Registration No. : | | | | | | | | | | |

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B. Tech

BECS 2208

Third Semester Regular Examination – 2014

DATABASE MANAGEMENT SYSTEM

BRANCH : MECH

QUESTION CODE : H 375

Full Marks – 70

Time – 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

   (a) What is data abstraction ?

   (b) What is the difference between multivalued attribute and composite attribute ?

   (c) What is the difference between DDL and DML ?

   (d) What is referential integrity constraint ?

   (e) What are the properties of good decomposition ?

   (f) What is the difference between cover and minimal cover ?

   (g) What is the difference between syntactic and semantic error ?

   (h) What are the properties of a transaction ?

   (i) What is cascading rollback ?

   (j) What is the difference between Serial schedule and serializable scheduule?

2. (a) To address the issue of data independence, the ANSI-SPARC three-level architecture was proposed. Compare and contrast the three levels of this model. 5

   (b) Compare and contrast the features of object based, record based and physical data models. 5

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3. (a) Discuss the differences between the candidate keys and the primary key of a relation. Explain what is meant by a foreign key. How do foreign keys of relations relate to candidate keys. Give examples to illustrate your answer. 5

(b) Explain the phases of query processing and optimization. 5

4. (a) Construct an ER diagram for a hospital with a set of patients and a set of medical doctors. A patient may be admitted to the hospital after a check up in OPD. Various tests may be conducted on patients. Rooms/Beds may be allotted to the patients on availability by the office. The patient may be released only after clearing all bills. 5

(b) Construct appropriate tables for the above E-R diagram. 5

5. Consider the following Schema :

Hotel (*hotelNo*, *hotelName*, *city*)

Room (*roomNo*, *hotelNo*, *type*, *price*)

Booking (*hotelNo*, *guestNo*, *dateFrom*, *dateTo*, *roomNo*)

Guest (*guestNo*, *guestName*, *guestAddress*)

(a) Express the following queries in SQL : 5

(i) What the average price of a room ?

(ii) List the bookings for which no dateTo has been specified.

(b) Express the following queries in relational algebra : 5

(i) List the price and type of all rooms at the Ginger hotel.

(ii) List all guests currently staying at Hotel Crown.

6. (a) What is the highest normal form of each of the following relations ? 6

(i) R_1 (A, B, C) with A $\rightarrow$ B, A $\rightarrow$ C, C $\rightarrow$ B.

(ii) R_2 (A, B, C, D) with A $\rightarrow$ BC, CD $\rightarrow$ B.

(iii) R_3 (A, B, C, D, E) with A $\rightarrow$ BC, E $\rightarrow$ A, CD $\rightarrow$ E.

Find the candidate keys for each of these relations.

(b) Consider the relation R (A, B, C, D, E) with a set of functional dependencies $F = \{A \rightarrow C, B \rightarrow C, C \rightarrow D, DE \rightarrow C, CE \rightarrow A\}$. Is the decomposition of R into R_1 (A, D), R_2 (A, B), R_3 (B, E), R_4 (C, D, E) and R_5 (A, E) lossless ? 4

7. (a) What is a timestamp ? How do timestamp-based protocols for concurrency control differ from locking based protocols ? 5

(b) What is 2PL ? Explain how 2PL guarantees serializability. 5

8. Write short notes on any two of the following : 5×2

(a) Different types of data base failures.

(b) Object oriented data model.

(c) ARIS algorithm.