BT：

1.a. A candidate key in a relational database is a set of one or more attributes (columns) that can uniquely identify each row (tuple) in a relation (table). In other words, no two rows can have the same values for all the attributes of a candidate key. A table can have multiple candidate keys.
b. A composite key is a candidate key that consists of two or more attributes. These attributes, when taken together, uniquely identify a row in a table. The individual attributes of a composite key may not be unique on their own, but the combination of them is.
c. A foreign key is an attribute or a set of attributes in one table that refers to the primary key (or a candidate key) of another table. It is used to establish a relationship between two tables. The table containing the foreign key is called the referencing table, and the table with the primary key being referred to is called the referenced table.
d. Functional dependency is a relationship between two sets of attributes in a relation (table). If we have two sets of attributes A and B, we say that B is functionally dependent on A (written as A→B) if for every value of A, there is exactly one value of B. In other words, the value of A determines the value of B.

2.a. Entity Integrity: Entity integrity is a rule that states that in a relational database, the primary key of a table cannot have null values. A primary key is used to uniquely identify each row in a table. The rule ensures that each entity (represented by a row) in the table is uniquely identifiable.
b. Referential Integrity: Referential integrity is a rule that ensures the consistency of relationships between tables. It states that the value of a foreign key in a referencing table must either match a primary key value in the referenced table or be null. A foreign key is an attribute (or set of attributes) in one table that refers to the primary key of another table.
c. Domain Integrity: Domain integrity is concerned with the validity of the values entered into a column of a table. It ensures that the data values in a column conform to a specific data type and any associated constraints such as range, format, or list of allowed values.

3. Analysis of Table 1
Entity Integrity:
The primary keys filmNo and directorNo have no null values, satisfying entity integrity.
Referential Integrity:
directorNo acts as a foreign key in the Director table, and all its values can be found corresponding to the directorNo column in the Director table, satisfying referential integrity.
Domain Integrity:
There are no obvious violations regarding data types and value ranges of each column. For example, the year is an integer, and the country is a string, satisfying domain integrity.
Analysis of Table 2
Entity Integrity:
The primary key (Supplier, PartNo) has no null values, satisfying entity integrity.
Referential Integrity:
There is no foreign key in this table, so there is no issue regarding referential integrity.
Domain Integrity:
There are no obvious violations regarding data types and value ranges of each column. For example, the quantity and price are numeric values, and the part number is a string, satisfying

domain integrity.

Analysis of Table 3

Entity Integrity:

The primary key Song has no null values, satisfying entity integrity.

Referential Integrity:

There is no foreign key in this table, so there is no issue regarding referential integrity.

Domain Integrity:

There are no obvious violations regarding data types and value ranges of each column. For example, the month and year are integers, and the artist is a string, satisfying domain integrity.

MT：

4.

a. INSERT anomalies

b. DELETE anomalies

c. UPDATE anomalies

1NF

ProjCode	ProjTitle	ProjManager	ProjBudget	EmpNo	EmpName	DeptNo	DeptName	HrlyRate
PRC10	Payroll System	M Scott	24500	S10001	J Kirk	L004	IT	£22.00
PRC10	Payroll System	M Scott	24500	S10030	L Jones	L023	Pensions	£18.50
PRC10	Payroll System	M Scott	24500	S21010	P Lewis	L004	IT	£21.00
PRC45	Pension System	L McCoy	17400	S10010	B Jones	L004	IT	£21.75
PRC45	Pension System	L McCoy	17400	S10001	J Kirk	L004	IT	£18.00
PRC45	Pension System	L McCoy	17400	S31002	T Gilbert	L028	Database	£25.50
PRC45	Pension System	L McCoy	17400	S13210	W Richards	L008	Salary	£17.00
PRC64	CRM System	P Chekov	12250	S31002	T Gilbert	L028	Database	£23.25
PRC64	CRM System	P Chekov	12250	S21010	P Lewis	L004	IT	£17.50
PRC64	CRM System	P Chekov	12250	S10034	B James	L009	HR	£16.50

2NF

ProjCode	ProjTitle	ProjManager	ProjBudget
PRC10	Payroll System	M Scott	24500
PRC45	Pension System	L McCoy	17400
PRC64	CRM System	P Chekov	12250

EmpNo	EmpName	DeptNo	DeptName	HrlyRate
S10001	J Kirk	L004	IT	£22.00
S10030	L Jones	L023	Pensions	£18.50
S21010	P Lewis	L004	IT	£21.00
S10010	B Jones	L004	IT	£21.75
S31002	T Gilbert	L028	Database	£25.50
S13210	W Richards	L008	Salary	£17.00
S21010	P Lewis	L004	IT	£17.50
S10034	B James	L009	HR	£16.50

ProjCode	EmpNo
PRC10	S10001
PRC10	S10030
PRC10	S21010
PRC45	S10010
PRC45	S10001
PRC45	S31002
PRC45	S13210
PRC64	S31002
PRC64	S21010
PRC64	S10034

3NF

ProjCode	ProjTitle	ProjManager	ProjBudget
PRC10	Payroll System	M Scott	24500
PRC45	Pension System	L McCoy	17400
PRC64	CRM System	P Chekov	12250

EmpNo	EmpName	DeptNo	HrlyRate
S10001	J Kirk	L004	£22.00
S10030	L Jones	L023	£18.50
S21010	P Lewis	L004	£21.00
S10010	B Jones	L004	£21.75
S31002	T Gilbert	L028	£25.50
S13210	W Richards	L008	£17.00
S21010	P Lewis	L004	£17.50
S10034	B James	L009	£16.50

DeptNo	DeptName
L004	IT
L023	Pensions
L028	Database
L008	Salary
L009	HR

ProjCode	EmpNo
PRC10	S10001
PRC10	S10030
PRC10	S21010
PRC45	S10010
PRC45	S10001
PRC45	S31002
PRC45	S13210
PRC64	S31002
PRC64	S21010

5.

1NF

Oder NO.	Acc No.	Customer	Address	Data	Item	Qty.	Price	Total Coast
7823	178	Daisy's Cafe	27 Bay Drive, Cove	16-Jul	Bakewell Tart	20	0.15	£12.35
7823	178	Daisy's Cafe	28 Bay Drive, Cove	16-Jul	Danish Pastry	13	0.2	£12.35
7823	178	Daisy's Cafe	29 Bay Drive, Cove	16-Jul	Apple Pie	45	0.15	£12.35
4633	526	Smith	12 Diee View, Aberdeen	16-Jul	Butteries	120	0.2	£24.00
2276	167	Sally's Snacks	3 High Street, Banchory	17-Jul	Apple Pie	130	0.15	£56
2276	167	Sally's Snacks	4 High Street, Banchory	17-Jul	Cherry Pie	100	0.18	£56
2276	167	Sally's Snacks	5 High Street, Banchory	17-Jul	Steak Pie	30	0.5	£56
2276	167	Sally's Snacks	6 High Street, Banchory	17-Jul	Meringue Pie	20	0.2	£56
1788	32	Tasty Bite	17 Wood Place, Insch	18-Jul	Apple Pie	15	0.15	£7.5
1788	32	Tasty Bite	18 Wood Place, Insch	18-Jul	Danish Pastry	50	0.2	£7.5

1NF

Oder NO.	Acc No.	Customer	Address	Data
7823	178	Daisy's Cafe	27 Bay Drive, Cove	16-Jul
4633	526	Smith	12 Diee View, Aberdeen	16-Jul
2276	167	Sally's Snacks	3 High Street, Banchory	17-Jul
1788	32	Tasty Bite	17 Wood Place, Insch	18-Jul

Oder NO.	Item	Qty.	Price	Total Coast
7823	Bakewell	20	0.15	£12.35
7823	Danish Pa	13	0.2	£12.35
7823	Apple Pie	45	0.15	£12.35
4633	Butteries	120	0.2	£24.00
2276	Apple Pie	130	0.15	£56
2276	Cherry Pi	100	0.18	£56
2276	Steak Pie	30	0.5	£56
2276	Meringue	20	0.2	£56
1788	Apple Pie	15	0.15	£7.5
1788	Danish Pa	50	0.2	£7.5

2NF

Oder NO.	Acc No.	Customer	Address	Data
7823	178	Daisy's Cafe	27 Bay Drive, Cove	16-Jul
4633	526	Smith	12 Diee View, Aberdeen	16-Jul
2276	167	Sally's Snacks	3 High Street, Banchory	17-Jul
1788	32	Tasty Bite	17 Wood Place, Insch	18-Jul

Oder NO.	Item	Qty.	Price	Total Coast
7823	Bakewell Tart	20	0.15	£12.35
7823	Danish Pastry	13	0.2	£12.35
7823	Apple Pie	45	0.15	£12.35
4633	Butteries	120	0.2	£24.00
2276	Apple Pie	130	0.15	£56
2276	Cherry Pie	100	0.18	£56
2276	Steak Pie	30	0.5	£56
2276	Meringue Pie	20	0.2	£56
1788	Apple Pie	15	0.15	£7.5
1788	Danish Pastry	50	0.2	£7.5

6.

a. **Patient Schema:**

```
Patient (
    PatientNo VARCHAR(10) PRIMARY KEY,
    Surname VARCHAR(50),
    FirstName VARCHAR(50),
    Admitted DATE,
    Discharged DATE,
    Ward CHAR(1)
)
```

Admission Schema:

```
Admission (
    PatientNo VARCHAR(10),
    Admitted DATE,
    Discharged DATE,
    Ward CHAR(1),
    FOREIGN KEY (PatientNo) REFERENCES Patient(PatientNo)
)
```

Doctor Schema：

```
Doctor (
    DoctorNo INT PRIMARY KEY,
    Surname VARCHAR(50),
    FirstName VARCHAR(50),
    Ward CHAR(1)
)
```

Ward Schema:

```
Ward (
    Ward CHAR(1) PRIMARY KEY,
    WardName VARCHAR(50),
    DoctorNo - InCharge INT,
    FOREIGN KEY (DoctorNo - InCharge) REFERENCES Doctor(DoctorNo)
)
```

b.c.