumber	→	Instructor_ID
I_MobileNumber	→	I_MobileNumber
I_MobileNumber	→	I_Email
I_MobileNumber	→	I_Name
I_MobileNumber	→	I_Experience
I_MobileNumber	→	I_InstitueName
I_MobileNumber	→	I_SubjectArea
I_Email	→	Instructor_ID
I_Email	→	I_MobileNumber
I_Email	→	I_Email
I_Email	→	I_Name
I_Email	→	I_Experience
I_Email	→	I_InstitueName
I_Email	→	I_SubjectArea
{Instructor_ID,Course_ID}	→	Instructor_ID
{Instructor_ID,Course_ID}	→	Course_ID
{Instructor_ID,Course_ID}	→	Fees
{Instructor_ID,Course_ID}	→	Total_classes
{Instructor_ID,Course_ID}	→	Classes_completed
{Instructor_ID,Course_ID}	→	Next_class
Student_ID	→	Student_ID
Student_ID	→	RS_Name
Student_ID	→	RS_Email
Student_ID	→	RS_MobileNumber
Student_ID	→	State
Student_ID	→	RS_City
Student_ID	→	Locality
RS_Email	→	Student_ID
RS_Email	→	RS_Name
RS_Email	→	RS_Email
RS_Email	→	RS_MobileNumber
RS_Email	→	State
RS_Email	→	RS_City
RS_Email	→	Locality

RS_MobileNumber	→	Student_ID
RS_MobileNumber	→	RS_Name
RS_MobileNumber	→	RS_Email
RS_MobileNumber	→	RS_MobileNumber
RS_MobileNumber	→	State
RS_MobileNumber	→	RS_City
RS_MobileNumber	→	Locality
{Student_ID,Instructor_ID,Course_ID}	→	Student_ID
{Student_ID,Instructor_ID,Course_ID}	→	Instructor_ID
{Student_ID,Instructor_ID,Course_ID}	→	Course_ID
{Student_ID,Instructor_ID,Course_ID}	→	Attendance
{Student_ID,Instructor_ID,Course_ID}	→	Rating
Test_ID	→	Test_ID
Test_ID	→	Total_Marks
Test_ID	→	Course_ID
{Student_ID,Test_ID}	→	Student_ID
{Student_ID,Test_ID}	→	Test_ID
{Student_ID,Test_ID}	→	Obtained_Marks
{Student_ID,Test_ID}	→	Rank
{Student_ID,P_Name}	→	Student_ID
{Student_ID,P_Name}	→	P_Name
{Student_ID,P_Name}	→	P_MobileNumber
{Student_ID,P_Name}	→	P_Email
Assistant_ID	→	Assistant_ID
Assistant_ID	→	Course_ID
Assistant_ID	→	Instructor_ID
Assistant_ID	→	A_Name
Assistant_ID	→	A_MobileNumber
Assistant_ID	→	A_Email
Assistant_ID	→	A_Experience
Assistant_ID	→	A_InstituteName
Assistant_ID	→	A_SubjectArea
A_MobileNumber	→	Assistant_ID
A_MobileNumber	→	Course_ID
A_MobileNumber	→	Instructor_ID
A_MobileNumber	→	A_Name
A_MobileNumber	→	A_MobileNumber
A_MobileNumber	→	A_Email
A_MobileNumber	→	A_Experience
A_MobileNumber	→	A_InstituteName
A_MobileNumber	→	A_SubjectArea
A_Email	→	Assistant_ID
A_Email	→	Course_ID
A_Email	→	Instructor_ID
A_Email	→	A_Name
A_Email	→	A_MobileNumber
A_Email	→	A_Email
A_Email	→	A_Experience
A_Email	→	A_InstituteName
A_Email	→	A_SubjectArea

{Student_ID,P_Name,Assistant_ID}	→	Student_ID
{Student_ID,P_Name,Assistant_ID}	→	P_Name
{Student_ID,P_Name,Assistant_ID}	→	Assistant_ID
{Student_ID,P_Name,Assistant_ID}	→	Performance_of_child
{Assistant_ID,Student_ID}	→	Assistant_ID
{Assistant_ID,Student_ID}	→	Student_ID
{Assistant_ID,Student_ID}	→	Review
URS_Email	→	URS_Email
URS_Email	→	URS_Name
URS_Email	→	URS_MobileNumber
URS_Email	→	URS_City
URS_MobileNumber	→	URS_Email
URS_MobileNumber	→	URS_Name
URS_MobileNumber	→	URS_MobileNumber
URS_MobileNumber	→	URS_City
{URS_Email,Course_ID,Instructor_ID}	→	URS_Email
{URS_Email,Course_ID,Instructor_ID}	→	Course_ID
{URS_Email,Course_ID,Instructor_ID}	→	Instructor_ID

PROJECTION OF ALL FUNCTIONAL DEPENDENCIES OF DATABASE AND PROOF OF NORMALISATION

COURSE : { Course_ID, Language, Batch, Duration, Course_title **}**		
Course_ID	→	Course_ID
Course_ID	→	Language
Course_ID	→	Batch
Course_ID	→	Duration
Course_ID	→	Course_title

CANDIDATE KEY : Course_ID
PRIMARY KEY : Course_ID
FOREIGN KEY : -
TYPE OF FORM : BCNF
REASON : Determinant of every FD that holds on R, is super-key of R. In other words we can say that for every FD A → B that holds on relation R, A is its super-key.
In this relational table Course_ID is the super key of R and is also determinant of every FD.

INSTRUCTOR : { Instructor_ID, I_MobileNumber, I_Email, I_Name, I_Experience, I_InstitueName, I_SubjectArea **}**		
Instructor_ID	→	Instructor_ID
Instructor_ID	→	I_MobileNumber
Instructor_ID	→	I_Email
Instructor_ID	→	I_Name
Instructor_ID	→	I_Experience
Instructor_ID	→	I_InstitueName
Instructor_ID	→	I_SubjectArea
I_MobileNumber	→	Instructor_ID
I_MobileNumber	→	I_MobileNumber
I_MobileNumber	→	I_Email
I_MobileNumber	→	I_Name
I_MobileNumber	→	I_Experience
I_MobileNumber	→	I_InstitueName
I_MobileNumber	→	I_SubjectArea
I_Email	→	Instructor_ID
I_Email	→	I_MobileNumber
I_Email	→	I_Email
I_Email	→	I_Name
I_Email	→	I_Experience
I_Email	→	I_InstitueName
I_Email	→	I_SubjectArea

CANDIDATE KEY : Instructor_ID, I_MobileNumber, I_Email
PRIMARY KEY : Instructor_ID
FOREIGN KEY : -
TYPE OF FORM : BCNF
REASON : Determinant of every FD that holds on R, is super-key of R. In other words we can say that for every FD A → B that holds on relation R, A is its super-key.
In this relational table Instructor_ID, I_MobileNumber, I_Email are the super key of R and either of these is also determinant of every FD.

COUSRE_OFFERED : { Instructor_ID, Course_ID, Fees, Total_classes, classes_completed, Next_class **}**

{Instructor_ID,Course_ID}	→	Instructor_ID
{Instructor_ID,Course_ID}	→	Course_ID
{Instructor_ID,Course_ID}	→	Fees
{Instructor_ID,Course_ID}	→	Total_classes
{Instructor_ID,Course_ID}	→	Classes_completed
{Instructor_ID,Course_ID}	→	Next_class

CANDIDATE KEY : {Instructor_ID,Course_ID}
PRIMARY KEY : {Instructor_ID,Course_ID}
FOREIGN KEY : Instructor_ID, Course_ID
TYPE OF FORM : BCNF
REASON : Determinant of every FD that holds on R, is super-key of R. In other words we can say that for every FD A → B that holds on relation R, A is its super-key.
In this relational table {Instructor_ID,Course_ID} is the super key of R and is also determinant of every FD.

REGISTERED_STUDENTS : { Student_ID, RS_Name, RS_Email, RS_MobileNumber, State, RS_City, Locality **}**

Student_ID	→	Student_ID
Student_ID	→	RS_Name
Student_ID	→	RS_Email
Student_ID	→	RS_MobileNumber
Student_ID	→	State
Student_ID	→	RS_City
Student_ID	→	Locality
RS_Email	→	Student_ID
RS_Email	→	RS_Name
RS_Email	→	RS_Email
RS_Email	→	RS_MobileNumber
RS_Email	→	State
RS_Email	→	RS_City
RS_Email	→	Locality
RS_MobileNumber	→	Student_ID
RS_MobileNumber	→	RS_Name
RS_MobileNumber	→	RS_Email
RS_MobileNumber	→	RS_MobileNumber
RS_MobileNumber	→	State
RS_MobileNumber	→	RS_City
RS_MobileNumber	→	Locality

CANDIDATE KEY : Student_ID, RS_Email, RS_MobileNumber
PRIMARY KEY : Student_ID
FOREIGN KEY : -
TYPE OF FORM : BCNF

REASON : Determinant of every FD that holds on R, is super-key of R. In other words we can say that for every FD A → B that holds on relation R, A is its super-key.
In this relational table Student_ID, RS_Email, RS_MobileNumber are the super key of R and either of these is also determinant of every FD.

PAID_COURSE_REGISTRATION : { Student_ID, Instructor_ID, Course_ID, Attendance **}**

{Student_ID,Instructor_ID,Course_ID}	➡	Student_ID
{Student_ID,Instructor_ID,Course_ID}	➡	Instructor_ID
{Student_ID,Instructor_ID,Course_ID}	➡	Course_ID
{Student_ID,Instructor_ID,Course_ID}	➡	Attendance
{Student_ID,Instructor_ID,Course_ID}	➡	Rating

CANDIDATE KEY : {Student_ID,Instructor_ID,Course_ID}
PRIMARY KEY : {Student_ID,Instructor_ID,Course_ID}
FOREIGN KEY : Student_ID, Instructor_ID, Course_ID
TYPE OF FORM : BCNF
REASON : Determinant of every FD that holds on R, is super-key of R. In other words we can say that for every FD A → B that holds on relation R, A is its super-key.
In this relational table {Student_ID,Instructor_ID,Course_ID} is the super key of R and is also determinant of every FD.

BEFORE DECOMPOSITION OF RESULT

RESULT : { Test_ID, Course_ID, Total_Marks, Student_ID, Obtained_Marks, Rank **}**

Test_ID	➡	Test_ID
Test_ID	➡	Course_ID
Test_ID	➡	Total_Marks
{Student_ID,Test_ID}	➡	Student_ID
{Student_ID,Test_ID}	➡	Test_ID
{Student_ID,Test_ID}	➡	Obtained_Marks
{Student_ID,Test_ID}	➡	Rank
{Student_ID,Test_ID}	➡	Course_ID
{Student_ID,Test_ID}	➡	Total_Marks

CANDIDATE KEY : {Student_ID, Test_ID}
PRIMARY KEY : {Student_ID, Test_ID}
FOREIGN KEY : Student_ID, Course_ID
TYPE OF FORM : 1NF
REASON : It is not in 2NF because non-prime attributes are not fully dependent on the primary key and there is partial dependencies.
It is not in 3NF as there is transitive dependencies.
It is not in BCNF as every determinant is not a candidate key

AFTER DECOMPOSITION OF RESULT INTO TEST_DETAILS AND RESULT

TEST_DETAILS : { Test_ID, Course_ID, Total_Marks **}**

Test_ID	→	Test_ID
Test_ID	→	Total_Marks
Test_ID	→	Course_ID

CANDIDATE KEY : Test_ID
PRIMARY KEY : Test_ID
FOREIGN KEY : Course_ID
TYPE OF FORM : BCNF
REASON : Determinant of every FD that holds on R, is super-key of R. In other words we can say that for every FD A → B that holds on relation R, A is its super-key.
In this relational table Test_ID is the super key of R and is also determinant of every FD.

RESULT : { Student_ID, Test_ID, Obtained_Marks, Rank **}**

{Student_ID,Test_ID}	→	Student_ID
{Student_ID,Test_ID}	→	Test_ID
{Student_ID,Test_ID}	→	Obtained_Marks
{Student_ID,Test_ID}	→	Rank

CANDIDATE KEY : {Student_ID,Test_ID}
PRIMARY KEY : {Student_ID,Test_ID}
FOREIGN KEY : Student_ID, Test_ID
TYPE OF FORM : BCNF
REASON : Determinant of every FD that holds on R, is super-key of R. In other words we can say that for every FD A → B that holds on relation R, A is its super-key.
In this relational table {Student_ID,Test_ID} is the super key of R and is also determinant of every FD.

PARENT/GUARDIAN : { Student_ID, P_Name, P_MobileNumber, P_Email **}**

{Student_ID,P_Name}	→	Student_ID
{Student_ID,P_Name}	→	P_Name
{Student_ID,P_Name}	→	P_MobileNumber
{Student_ID,P_Name}	→	P_Email

CANDIDATE KEY : {Student_ID,P_Name}
PRIMARY KEY : {Student_ID,P_Name}
FOREIGN KEY : Student_ID
TYPE OF FORM : BCNF
REASON : Determinant of every FD that holds on R, is super-key of R. In other words we can say that for every FD A → B that holds on relation R, A is its super-key.
In this relational table {Student_ID,P_Name} is the super key of R and is also determinant of every FD.

ASSISTANT : {Assistant_ID, Course_ID, Instructor_ID, A_Name, A_MobileNumber, A_Email, A_Experience, A_InstituteName, A_SubjectArea **}**		
Assistant_ID	→	Assistant_ID
Assistant_ID	→	Course_ID
Assistant_ID	→	Instructor_ID
Assistant_ID	→	A_Name
Assistant_ID	→	A_MobileNumber
Assistant_ID	→	A_Email
Assistant_ID	→	A_Experience
Assistant_ID	→	A_InstituteName
Assistant_ID	→	A_SubjectArea
A_MobileNumber	→	Assistant_ID
A_MobileNumber	→	Course_ID
A_MobileNumber	→	Instructor_ID
A_MobileNumber	→	A_Name
A_MobileNumber	→	A_MobileNumber
A_MobileNumber	→	A_Email
A_MobileNumber	→	A_Experience
A_MobileNumber	→	A_InstituteName
A_MobileNumber	→	A_SubjectArea
A_Email	→	Assistant_ID
A_Email	→	Course_ID
A_Email	→	Instructor_ID
A_Email	→	A_Name
A_Email	→	A_MobileNumber
A_Email	→	A_Email
A_Email	→	A_Experience
A_Email	→	A_InstituteName
A_Email	→	A_SubjectArea

CANDIDATE KEY : Assistant_ID, A_MobileNumber, A_Email
PRIMARY KEY : Assistant_ID
FOREIGN KEY : Course_ID, Instructor_ID
TYPE OF FORM : BCNF
REASON : Determinant of every FD that holds on R, is super-key of R. In other words we can say that for every FD A → B that holds on relation R, A is its super-key.
In this relational table Assistant_ID, A_MobileNumber, A_Email are the super key of R and either of these is also determinant of every FD.

INTERACT : { Student_ID, P_Name, Assistant_ID, Performance_of_child **}**		
{Student_ID,P_Name,Assistant_ID}	→	Student_ID
{Student_ID,P_Name,Assistant_ID}	→	P_Name
{Student_ID,P_Name,Assistant_ID}	→	Assistant_ID
{Student_ID,P_Name,Assistant_ID}	→	Performance_of_child

CANDIDATE KEY : {Student_ID, P_Name, Assistant_ID}
PRIMARY KEY : {Student_ID, P_Name, Assistant_ID}
FOREIGN KEY : Student_ID, P_Name, Assistant_ID
TYPE OF FORM : BCNF
REASON : Determinant of every FD that holds on R, is super-key of R. In other words we can say that for every FD A → B that holds on relation R, A is its super-key.
In this relational table {Student_ID, P_Name, Assistant_ID} is the super key of R and is also determinant of every FD.

DOUBT_SOLVING : { Assistant_ID, Student_ID, Review **}**		
{Assistant_ID,Student_ID}	⟶	Assistant_ID
{Assistant_ID,Student_ID}	⟶	Student_ID
{Assistant_ID,Student_ID}	⟶	Review

CANDIDATE KEY : {Assistant_ID, Student_ID}
PRIMARY KEY : {Assistant_ID, Student_ID}
FOREIGN KEY : Assistant_ID, Student_ID
TYPE OF FORM : BCNF
REASON : Determinant of every FD that holds on R, is super-key of R. In other words we can say that for every FD A → B that holds on relation R, A is its super-key.
In this relational table {Assistant_ID, Student_ID} is the super key of R and is also determinant of every FD.

UNREGISTERED_STUDENTS : { URS_Email, URS_Name, URS_MobileNumber, URS_City **}**		
URS_Email	⟶	URS_Email
URS_Email	⟶	URS_Name
URS_Email	⟶	URS_MobileNumber
URS_Email	⟶	URS_City
URS_MobileNumber	⟶	URS_Email
URS_MobileNumber	⟶	URS_Name
URS_MobileNumber	⟶	URS_MobileNumber
URS_MobileNumber	⟶	URS_City

CANDIDATE KEY : URS_Email, URS_MobileNumber
PRIMARY KEY : URS_Email
FOREIGN KEY :
TYPE OF FORM : BCNF
REASON : Determinant of every FD that holds on R, is super-key of R. In other words we can say that for every FD A → B that holds on relation R, A is its super-key.
In this relational table URS_Email, URS_MobileNumber are the super key of R and either of these is also determinant of every FD.

FREE_COURSE_REGISTRATION : {URS_Email, Course_ID,Instructor_ID **}**		
{URS_Email,Course_ID,Instructor_ID}	⟶	URS_Email
{URS_Email,Course_ID,Instructor_ID}	⟶	Course_ID
{URS_Email,Course_ID,Instructor_ID}	⟶	Instructor_ID

CANDIDATE KEY : {URS_Email, Course_ID, Instructor_ID}

PRIMARY KEY : {URS_Email,Course_ID,Instructor_ID}
FOREIGN KEY : URS_Email, Course_ID, Instructor_ID
TYPE OF FORM : BCNF
REASON : Determinant of every FD that holds on R, is super-key of R. In other words we can say that for every FD A → B that holds on relation R, A is its super-key.
In this relational table {URS_Email, Course_ID, Instructor_ID} is the super key of R and is also determinant of every FD.