Question One

Solution:

1NF:

Project Code	**Project Name**	**Project Manager**	**Project Budget**
P - 10	Inventory Management	John Smith	$10000
P – 11	Supply Chain Management	Carlos Silva	$20000

Project Code	**Employee ID**	**Employee Name**	**Department No.**	**Department Name**	**Hourly Rate**
P - 10	E – 100	Emily	D – 01	Quality Assurance	$ 10
P - 10	E – 101	Anna	D – 03	R & D department	$ 12.5
P - 10	E – 102	Jamal	D – 02	IT department	$ 11.5
P – 11	E – 103	Maria	D – 03	R & D department	$ 15.5
P – 11	E – 104	Samuel	D – 02	IT department	$ 14.5
P – 11	E – 105	Ethan	D – 01	Quality Assurance	$ 13.5

2NF:

Project Code	**Project Name**	**Project Manager**	**Project Budget**
P - 10	Inventory Management	John Smith	$10000
P – 11	Supply Chain Management	Carlos Silva	$20000

Project Code	**Employee ID**	**Hourly Rate**
P - 10	E – 100	$ 10
P - 10	E – 101	$ 12.5
P - 10	E – 102	$ 11.5
P – 11	E – 103	$ 15.5
P – 11	E – 104	$ 14.5
P – 11	E – 105	$ 13.5

Employee ID	**Employee Name**	**Department No.**	**Department Name**
E – 100	Emily	D – 01	Quality Assurance
E – 101	Anna	D – 03	R & D department
E – 102	Jamal	D – 02	IT department
E – 103	Maria	D – 03	R & D department
E – 104	Samuel	D – 02	IT department
E – 105	Ethan	D – 01	Quality Assurance

3NF:

Project Code	**Project Name**	**Project Manager**	**Project Budget**
P - 10	Inventory Management	John Smith	$10000
P – 11	Supply Chain Management	Carlos Silva	$20000

Project Code	**Employee ID**	**Hourly Rate**
P - 10	E – 100	$ 10
P - 10	E – 101	$ 12.5
P - 10	E – 102	$ 11.5
P – 11	E – 103	$ 15.5
P – 11	E – 104	$ 14.5
P – 11	E – 105	$ 13.5

Employee ID	**Employee Name**	**Department No.**
E – 100	Emily	D – 01
E – 101	Anna	D – 03
E – 102	Jamal	D – 02
E – 103	Maria	D – 03
E – 104	Samuel	D – 02
E – 105	Ethan	D – 01

Department No.	**Department Name**
D – 01	Quality Assurance
D – 02	IT department
D – 03	R & D department

Question Two

Solution:

1. S – ID, C - ID
2. Insertion: If a new course is entered, no student will be initially registered so Student ID will be null violating entity integrity constraint.
   Updation: If the course title changes for a particular course, then all the tuples need to be updated properly.
   (Any other is acceptable).
3. 1NF:
   Composite PK (S – ID, C – ID)

S - ID	Sname	Campus Location	Major	C - ID	CTitle	FName	FLocation	CGrade
10056	Liam	123 Main Street	CS	CS 2001	Database	Laura	R - 15	A
10056	Liam	123 Main Street	CS	CS 2005	Operating Systems	Johnson	R - 18	B
10489	Martin	456 Avenue	IS	CS 2001	Database	Laura	R - 15	C
10489	Martin	456 Avenue	IS	IS 2014	Vulnerability Assessment	Brown	R - 18	B
10489	Martin	456 Avenue	IS	IS 2048	Reverse Engineering	Sam	R - 09	A

2NF

C - ID	CTitle	FName	FLocation
CS 2001	Database	Laura	R - 15
CS 2005	Operating Systems	Johnson	R - 18
IS 2014	Vulnerability Assessment	Brown	R - 18
IS 2048	Reverse Engineering	Sam	R - 09

S - ID	Sname	Campus Location	Major
10056	Liam	123 Main Street	CS
10489	Martin	456 Avenue	IS

C - ID	S - ID	CGrade
CS 2001	10056	A
CS 2005	10056	B
CS 2001	10489	C
IS 2014	10489	B
IS 2048	10489	A

3NF

C - ID	CTitle	FName
CS 2001	Database	Laura
CS 2005	Operating Systems	Johnson
IS 2014	Vulnerability Assessment	Brown
IS 2048	Reverse Engineering	Sam

FName	FLocation
Laura	R - 15
Johnson	R - 18
Brown	R - 18
Sam	R - 09

C - ID	S - ID	CGrade
CS 2001	10056	A
CS 2005	10056	B
CS 2001	10489	C
IS 2014	10489	B
IS 2048	10489	A

S - ID	Sname	Campus Location	Major
10056	Liam	123 Main Street	CS
10489	Martin	456 Avenue	IS

4. Schema

C - ID →CTitle, FName, FLocation
C - ID → S – ID,CGrade
S - ID →Sname, Campus Location,Major
FName→FLocation

PK **FK**

C - ID	CTitle	FName

PK
FK **FK**

C - ID	S - ID	CGrade

PK

S - ID	Sname	Campus Location	Major

PK

FName	FLocation

Question Three