**United College of Engineering and Research, Prayagraj**

**Department of Computer Science and Information Technology**

**IInd Sessional Examination (2020-21)**

**B.Tech. (Vth Semester)**

**Database Management System**

**Subject Code: KCS-501**

**Time:** 1.30 hours **Max. Marks:** 30

**Note:** There are three sections in this paper. All sections are compulsory.

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| **Question No.** | **Question** | **Marks** | **CO** | **Bloom’s level** |
| **Section-A** | | | | |
| 1 | Define functional dependency. | 10 | 1 | L1 |
| 2 | Define canonical cover. | 1 | L1 |
| 3 | Why do we normalize database? | 1 | L2 |
| 4 | Define multivalued dependency. | 1 | L1 |
| 5 | What is recoverable schedule? | 2 | L1 |
| 6 | Define Atomicity and Durability property of transaction. | 2 | L2 |
| 7 | Relation R has eight attributes ABCDEFGH. Fields of R contain only atomic values. F = {CH -> G, A -> BC, B -> CFH, E -> A, F -> 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?   1. 3 (B) 4 (C) 5 (D) 6 | 1 | L3 |
| 8 | The maximum number of super keys for the relation schema R(E,F,G,H) with E as the key is   1. 5 (B) 6 (C) 7 (D) 8 | 1 | L2 |
| 9 | The relation scheme Student Performance (name, courseNo, rollNo, grade) has the following functional dependencies:  name, courseNo → grade, rollNo, courseNo → grade  name → rollNo, rollNo → name  The highest normal form of this relation scheme is   1. 2NF (B) 3NF (C) BCNF (D) 4NF | 1 | L3 |
| 10 | Consider the following four schedules due to three transactions (indicated by the subscript) using read and write on a data item x, denoted by r(x) and w(x) respectively. Which one of them is conflict serializable.  https://www.geeksforgeeks.org/wp-content/uploads/gq/2014/04/GATECS2014Q39.png   1. A (B) B (C) C (D) D | 1 | L3 |
| **Section-B** | | | | |
| 1. **Attempt any two.** | | | | |
|  | What are the different types of anomalies associated with database? Explain all in detail. | 3 | 3 | L2 |
|  | Define Minimal Cover. Suppose a relation R (A,B,C) has FD set  F ={ A→B, B→C, A→C, AB→B, AB→C, AC→B }. Find canonical cover or minimal cover of F. | 3 | 3 | L3 |
|  | Write the difference between 3NF and BCNF. Find normal form of relation  R(A, B, C, D, E) having FD set F={ A->B, BC->E, ED->A}. | 3 | 3 | L4 |
| 1. **Attempt any two.** | | | | |
|  | What do you understand by ACID properties of transaction ? Explain in details. | 3 | 4 | L2 |
|  | What is transaction? Draw a state diagram of a transaction showing its state. | 3 | 4 | L2 |
|  | Which of the following schedules are conflicts serializable? For each serializable schedule find the equivalent serial schedule.  S1: r1(x); r3(x); w3(x); w1(x); r2(x)  S2: r3(x); r2(x); w3(x); r1(x); w1(x)  S3: r1(x); r2(x); r3(y); w1(x); r2(z); r2(y); w2(y) | 3 | 4 | L3 |
| **Section-C** | | | | |
| 1. **Attempt any one.** | | | | |
|  | Consider R = (A, B, C, D, E) and  F= { A 🡪 B, BC 🡪 E, ED 🡪 A }  (a) List all the candidate keys for R.  (b) Is R in third normal form?  (c) Is R in BCNF? | 4 | 3 | L4 |
|  | Consider R = (A, B, C, D, E, F, G, H) and  F= { AB 🡪 C, BC 🡪 D, E 🡪 F, G 🡪 F, H 🡪 A, FG 🡪 H }  Is the decomposition of R into R1(A, B, C, D), R2(A, B, C, E, F), R3(A, D, F, G, H) lossless? Is it dependency preserving? | 4 | 3 | L4 |
| 1. **Attempt any one.** | | | | |
|  | What do you mean by serializability? Discuss the conflict and view serialzability with example. Discuss the testing of serializability also. | 4 | 4 | L4 |
|  | Consider the following two transactions:  T1: read(A);  read(B);  if A = 0 then B := B + 1;  write(B).  T2: read(B);  read(A);  if B = 0then A := A + 1;  write(A).  Let the consistency requirement be A = 0 ∨ B = 0, with A = B = 0 the initial values.  a) Show that every serial execution involving these two transactions preserves the consistency of the database.  b) Show a concurrent execution of T1 and T2 that produces a non-serializable schedule.  c) Is there a concurrent execution of T1 and T2 that produces a serializable schedule? | 4 | 4 | L4 |

**Bloom’s taxonomy level**  (1- Remembering, 2. Understanding, 3. Applying, 4. Analyzing, 5. Evaluating, 6. Creating)

**CO** -- Course Outcome