

**Index****QUESTIONS # 1****10 marks**

Use the **Index&Views.sql** file only to insert data into the database. Then, perform the following tasks directly in your SQL environment.

1. Create an index named **DeptIndex** on the EMP table for the department number column to improve the speed of department-based queries.
2. Create a composite index named **EmpSearchIndex** on the EMP table for the columns employee name and city to optimize search queries involving these two fields.
3. Retrieve all records from the EMP table where salary is greater than 2500 using an index to enhance the query's performance.
4. Create an index on the **hire\_date** column and then retrieve all employees hired within a specific date range.
5. Drop the **DeptIndex** index created on the department number column. Verify that it has been removed from the EMP table indexes.

**Views****QUESTIONS # 1****10 marks**

Describe the differences between **Virtual** and **Materialized views** regarding data storage, performance, and data freshness.

**Example Scenario:**

- Describe a scenario where a **virtual view** is ideal, explaining why data freshness is important.
- Describe a scenario where a **materialized view** is ideal, explaining why performance is prioritized over data freshness.

**QUESTIONS # 2****10 marks**

Use the **Index&Views.sql** file only to insert data into the database. Then, perform the following tasks directly in your SQL environment.

1. Create a view with named as DisplayEmp , which contains employee name, number, salary and department number from EMP table.
2. Display all records from DisplayEmp where employee numbers are 7839, 7788 and 7521.
3. Update any employee name as your “name”.
4. Create a view with named as DisplayDept , which contains department name, number and location from DEPT table.
5. Delete all views.

**DCL****QUESTIONS # 1****9 marks**

1. Define Data Control Language (DCL) in your own words. Explain why DCL is important in managing data in a database.
2. Write the syntax for the **GRANT** command. Explain what each part of the command does.
3. Write the syntax for the **REVOKE** command. Explain what each part of the command does.

**QUESTIONS # 2****15 marks**

**Scenario:** You are a Database Administrator (DBA) for a school database. The database has two tables: Student and Teacher.

**Tasks (3 Marks each Sub-Point)**

1. **Create Roles and Grant Permissions:**
  - Grant a role called AdminRole with permissions to SELECT, INSERT, DELETE, and UPDATE data in both the Student and Teacher tables.
  - Grant a role called StudentRole with permission to SELECT data from only the Student table.
2. **Assign Roles to Users:**
  - Assign the AdminRole to a user named Sarah.
  - Assign the StudentRole to a user named John.
3. **Modify Role Permissions:**
  - Revoke the DELETE permission on the Teacher table from the AdminRole.

**Normalization****PART A****QUESTIONS # 1:****10 marks**

StdSSN	StdCity	StdClass	OfferNo	OffTerm	OffYear	EnrGrade	CourseNo	CrsDesc
S1	SEATTLE	JUN	O1	FALL	2006	3.5	C1	DB
S1	SEATTLE	JUN	O2	FALL	2006	3.3	C2	VB
S2	BOTHELL	JUN	O3	SPRING	2007	3.1	C3	OO
S2	BOTHELL	JUN	O2	FALL	2006	3.4	C2	VB

1. What do you mean by anomalies and why it is present in relation?
2. Discuss different type of anomalies in above table

**QUESTIONS # 2:****10 marks****StaffBranch Table**

staffNo	name	position	salary	branchNo	branchAddress	telNo
S1500	Tom Daniels	Manager	46000	B001	8 Jefferson Way, Portland, OR 97201	503-555-3618
S0003	Sally Adams	Assistant	30000	B001	8 Jefferson Way, Portland, OR 97201	503-555-3618
S0010	Mary Martinez	Manager	50000	B002	City Center Plaza, Seattle, WA 98122	206-555-6756
S3250	Robert Chin	Supervisor	32000	B002	City Center Plaza, Seattle, WA 98122	206-555-6756
S2250	Sally Stern	Manager	48000	B004	16 – 14th Avenue, Seattle, WA 98128	206-555-3131
S0415	Art Peters	Manager	41000	B003	14 – 8th Avenue, New York, NY 10012	212-371-3000

1. Do any anomalies exist in above relation? If yes explain each anomaly in above relation
2. Normalize the above relation to 3NF

**PART B****QUESTIONS # 1:****15 marks**Apply 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> Normal Form the following scenario

Project Management Report				
<b>Project Code:</b>		PC010		
<b>Project Title:</b>		Pensions System		
<b>Project Manager:</b>		M Phillips		
£24,500		<b>Project Budget:</b>		
Employee No.	Employee Name	Department No.	Department Name	Hourly Rate
=====				
S10001	A Smith	L004	IT	£22.00
S10030	L Jones	L023	Pensions	£18.50
S21010	P Lewis	L004	IT	£21.00
S00232	R Smith	L003	Programming	£26.00
=====				
<b>Total Staff on Project: 4</b>			<b>Average Hourly Rate:</b>	£21.88
<div style="text-align: center;"> </div>				

## QUESTIONS # 2:

9 marks

<i>branchNo</i>	<i>branchAddress</i>	<i>telNos</i>
B001	8 Jefferson Way, Portland, OR 97201	503-555-3618, 503-555-2727, 503-555-6534
B002	City Center Plaza, Seattle, WA 98122	206-555-6756, 206-555-8836
B003	14 – 8th Avenue, New York, NY 10012	212-371-3000
B004	16 – 14th Avenue, Seattle, WA 98128	206-555-3131, 206-555-4112

1. Why is this table not in 1NF?
2. Describe and illustrate the process of normalizing the data shown in this table to third normal form (3NF).
3. Identify the primary, alternate and foreign keys in your 3NF relations.

## QUESTIONS # 3:

12 marks

<i>staffNo</i>	<i>branchNo</i>	<i>branchAddress</i>	<i>name</i>	<i>position</i>	<i>hoursPerWeek</i>
S4555	B002	City Center Plaza, Seattle, WA 98122	Ellen Layman	Assistant	16
S4555	B004	16 – 14th Avenue, Seattle, WA 98128	Ellen Layman	Assistant	9
S4612	B002	City Center Plaza, Seattle, WA 98122	Dave Sinclair	Assistant	14
S4612	B004	16 – 14th Avenue, Seattle, WA 98128	Dave Sinclair	Assistant	10

1. Is this relation is in 1<sup>st</sup> NF?
2. Check if it is in 2NF
3. Normalized the relation in 3NF
4. Identify the primary, (alternate) and foreign keys in your 3NF relations.

## QUESTIONS # 4:

9 marks

<i>branchNo</i>	<i>branchAddress</i>	<i>telNo</i>	<i>mgrStaffNo</i>	<i>name</i>
B001	8 Jefferson Way, Portland, OR 97201	503-555-3618	S1500	Tom Daniels
B002	City Center Plaza, Seattle, WA 98122	206-555-6756	S0010	Mary Martinez
B003	14 – 8th Avenue, New York, NY 10012	212-371-3000	S0145	Art Peters
B004	16 – 14th Avenue, Seattle, WA 98128	206-555-3131	S2250	Sally Stern

1. Why is this table not in 3NF?
2. Describe and illustrate the process of normalizing the data shown in this table to third normal form (3NF).
3. Identify the primary, (alternate) and foreign keys in your 3NF relations

**QUESTIONS # 5:****15 marks**

Consider the data in the table below:

Emp_id	Emp_name	Emp_address	Emp_mobile
101	Herschel	New Delhi	8912312390
102	Jon	Kanpur	8812121212 9900012222
103	Ron	Chennai	7778881212
104	Lester	Banglore	9990000123 8123450987

**Required:**Study the above table and normalize it up to 3<sup>rd</sup> NF.**QUESTIONS # 6:****14 marks****1. Events**

Event_Name	Event Type	Event Coordinator
Basket Ball	Sports	Mr. Adeel
Futsal	Sports	Mr. Adeel
Rob maze	EE	Mr. Adeel
Badminton	Sports	Mr. Adeel
Speed Programming	CS	Mr. Adeel
Taken Tag	Gaming	Mr. Adeel
BUSINESS IDEAS	Management	Mr. Adeel

**2. Timeline**

Time	Day	Location
08:00-09:45	Day 1	Front ground, 101
05:00-06:30	Day 2	Cricket Ground
04:00-05:53	Day 3	Futsal Ground, 102
03:45-09:00	Day 1	Main Lobby, 101

**3. Society**

Society_id	Society Name	Organizer_id
So-001	FAS	O-001
So-004	FEGS	O-005
So-002	Rang	O-003
So-007	Arts	O-003
So-003	Business	O-006
So-009	FCAP	O-004

**4. Event Organizer**

Organizer_id	Organizer Name	Organizer-Office-Address	Organizer_Dept
O-001	Mr. Zeeshan	CS-11	CS
O-004	Mr. Amir	F-208	MG
O-003	Mr. Usman	CS-09	CS
O-006	Mr. Habib	CS-08	CS
O-005	Mr. Adeel	CS-14	CS

**5. Media/ Sponsorships**

Sponsor-Id	Sponsor-Name	sponsored-amount
S0019	HBL	4,000
FD00120000	City FM 93	5,999
XM0213212	Okays Bristo	10,000
XMN009	Roof Top Rest	98,000
S000563	Fork n knife	1,245
S00125634	Bahria Town	19,000
S001	Gawadar Golf City	2,1053

**7. Participants**

P-Name	P-Affiliation Type 'Not Null'	Event_Name
Ali	UCP	Basket Ball
Adeel	GC-FSD	Futsal
Faheem	FAST-CFD	Rob maze
Azeem	FAST-ISB	Badminton
Asif	LUMS	Speed Programming
Zain	NUST	Taken Tag
Zainab	Arid University	BUSINESS IDEAS



Consider the above given tables, and answer the following Questions:

- I. Identify the **Update Anomaly** in the above database, discuss how it can be resolved.
- II. What will happen on anomalies (Insert, Delete, Update (**Any**)), if we change the type of attribute '*P-Affiliation*' may Null of table '*Participants*'?
- III. Identify the **Delete Anomaly** in the above database, discuss how it can be resolved.
- IV. Identify **Insert Anomaly** in the above database.
- V. Identify which table(s) in the above database is not in First Normal Form. (1NF). Convert above database in (1NF) if identified.
- VI. Identify which table(s) in the above database is not is Second Normal Form. (2NF). Convert above database in (2NF) if identified.
- VII. Identify which table(s) in the above database is not in Third Normal Form. (3NF). And define by giving example if the above database is currently in (3NF).

### QUESTIONS #7:

16 marks

Examine the table shown below and answer the following questions :

<u>Emp_ID</u>	<u>Name</u>	<u>Dept_Id</u>	<u>Dept_Name</u>	<u>Salary</u>	<u>Course_ID</u>	<u>Course_Title</u>	<u>Date_Completed</u>
20	Amna	D03	Finance	78000	C002	DBS	02/02/2019
20	Amna	D03	Finance	78000	C098	CCS	09/03/2015
40	Umar	DT12	Testing	65000	C34	JAVA	25/04/2015
10	Saad	DP6	Planning	23000	C002	DBS	16/02/2016
10	Saad	DP6	Planning	23000	CD34	PM	16/02/2014
80	Sadia	DA3	Auditing	45000	C450	Tax Access	25/04/2016
50	Alia	D03	Finance	34000	C002	DBS	01/02/2019
50	Alia	D03	Finance	34000	CA23	ACCA	09/03/2015

1. Is this table in 1 NF?
2. how so? If not then convert it into 1 NF
3. Is this table in 2 NF?
4. how so? If not then convert it into 2 NF
5. identify the primary key and foreign key in your 2NF tables.
6. are resulting tables in 3NF?
7. how so? If not then convert them further into 3NF

8. identify the primary key and foreign key in your 3NF tables.
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**Submission Guidelines:**

- Do all the tasks in the given sequence.
- **Use A4 paper** for any handwritten parts.
- Plagiarism is strictly prohibited; assignment will be marked zero if plagiarized.
- Assignment should be submitted online with the naming scheme as “22FXXXX\_DB\_A#”
- To be submitted on classroom. Late submission is not allowed.
- Total Marks 154

**GOOD LUCK** 😊