INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

ROORKEE – 247667

Database Management Systems (CSN-351)

Sheet: 1

Total Marks: 100

Instructions:

- The deadline for assignment submission is **24 August till 11:59 PM**.
- If there is any similarity between the two students' submissions, both will be awarded **zero marks**. So, it's the student's responsibility not to share the submission with other students.
- Each late submission will receive a 15% penalty per day for up to 2 days. No submission will be accepted after the 2nd late day.
- You must handwrite your solutions; please scan the hard copy and convert it into a PDF with your name and enrolment number. Your name and roll number should be clearly written on the top of the first page.
- Please do not email us your submissions.
- Your submission must be uploaded to the Microsoft team.
- For questions five to seven, mention all the steps clearly; otherwise, you will lose marks.

Que. 1: What are the advantages of DBMS over the file processing system? When would it make sense not to use a database system? [15 Marks]

Que. 2: Explain the difference between the view(external), physical(internal), and logical (conceptual) schemas. How are these different schema layers related to the concept of logical and physical data independence? [15 Marks]

Que. 3: List the reasons why null values might be introduced into the database? [5 Marks]

Que. 4: What are the design goals for relational databases, and explain why each is desirable?

[15 Marks]

Que. 5: Let R be a relation schema and F be a set of functional dependencies on R. Find all Candidate Key(s) for relation R? *[25 Marks]*

i. *R(ABCDE)*
   F= {AB->C, C->D, D->E, A->B, C->A}
ii. *R(ABCDE)*
   F = {A->D, AB->C, B->E, D->C, E->A}
iii. *R(ABCDE)*
   F = {AB -> C, C -> D, D -> E, E -> A, D -> B}
iv. *R(ABCDEF)*
   F = {AB -> C, C -> DE, E -> F, F -> A}
v. *R(ABCDEFGH)*
   F = {AB -> CD, D -> EG, F -> H, C -> EF, H -> A, G -> B, A -> B}

Que. 6: Let *R(ABCDEFGHIJ)* be a relation schema and *F = {AB -> C, A -> DE, B -> F, F ->GH, D ->IJ}* be a set of functional dependencies on *R*. Determine the schema is lossless or lossy for the following decomposition? [15 Marks]

i. D1 = {ABC, ADE, BF, FGH, DIJ}
ii. D2 = {ABCDE, BFGH, DIJ}
iii. D3 = {ABCD, DE, BF, FGH, DIJ}

Que. 7: Let R(ABCDEG) be a relation schema and F = {AB -> C, AC -> B, AD -> E, B -> D, BC -> A, E -> G} be a set of functional dependencies on *R.* Determine the following decomposition is dependency preserving or not? [10 Marks]

i. D1 = {ABC, ACDE, ADG}
ii. D2 = {ABC, ADEG}