Total number of printed pages–7

3 (Sem–4/CBCS) CSC HC 3

2022

COMPUTER SCIENCE

(Honours)

Paper : CSC–HC–4036

(Database Management System)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Write down the correct answers from the available options : ***(any seven)*** 1×7=7

   (i) _____ represent(s) raw facts, whereas _____ is/are data made meaningful.

   A. Data, information

   B. Information, reporting

   C. Records, bytes

   D. Information, bits

Contd.

(ii) Which of the following types of tables constraints will prevent the entry of duplicate rows?

A. Unique key
B. Foreign key
C. Primary key
D. Candidate key

(iii) The ability to find an individual item in a file immediately is

A. sequential access
B. file allocation table
C. directory
D. direct access

(iv) In a relation

A. ordering of rows is immaterial
B. no two rows are identical
C. A and B both are true
D. None of the above

(v) Cartesian product in relational algebra is

A. a unary operator
B. a binary operator
C. a ternary operator
D. not defined

(vi) In E-R diagram, attributes are represented by

A. rectangle
B. square
C. ellipse
D. triangle

(vii) 'AS' clause is used in SQL for

A. selection operation
B. projection operation
C. rename operation
D. join operation

(viii) The property of a database is that

A. it is an integrated collection of logically related records
B. it consolidates separated files into a common pool of data records
C. data is stored in a database
D. All of the above

(ix) Which database level is closest to the users?

A. External
B. Internal
C. Physical
D. Conceptual

Contd.

(x) The file organisation that provides very fast access to any arbitrary records of a file is

A. ordered file

B. unordered file

C. hashed file

D. B-tree

2. Answer the following questions shortly : ***(any four)*** 2×4=8

(i) Define the term 'metadata'.

(ii) What do you mean by stored and derived attributes ?

(iii) Define null values.

(iv) What is the difference between static and dynamic files ?

(v) Define the term 'functional dependency'.

(vi) What is the difference between procedural and non-procedural DMLs ?

(vii) What is a super key ?

(viii) What is identifying relationship ?

3. Write down the answers for the following questions : ***(any three)*** 5×3=15

(i) What are diffcrent types of database end users ? Discuss the main activities of each.

(ii) What are the cardinality ratios for binary relationships ? Explain.

(iii) Consider a bank database. Each bank can have multiple branches and each branch can have multiple accounts and loans. A customer of the bank can have multiple accounts and multiple loans in the bank branches.

Draw an E-R diagram of the bank database.

(iv) Describe shortly *five* operations on files.

(v) List the data types that are allowed for SQL attributes.

(vi) Consider the universal relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies $F\{\{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\}\}$

What is the key for R ?

Decompose R into 2NF and then 3NF relations.

(vii) Discuss various types of inner join operations. Why is theta join required?

(viii) What are the advantages and disadvantages of indexed sequential files?

4. Write down long answers for the following questions : ***(any three)*** 10×3=30

(i) Describe three schema architecture. Why do we need mappings between schema levels? How do different schema definition languages support this architecture?

(ii) Discuss the correspondences between the E-R model constructs and relational model constructs. Show how each E-R model construct can be mapped to the relational model.

(iii) Discuss the main characteristics of database approach.

(iv) What does the term 'unnormalised relation' refer to? Describe 1NF, 2NF, 3NF and BCNF with suitable examples.

(v) What is relational algebra? Describe *any four* operations of relational algebra.

(vi) What do you mean by file organisation? Describe the sequential file organisation method. Also list the advantages and disadvantages of sequential file organisation.

(vii) Consider the relation schema with the following relations :

PROJECT (Project#, Project_name, Chief_Architecture)

EMPLOYEE (Emp#, Emp_name)

ASSIGNED_TO (Project#, Emp#)

Express the following queries in SQL : 2×5=10

A. Get Emp# of employees working in project numbered 'Comp005'.

B. Get all Emp_name.

C. Get details of employees working on all database projects.

D. Get Emp# of employees who do not work on project 'Comp005'.

E. Get Emp# of employees who work on at least all those projects that 'employee 107' works on.

(viii) Explain database integrity rules. Discuss different types of keys available in relational model.
