

(3 Hours)

Total Marks: 100

- N.B. (1) Question No. 1 is compulsory.**
(2) Attempt any four questions from Q.2 to Q.7.
(3) Answers to questions should be grouped and written together.
(4) All questions carry equal marks

- Q.1 (a) A university registrar's office maintains data about the following entities: 10
 (a) courses, including number, title, credits, syllabus, and prerequisites;
 (b) course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;
 (c) students, including student-id, name, and program; and
 (d) instructors, including identification number, name, department, and title.
 Construct an E-R diagram for the registrars office. Document all assumptions that you make about the mapping constraints.
- (b) Write the schema definition and normalize all the tables till 3NF 10
- Q.2 (a) Given the following schema 10
 Dept_master(Dept_no, Dept_name)
 Emp_master(Emp_no, Emp_name, Emp_add, Joining_date, Dept_no, Salary)
 i) List the Employee name and salary in descending order.
 ii) List the Employee name whose salary is more than 30,000 and designation is manager
 iii) List the employee name and Department name for those employees whose earning salary more than 50000
 iv) List the Employee name which contains at least 2 occurrences of 'a' in their name.
 v) List the name of employee who earning highest salary.
- (b) What is serializability? Explain conflict equivalence and view equivalence 10
- Q.3 (a) Explain architecture of DBMS. Describe the advantages of DBMS over file systems 10
 (b) Define deadlock? Explain deadlock prevention techniques? 10
- Q.4 (a) Explain Query optimization process in DBMS 10
 (b) What is Bell la pedula model? Explain in detail 10
- Q.5 (a) Suppose that we decompose the schema $R = (ABCDE)$ into $(ABC), (ADE)$. Show that this decomposition is a lossless-join decomposition, if the following set F of functional dependency holds:
 $A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A$
 Also find out the candidate key. 10
 (b) What is locking protocol? How 2 phase locking protocol is different from strict two phase locking protocol. 10

- Q.6 (a) Differentiate between 10
i) Generalization and Specialization
ii) Physical Data Independence and Logical Data Independence
- (b) Explain timestamp based protocol and how it is used to control concurrency 10
- Q.7 Write a short note on the following(any four): 20
i) Candidate Key, Super Key and Primary key
ii) MVD
iii) Natural Join
iv) ACID properties of transaction.
v) Lossless and dependency preserving decomposition