DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
B.TECH. SEMESTER V [IT]
SUBJECT: (IT502) DATABASE MANAGEMENT SYSTEM

Examination	**:Second Sessional**	**Seat No.**	**: _____**
Date	**: 08/09/2015**	**Day**	**: Tuesday**
Time	**: 12.00 to 1:15**	**Max. Marks**	**: 36**

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 **Do as directed.** **[12]**

(a) True or False, Justify: Secondary indices must be a sparse index. **[2]**

(b) Consider the universal relation R=(A,B,C,D,E,F,G,H,I,J) and the set of functional dependencies G = {AB→ C, A→ DE, B→F, F→GH, D→IJ}. Find candidate keys of R. **[2]**

(c) Which of the following two statements are true? Justify your answer. **[2]**
1) If A→→B, then A→B
2) If A→B, then A→→B

(d) Suppose we decompose a relation R into two relations $\mathbf{R_1}$ and $\mathbf{R_2}$. Explain why such decomposition must be lossless join decomposition. **[2]**

(e) Given an instance of a relation R(X,Y,Z) as follows: **[2]**

X	Y	Z
1	9	3
2	8	2
1	7	3

Which of the following functional dependencies holds on the above instance?
X→Y, Y→X, XY→Z, XZ→Y

(f) Let R (A, B, C, D). Suppose the attribute closure of A is $\mathbf{A^+}$ = {A, B, C, D}. Can we say that A→B belongs to $\mathbf{F^+}$? Can we conclude that A is the candidate key of R? **[1]**

(g) Is the following relation R (A, B) in 1NF? Justify your answer. **[1]**

A	B
1	{1,2,3}
2	{2,1}

Q.2 **Answer the following questions. Any two** **[12]**

(a) Explain steps in query processing. Perform materialization of the equivalent relation algebra expression of following SQL query: **[6]**
Select empName,DeptName from EMPOLYEE E,DEPARTMENT D
Where E.deptId= D.deptId;

(b) (i) Find the canonical cover for the given relation R(A,B,C,D,E,H) and the set of Functional Dependencies F={A→BC, B→CE, A→E, AC→H, D→B}. **[3]**

(ii) Normalize the following relations upto the highest normal form **[3]**
Student(sno, sname)
StudMajor(sno, major, advisor)
StudCourse(sno, major, courseno, ctitle, instructname, instructlocn, grade)
The set of functional dependencies are:-
FD={sno→sname
courseno→ctitle, instructname
instructname→ instructlocn
studno, courseno, major→ grade
sno, major→advisor
advisor→major}

(c) (i) State true or false with justification: **[2]**
1) $\mathbf{B^+}$ tree index is dense index.
2) $\mathbf{B^+}$ tree index is single-level index.

(ii) Explain difference between B^+tree index and Btree index in detail. **[2]**

(iii)Armstrong's axioms are _____ and _____. Give proper justification. **[2]**

Q.3 (a) Create an Extendable Hash structure for the following key values: **[8]**
x= {15,3,52,45,68,75,19,26,83,64,57,37,72,46}
Assume that one bucket can store maximum 3 keys at a time where the hash function is,
H(x) = x mod 3.

(b) Given a relation R (M, N, O, P) and a set F of functional dependencies on R given as F={MN→O,MN→P , O→M, P→N}. Find any two candidate keys of R. Show each step. Is R in BCNF? **[4]**

OR

Q.3 (a) Construct B^+ tree for the following keys. Assume that the fan-out (i.e. the number of pointers in a node) is 3. x= {3, 12, 52, 45, 75, 68, 9, 26, 83, 64, 37, 57, 46, 72}. **[8]**
After construction, delete 26, delete 83.

(b) Explain data dictionary storage. **[4]**