MANIPAL INSTITUTE OF TECHNOLOGY, MANIPAL 576104
(Constituent College of Manipal University)

FIFTH SEMESTER B.TECH. (CCE) DEGREE END SEMESTER EXAMINATION NOV/DEC – 2015
SUBJECT: DATABASE SYSTEMS – ICT 357
(REVISED CREDIT SYSTEM)

TIME: 3 HOURS	02/12/2015	MAX. MARKS: 50

Instructions to candidates
- Answer any **FIVE FULL** questions.
- Missing data, if any, may be suitably assumed.

1A. Consider a university database:
Student(Stud_ID, Fname, Lname, Dept, E_mail)
Department(Dept_ID, Dept_Name, Head_ID)
Employee(Emp_ID, Name, Designation, E_mail, Ph_No, Dept_ID)
Course(Course_ID, C_Name, dept_ID)
Enrollment(Student_ID, C_ID, Grade, Marks)
Handles(E_ID, C_ID)
Answer the following in SQL:
    i. Find students whose E-mail ID is not yet registered in the database.
    ii. Create an assertion to check whether course titles are distinct across the departments.
    iii. Update the grade as A+ if a mark scored is more than 90 otherwise set grade as A.
    iv. Find number of students in each course along with course details.

1B. What is a trigger? Consider the university database in Q. 1A, fire a trigger to check whether new marks entered is always less than or equal to 100.

1C. Why concurrency control is needed? Explain Unrepeatable Read problem with an example.

[5+3+2]

2A. Consider a holiday booking system which has the information about various hotels. The customer can get the flights and railway details for the required date of travel. The information maintained about train/flight is name, number along with seat availability, start time and reach time. The information maintained about hotel is name, number of rooms available, distance from airport or railway station. When a customer books, all the information about his booking is saved with respect to a hotel and flight/railway. Any information regarding cancellation should also be saved. On payment, a bill should be generated which has all the booking details along with the amount. Properties of entities can be assumed suitably.
a) Design an ER diagram for the above requirement.
b) Reduce the ER diagram to relational schema.

2B. Illustrate with an example how the operation join and using avoids erroneous attribute equating in natural join.

2C. Let R={Flight#, From, To, DeptTime, ArriveTime, Duration, PlaneType, FirstClass, Coach, TotalSeats, Meals} and F={PlaneType→FirstClass,Coach,TotalSeats,(DeptTime, Duration)→Meals, (Flight#)→From, To, DeptTime, ArriveTime, Duration, PlaneType, TotalSeats, (FirstClass,Coach)→TotalSeats,(FirstClass,TotalSeats)→Coach,(Coach,TotalSeats)→FirstClass} Normalize the above relation into 3NF.

[5+3+2]

3A. Consider the university database in Q. 1A, Answer the following in SQL,
    i. Display the maximum marks in each course along with course name.
    ii. Using correlation variable in from clause, display the course name and number of students in each course.

iii. Find the names of departments in which every course has more than 20 students.

iv. Find the names of employees who teach all courses offered by department number 10.

3B. List any four cursor attributes. Write a PL/SQL block to find the sum of salaries of all employees using cursor for loop.

3C. List and explain advantages of roles in database.

[5+3+2]

4A. Differentiate between (i) Assertion and Triggers (ii) comparison operator '=' and set membership operator 'in'.

Consider the Flight database:

Sailor(Sid,Sname,Rating,Age)

Boat(Bid,Name,Color)

Reserves(Sid,Bid,Day)

Answer the following using relational algebra

i. Find the name of the boat reserved by sailor with ID 11 on 17/11/2015.

ii. Find the number of boats reserved by each sailor.

iii.Find the sum of ratings of each sailor on each day. Rename the relation as Rating with appropriate attribute names.

4B. Explain with an example why position of lock and unlock operation is important in a transaction.

4C. Given a relation R(A,B,C,D,E,G) and set F={AB→C, C→A, BC→D, ACD→B, D→E, D→G, BE→C, CG→B, CG→D, CE→A, CE→G}, convert F to an irreducible form.

[5+3+2]

5A. Explain desirable properties of transaction with sequence of transaction operations.

5B. Illustrate with example different ways of guarding integrity constraints on a relation.

5C. Consider the following two sets of functional dependencies:

F = { A→BC, B→C, A→B, AB→C, AC→D } and

G = { A→B, B→C, AC→D}.

Check whether they are equivalent or not.

[5+3+2]

6A. Write the algorithm to test Non additive join property of relational decomposition. Given R(A,B,C,D, E,F,G,I) with the set of FDs, F{A→CD, E→GI, E→A, E→BF, F→E }. Is the decomposition of R into R1(A,C,D), R2 (E,G,I,A) and R3(E,B,F) lossless? Prove.

6B. Answer the following:

i. Is Sa: r1(x);r1(y);w1(x);r2(y);r2(x);w2(y);c2;a1 recoverable? Justify

ii. Is Sb: r1(A);r2(A);w2(A);r2(B);w1(A);r1(B);w1(B);w2(B) serializable? Justify

iii. Is Sc: r1(x);r1(y);w1(x);r2(y);r2(x);w2(y);c2;a1 strict? Justify

6C. Explain different types database management systems.

[5+3+2]