Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

ESE Question Paper

Subject: **Database Management Systems**

Class: Second Year (Comp / IT)

Max. Marks: 60 **Duration: 2 Hours**

Note:

1) All questions are compulsory
2) All questions carry equal marks
3) Correctly executing query will get marks
4) Make assumptions wherever needed and indicate in the answer sheet.

<table>
<tr><th>QNo</th><th>Question</th><th>Marks</th><th>CO</th></tr>
<tr><td>Q1 a)</td><td>Consider the following schema:

R (a, b, c, d) S (x, y, z) T (a, x)

Draw optimized query tree for following query of the above relation. (Justify your answer at each step)

$\Pi_{R.b, S.y}(((\Pi_{S.x,S.y}(S)) \bowtie (T \bowtie (\sigma_{R.d}=\text{'DBMS'}(\Pi_{R.a, R.b, R.d}(R)))))$</td><td>5</td><td>5</td></tr>
<tr><td>b)</td><td>Describe linear search algorithm to implement the selection operation while processing a query.</td><td>5</td><td>5</td></tr>
<tr><td>Q2 a)</td><td>Write following query in SQL

Consider the following relation Student for question (i, ii, iii)

<table>
<tr><th colspan="5">Student</th></tr>
<tr><td>Uid</td><td>Dept</td><td>Name</td><td>Subject</td><td>Marks</td></tr>
<tr><td>789</td><td>CS</td><td>Gopi</td><td>DBMS</td><td>80</td></tr>
<tr><td>234</td><td>IT</td><td>Aarushi</td><td>OS</td><td>78</td></tr>
<tr><td>345</td><td>CS</td><td>Ram</td><td>DBMS</td><td>89</td></tr>
<tr><td>567</td><td>EXTC</td><td>Aman</td><td>DBMS</td><td>58</td></tr>
<tr><td>678</td><td>EXTC</td><td>Nishad</td><td>DBMS</td><td>48</td></tr>
</table>
</td><td>5</td><td>2</td></tr>
</table>

i) Write a query to display following output.

Uid	Name	Marks
234	Aarushi	78
567	Aman	58

ii) Write a query to display following output.

Dept	Marks
CS	169
IT	78

iii) Write a query to find Uid and Name whose Marks is greater than or equal to 70 but less than or equal to 89.

iv) Consider the following relation Department

Department			
Dept_name	Incharge_name	No_of_student	No of faculty
CS-1	Prof. ROY	200	17
CS-2	Prof. RIYA	120	16
IT	Prof. SAYAN	120	15
EXTC	Prof. PRIYA	180	18

Create a view as Info on Department table with Dept name and No_of_studnet that enlist Department whose Incharge_name ends with "A".

v) Suppose there are two relations R and S as follows:

R		
A	B	C
1	3	P
2	5	Q
3	2	Q

S		
A	C	D
5	Q	3
6	R	3
7	S	4

Write a query to get following output.

R.A	R.B	R.C	S.A	S.C	S.D
1	3	P	5	Q	3
1	3	P	6	R	3
1	3	P	7	S	4
3	2	Q	5	Q	3
3	2	Q	6	R	3
3	2	Q	7	S	4

<table>
<tr><td>b)</td><td>Write a store procedure to compare three numbers and display the minimum number.</td><td>5</td><td>2</td></tr>
<tr><td>Q3)

i)

ii)

iii)

iv)

v)</td><td>Write following query in relational algebra

Consider the relations

AUTHOR (AUTHORID, NAME, LOCATION)

BOOK (BOOKNAME, AUTHORID)

Write a query to find Names of all BOOK written by “Dr.Subhash“

Consider the relation

STUDENT (ID, RANK, MARKS, SCHOOL)

Write a query to find “Rank of all students of ABS International school, whose marks is greater than 80”.

Consider the following instance:

<table><tr><td colspan="2">Student</td></tr><tr><td>Name</td><td>Sport</td></tr><tr><td>Aayush</td><td>Cricket</td></tr><tr><td>Sonia</td><td>Cricket</td></tr><tr><td>Ranjit</td><td>Football</td></tr><tr><td>Subhash</td><td>Badminton</td></tr><tr><td>Ram</td><td>Basketball</td></tr><tr><td>Aayush</td><td>Basketball</td></tr><tr><td>Aayush</td><td>Football</td></tr></table>
<table><tr><td>Order</td></tr><tr><td>Sport</td></tr><tr><td>Cricket</td></tr><tr><td>Football</td></tr><tr><td>Basketball</td></tr></table>
Write a query to display Name as “Aayush”

Consider the following relation for (Q3-iv,v)

Student (id, name)

enrolled In (id, code)

subject (code, lecture)

Write a query to find name of students in both IT-101 and IT-301

Write a query to find names of students taking subject taught by Prof. Ram</td><td>10</td><td>2</td></tr>
</table>

<table>
<tr><td>Q4 a)</td><td>Consider the following schedule S of Transactions T1, T2, T3 and T4.
T2: R(Y); T2: R(X); T3: R(X); T3: commit; T1: W(X); T2: W(Y); T2: R(Z); T2: commit; T4: R(X); T4: R(Y); T1: W(Z); T1: commit; T4: commit

Prove or Disprove

1) S is conflict serializable
2) S is recoverable
3) S is cascadeless schedule

OR

Consider following schedules where S1 and S2 consist of transactions (T1, T2 and T3); and S3 and S4 consist of transactions (T1 and T2).
S1: W1(X) W2(X) R3(X)
S2: W1(X) R3(X) W2(X)
S3: R1(X) W2(X) W1(X)
S4: R1(X) W1(X) W2(X)
Prove or Disprove

1) schedule S1 and S2 are not view equivalent
2) schedule S3 and S4 are not view equivalent</td><td>

3
1
1

5</td><td>4</td></tr>
<tr><td>b)</td><td>Consider the partial schedule

<table><tr><td>T1</td><td>T2</td></tr><tr><td>Lock-x(B)</td><td></td></tr><tr><td>Read (B)</td><td></td></tr><tr><td>B=B-50</td><td></td></tr><tr><td>Write (B)</td><td></td></tr><tr><td></td><td>Lock-s(A)</td></tr><tr><td></td><td>read(A)</td></tr><tr><td></td><td>Lock-s(B)</td></tr><tr><td>Lock-x(A)</td><td></td></tr></table>1) Is the above schedule suffer with deadlock? Justify your answer with graph.
2) Discuss deadlock prevention strategies with the help of above schedule.</td><td>

2

3</td><td></td></tr>
<tr><td>Q5 a)</td><td>Consider the following relation R with given FD.
R (P Q R S T U)

FD: {PQ→R, R→ST, T→U, U→P}
1) Find candidate key of R
2) Write Prime and Non-Prime Attribute.
3) Identify the highest normal Form for relation R</td><td>

1
1
3</td><td>3</td></tr>
</table>

b)	Consider the relation NewsPaper (PaperName, ArticleNo, Reporter, Editor) with the following functional dependencies: FD1: {PaperName, ArticleNo} → Reporter FD2: {ArticleNo, Reporter} → Editor Define and decompose the relation NewsPaper in to BCNF OR With the help of example discuss Lossy and Lossless Join Decomposition.	5	
Q6)	Draw E-R model for following case study 'Hospital Management System' XYZ hospital is a multi-specialty hospital that includes several departments, rooms, doctors, nurses, compounders, and other staff working in the hospital. Patients having different kinds of ailments come to the hospital and get checkup done from the concerned doctors. If required, they are admitted in the hospital and discharged after treatment. It also maintains records of the regular patients, patients admitted in the hospital, the checkup of patients done by the doctors, the patients that have been operated, and patients discharged from the hospital. According to the ailments, the doctor either prescribes medicine or admits the patient in the concerned department. The patient may choose either private or general room according to his/her need. But before getting admission in the hospital, the patient must fulfill certain formalities of the hospital like room charges, etc. After the treatment is completed, the doctor discharges the patient. Before discharging from the hospital, the patient again must complete certain formalities of the hospital like balance charges, test charges, operation charges (if any), blood charges, doctors' charges, etc. There are two types of the doctors in the hospital, namely, regular doctors and call on doctors. Regular doctors are those doctors who come to the hospital daily. Calls on doctors are those doctors who are called by the hospital if the concerned doctor is not available.	10	1