1. B.

AId	Firstname	Lastname	dob

Here the Primary key is AId attribute

Actors Table

DId	Firstname	Lastname	dob

Here the Primary key is DId attribute

Directors Table

MRN	Title	Year	Genre

Here the Primary key is MRN attribute

Movies Table

AId	MRN

Here the Primary key is (AId,MRN) set of attributes

Starred Relationship Table

DId	MRN

Here the Primary key is (DId,MRN) set of attributes

Directed Relationship Table

1. C.

i.

SRK = $\Pi_{AId}(\sigma_{firstname = \text{“Shahrukh”}, lastname=\text{”Khan”}}(Actors))$

Ans. = $\Pi_{title, year}(\sigma_{AId = SRK}(Starred \blacktriangleright\blacktriangleleft Movies))$

ii.

SRK in part (i) is the AId of Actor “Shahrukh” “Khan”

DSRK = $\Pi_{DId}(\sigma_{firstname = \text{“Shahrukh”}, lastname=\text{”Khan”}}(Directors))$

is the DId of Director “Shahrukh Khan”

Ans. = $(\Pi_{title, year}(\sigma_{AId = SRK}(Starred \blacktriangleright\blacktriangleleft Movies))) \cap (\Pi_{title, year}(\sigma_{DId =}$

$_{DSRK}$(Directed ►◄ Movies)))

iii.
Ans. = $\sigma_{genre=”thriller”,year>2000}(\Pi_{title,\ year,\ genre}(\sigma_{AId\ =\ SRK}$(Starred ►◄ Movies)))

iv.
SRK_movies = $\Pi_{MRN}(\sigma_{AId=SRK}$(Starred ►◄Movies))
SRK_dob = $\Pi_{dob}(\sigma_{AId=SRK}$(Actors))
Ans. = $\Pi_{firstname,lastname}(\sigma_{MRN\ \epsilon\ SRK\_movies,\ AId=SRK}$(Actors►◄Starred)) ∩
$\Pi_{firstname,lastname}(\sigma_{SRK\_dob\ –\ Actors.dob\ >=\ 10}$(Actors))

v. ADM (combined table of all relationships)
= (Actors ►◄ Starred)►◄Movies►◄(Directors►◄Directed)

SADM (Combined Director and Movies Table when Shahrukh Khan was actor)
= $\sigma_{actors.firstname=”Shahrukh”,actors.lastname=”Khan”}$(ADM)

DFS (Director Frequency for Shahrukh Khan)
= $_{directors.DId,directors.firstname,directors.lastname}Count_{MRN}$(SADM)

Ans. = $Max_{no\ of\ movies}$(DFS)

1. D.
SQL commands:

```
>create database seleri;
>use seleri;
>create table actors ( A_ID INT UNSIGNED NOT NULL,
->firstname varchar(21), lastname varchar(21), dob DATE);
>create table directors ( D_ID INT UNSIGNED NOT NULL,
->firstname varchar(21), lastname varchar(21), dob DATE );
>create table movies ( MRN INT UNSIGNED NOT NULL,
```

```
->title varchar(30), year INT(4) UNSIGNED, genre varchar(18) );
>create table starred ( A_ID INT UNSIGNED NOT NULL,
->MRN INT UNSIGNED NOT NULL );
>create table directed ( D_ID INT UNSIGNED NOT NULL,
->MRN INT UNSIGNED NOT NULL );

>show tables;
>describe actors;
+----------+-----------------+------+-----+---------+-------+
| Field    | Type            | Null | Key | Default | Extra |
+----------+-----------------+------+-----+---------+-------+
| A_ID     | int(10) unsigned | NO   |     | NULL    |       |
| firstname | varchar(21)     | YES  |     | NULL    |       |
| lastname  | varchar(21)     | YES  |     | NULL    |       |
| dob      | date            | YES  |     | NULL    |       |
+----------+-----------------+------+-----+---------+-------+
4 rows in set (0.00 sec)
>alter table actors add primary key (A_ID);
>alter table directors add primary key (D_ID);
>alter table movies add primary key (MRN);
>alter table starred add primary key (A_ID,MRN);
#setting composite key
>alter table directed add primary key (D_ID,MRN);

>insert into actors set A_ID=30039, firstname="Shahrukh",
->lastname="Khan", dob="1965-11-02";
> select * from actors;
+-------+----------+---------+-----------+
| A_ID  | firstname | lastname | dob       |
+-------+----------+---------+-----------+
| 30039 | Shahrukh  | Khan     | 1965-11-02 |
+-------+----------+---------+-----------+
1 row in set (0.00 sec)
>insert into actors set A_ID=10034, firstname="Amitabh",
->lastname="Bachchan", dob="1942-10-11";
```

```
>insert into actors set A_ID=60003, firstname="Esha",
->lastname="Gupta", dob="1985-11-28";

>insert into directors set D_ID=4123, firstname="Rohit",
->lastname="Shetty", dob="1976-11-28";
>insert into directors set D_ID=3123, firstname="Farah",
->lastname="Khan", dob="1980-12-06";
>insert into directors set D_ID=7223, firstname="Shahrukh",
->lastname="Khan", dob="1965-11-02";
>insert into directors set D_ID=3423, firstname="R.",
->lastname="Balki", dob="1955-11-02";
>insert into directors set D_ID=4253, firstname="Prakash",
->lastname="Jha", dob="1961-11-02";

>insert into movies set MRN=129623, title="Om Shanti Om",
->year=2007, genre="comedy";
>insert into movies set MRN=152623, title="Chennai Express",
->year=2013, genre="thriller";
>insert into movies set MRN=212623, title="kalu ram",
->year=2017, genre="comedy";
>insert into movies set MRN=135423, title="Chakravyuh",
->year=2012, genre="war";
>insert into movies set MRN=121423, title="Paa", year=2009,
->genre="drama";

>insert into directed set D_ID=3423, MRN=121423;
>insert into directed set D_ID=3123, MRN=129623;
>insert into directed set D_ID=4253, MRN=135423;
>insert into directed set D_ID=4123, MRN=152623;
>insert into directed set D_ID=7223, MRN=212623;

>insert into starred set A_ID=10034, MRN=121423;
>insert into starred set A_ID=30039, MRN=129623;
>insert into starred set A_ID=30039, MRN=152623;
>insert into starred set A_ID=50307, MRN=129623;
```

>insert into starred set A_ID=50307, MRN=152623;
>insert into starred set A_ID=30039, MRN=212623;
>insert into starred set A_ID=60003, MRN=135423;
SQL Queries:
i)
>select title, year from starred, movies where starred.MRN =
->movies.MRN and starred.A_ID in (select A_ID from actors
->where actors.firstname="Shahrukh" and
->actors.lastname="Khan"); ###execution time: (0.00 sec)
or,
>select title, year from starred natural join movies where A_ID in
->(select actors.A_ID from actors where
->actors.firstname="Shahrukh" and actors.lastname="Khan");
###execution time: (0.01 sec)

ii)
>select title, year from starred, movies where starred.MRN =
->movies.MRN and starred.A_ID in (select a.A_ID from actors as
->a where a.firstname="Shahrukh" and a.lastname="Khan") and
->movies.MRN in (select directed.MRN from directed, movies
->where directed.MRN = movies.MRN and directed.D_ID in
->(select directors.D_ID from directors where
->directors.firstname="Shahrukh" and
->directors.lastname="Khan"));

iii)
>select title, year, genre from starred, movies where
->starred.MRN=movies.MRN and starred.A_ID in (select a.A_ID
->from actors as a where a.firstname="Shahrukh" and
->a.lastname="Khan") and movies.genre="thriller" and
->year>2000;

iv)
>select actors.firstname, actors.lastname from actors, starred
->where actors.A_ID=starred.A_ID and starred.MRN in (select

```
->starred.MRN from starred, movies where
->starred.MRN=movies.MRN and starred.A_ID in (select a.A_ID
->from actors as a where a.firstname="Shahrukh" and
->a.lastname="Khan")) and starred.A_ID not in (select a.A_ID
->from actors as a where a.firstname="Shahrukh" and
->a.lastname="Khan") and actors.A_ID in (select b.A_ID from
->actors as a, actors as b where (YEAR(a.dob)-YEAR(b.dob)--
>(DATE_FORMAT(a.dob, '%m%d') < DATE_FORMAT(b.dob,
->'%m%d')) <= -10));
```

v)

```
>select max(dcount), did, df, dl from (select count(movies.MRN)
->as dcount, directors.D_ID as did, directors.firstname as df,
->directors.lastname as dl from actors, starred, directors, directed,
->movies where actors.A_ID = starred.A_ID and directors.D_ID =
->directed.D_ID and starred.MRN = movies.MRN and
->directed.MRN = movies.MRN and actors.firstname =
->"Shahrukh" and actors.lastname = "Khan" group by did) as
->dfrequency;
```