Makeup Spring Mid Semester Examination – 2019
School of Computer Engineering
Kalinga Institute of Industrial Technology (KIIT) Deemed to be University
Subject: Database Management System (CS-2004)

Time: 1½ Hrs   Full Marks: 20

(Answer any Four Questions including Question No. 1)

1.   1×5
   a) Explain selection and projection operations with suitable examples.
   b) Differentiate between trivial and not-trivial functional dependency.
   c) Show that the FD $X \to YZ$ can be inferred from the FD set $\{X \to Y$ and $Y \to Z\}$.
   d) Differentiate between natural join and outer join.
   e) Consider a schema R(A, B, C, D) and functional dependencies $A \to B$ and $C \to D$. Then the decomposition of R into R1 (A, B) and R2(C, D) is
      i.   dependency preserving and lossless join
      ii. lossless join but not dependency preserving
      iii. dependency preserving but not lossless join
      iv. not dependency preserving and not lossless join

2. List three data anomalies that are likely to occur in a relation as a result of   5
   data redundancy. Give examples to support your answer.

3. Consider the relation R(A, B, C, D, E, F, G, H, I, K) and the set of functional   5
   dependencies $F = \{AB \to C, A \to DE, B \to F, F \to GH, D \to IK\}$.
   i.   What is the key for R?
   ii. Decompose R into 2NF.

4. Consider the following relational schema   5
      Employee (empno, name, office, age)
      Books(isbn, title, author, publisher)
      Borrow(empno, isbn, date)
   Write the following queries in relational calculus.
   i.   Find the name of employees, who are of minimum 18 years age.
   ii. Find the names of employees who have borrowed a book published by TMH.
   iii. Find the names of employees who have borrowed all books published by Pearson.
   iv. Find the names of employees who have not borrowed any book.
   v.   Find names of employees who have borrowed book published by both TMH and Pearson publishers.

5. Relation R has eight attributes A, B, C, D, E, F, G and H. Fields of R contain   5
   only atomic values. $F = \{CH \to G, A \to BC, B \to CFH, E \to A, F \to EG\}$ is
   a set of functional dependencies (FDs) so that F^+ is exactly the set of FDs
   that hold for R. How many candidate keys does the relation R have?