

Undergraduate Examination 2018
Semester-III
Computer Science
Generic Elective Course (GEC-3)
(Introduction to Database System)

Time : 3 Hours

Full Marks : 40

Questions are of value as indicated in the margin

Answer Question No.1 and **any four** from the rest

1. Answer **any four** questions : 4×2=8
- Distinguish between a prime attribute and a non-prime attribute.
 - Define Super key and Candidate key.
 - Let $F = \{A \rightarrow B, B \rightarrow C, AB \rightarrow D\}$ and $G = \{A \rightarrow B, B \rightarrow C, A \rightarrow C, A \rightarrow D\}$ be two Dets of functional dependencies. Show that “F is equivalent to G”.
 - What is “Data Redundancy” and “Atomicity”?
 - Discuss the significance of *Integrity constraints*.
 - Explain *Natural Join* operation with example.
2. The Motor Vehicle Branch administers driving tests and issues driver’s licenses. Any person who wants a driver’s license must first take a learner’s examination at any Motor Vehicle Branch in the province. If he/she fails the examination he/she can take the examination again any time after a week of the failed exam date, at any branch. If he/she passes the examination he/she is issued a license of type learner’s with unique license number. A learner’s license may contain a single restriction on it. The person may take his/her driver’s examination at any branch any time before the learner’s license expiry date. If he/she passes the examination the branch issues him/her a driver’s license. A driver’s license must also record if the driver has completed driver’s education for insurance purposes.
- Identify the entity sets and the relationships among them.
 - Draw an E-R diagram for the database.
 - Obtain the corresponding relational schema. 2+4+2=8
3. a) What is physical data independence?
b) Write down the advantages of Entity Relationship Diagram
c) Write down the differences between DDL and DML.
d) What is Referential Integrity? 2+2+2+2=8
4. a) Write down an algorithm to obtain keys of a given relation.
b) Given the relation: $R(A, B, C, D, E, F, G, H)$ with following functional dependencies:
 $CH \rightarrow G, A \rightarrow BC, B \rightarrow CFH, E \rightarrow A, F \rightarrow EG$
Obtain:
i) candidate key(s) of R.
ii) A minimal set of FD.

(2)

- iii) The Normal form to which R belongs. 2+(2+2+2)=8
5. a) What is normalization?
b) Why normalization is needed in database design?
c) Define functional dependency in database design.
d) Explain partial and transitive functional dependencies with example. 1+3+1+(1.5+1.5)=8
6. a) Consider the following database and write down following queries in SQL:
University Database:
department (dept_name, building, budget)
course(course_id, title, dept_name, credits)
instructor(I_ID, name, dept_name, salary)
section(course_id, sec_id, semester, year, building, room_number, time_slot_id)
teaches(I_ID, course_id, sec_id, semester, year)
student(S_ID, name, dept_name, tot_cred)
takes(S_ID, course_id, sec_id, semester, year, grade)
adviser(S_ID, I_ID)
- i) Find the average salary of instructors in the Computer Science department.
ii) Find the average salary of instructor in each department.
iii) Find all the courses taught in the Fall 2009 semester but not in the Spring 2010 semester.
iv) Find the names of all instructors whose salary is greater than at least one instructor in the Biology department.
v) For all instructors in the university who have taught some course, find their names and the course ID of all courses they taught. 1+1+2+2+2=8
7. a) What is key difference between the Logical view and User view of Database?
b) Discuss the difference between *Selection* and *Projection* Operator in Relational algebra.
c) With example, discuss *weak* entity set.
d) Primary key should be “NOT NULL” – what does it mean? 2+2+2+2=8
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