Instructions: 1. **Total Marks: 20   Duration 1 Hour (11 AM – 12 Noon)**
2. Date: **27-03-2021**
3. **Write your Roll Number, Name and upload pdf file in Microsoft Team**

1. Consider the following scheme of a hotel database with relations
   Hotel (Hotel_ID, Hotel_name, location)
   Rooms (Hotel_ID, Room_no, type, rent)
   Booking (Hotel_ID, Room_no, Tourist_ID, Entry_date, Departure_date)
   Tourist (Tourist_ID, Tourist_name, Tourist_city)

   Express the following queries in **SQL**:
   a) Display the vacant room numbers of Hotel Park at Kharagpur on 27.3.2021
   b) Display the name of tourists who have stayed in all hotels located in Kharagpur.
   c) Find the name of the hotel whose deluxe type room rent is highest.

   (3M)

2. Consider the following database scheme:
   Client (Client_no, Client_name, Address)
   Project (Project_no, Project_name, Client_no)
   Consultant (Consultant_no, Consultant_name)
   Assignment (Consultant_no, Project_no, rate)

   Express the following queries in QUEL:
   a) Find the consultant names who are associated either in the project P_1 or in the project P_2.
   b) Find the project names and the corresponding clients where rate is more than Rs 5000.
   c) Find the client numbers and the corresponding rate of the project who have not chosen Mr. XYZ as consultant.

   (3M)

3. Consider the following relation R(Course, S_ID, Grade):

	Course	S_ID	Grade
R_0	DMS	2100	18
R_1	ITP	2157	18
R_2	ITP	2230	30
R_3	DMS	2177	24
R_4	OS	2340	30
R_5	ITP	2200	23
R_6	DMS	2157	28
R_7	DB	2300	30
R_8	DMS	2263	25
R_9	DB	2299	28

Show the following index structures and file organizations:

a) An indexed sequential file organization with a primary sparse index on S_ID. For a search key K, an index entry is created if $K \bmod 100 = 0$

b) On top of the index-sequential structure created in (a) above, develop a secondary B^+-tree index on Grade. Assume order of B^+-tree as 1. The tuples are read sequentially as stored in the index-sequential file given in (a).

c) A hash file organization using extendible hashing on Grade and the hash function $h(v) = v \bmod 8$. Each bucket holds at most 2 tuples. Show the structure after inserting R_0 - R_4 and after inserting all tuples.

(3M+3M+3M)

4. a) Outline essential features of a heap file organization. For what kind of operations, heap file organization is most suitable? Justify your answer.

   b) If a hash structure is used on a search key for which range queries are likely, what property should the hash function possesses?

(3M+2M)

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