KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2018

Marks Scored:

Level : B.E.
Year : III
Course : GEOM 318
Semester: I

Exam Roll No.:
Time: 30 mins.
F.M. : 10

Registration No.:
Date : MAR 13 2018

SECTION "A"
[20 Q.×0.5=10 marks]

1. In a database, attributes are:
   a. Properties of a database
   b. Properties of a field
   c. Properties of an entity
   d. Properties of a record

2. _____is computer professional who optimizes and guarantees the continued use of the valuable data resource.
   a. Database Administrator (DBA):
   b. Database Designer
   c. Systems Analyst
   d. Sophisticated End-user

3. DBMS component that ensures that tables can be stored, and records can be inserted, retrieved, updated and deleted.
   a. Transaction manager
   b. Query optimizer
   c. Storage manager
   d. Concurrency controller

4. In an ER diagram, a weak entity set is denoted by:
   a. Double rectangles
   b. Single rectangles
   c. Dashed rectangles
   d. Double dashed rectangles

5. If not exclusively stated, the attribute values for phone number belong to a category of:
   a. Derived attribute
   b. Multivalued attribute
   c. Composite attribute
   d. Single valued attribute

6. A relation is a subset of Cartesian product of its:
   a. List of attributes
   b. List of domains
   c. List of tuples
   d. List of relations

7. The snapshot of the data in a database at a given instant in time is :
   a. Database screen
   b. Database schema
   c. Database instance
   d. Database structure

8. Instructor (name, weight, course). Here *name, weight* and *course* are _____and *Instructor* is a _____.
   a. Tuple, Attributes
   b. Attributes, Tuple
   c. Tuple, Relation
   d. Attributes, Relation

9. The values occurring in the _____key attribute of the referenced relation may occur in the ____ key attribute of the referencing relation.
   a. Foreign, Primary
   b. Primary, Foreign
   c. Primary, Candidate
   d. Primary, Super

10. The entities that have primary keys are called:
    a. Primary entities
    b. Strong entities
    c. Weak entities
    d. Primary keys

11. All of the following string notations are accepted in SQL, except:
    a. '_ _%'
    b. '_ _ _"
    c. '_ _ _'
    d. '%_ _%'

12. Geometry collection that represent complex shapes are of three types, namely:
    a. Polygon, line, point
    b. Multipolygon, multiline, multipoint
    c. Multipoint, Multicurve, multisurface
    d. Line, curve, line string

13. Unary operator that returns its argument relation, with certain attributes left out.
    a. Rename
    b. Union
    c. Select
    d. Project

14. SDBMS differs from a non-spatial DBMS in all the following, except:
    a. handles spatial operations with spatial extensions
    b. ability to tackle multiuser and transaction issues faced in GIS
    c. Usage of spatial indices
    d. Capacity and scalability decrease by query optimizer

15. Identify the wrong DDL (Data Definition Language) command.
    a. ALTER
    b. CREATE
    c. UPDATE
    d. USE

16. A command to remove a relation from a SQL database:
    a. Erase table <table name>
    b. Drop table <table name>
    c. Delete table <table name>
    d. Alter table <table name>

17. In pictogram the symbol  denotes:
    a. Part of partition
    b. Alternate shapes
    c. Basic shapes
    d. Part of network

18. All of the following are features of OGIS except:
    a. Third party libraries implementing OGIS are available
    b. OGIS spatial data model consists of base class Geometry
    c. Supports GIS operations like Reclassify
    d. Supports the CREATE TYPE statement

19. Modern geographic information systems that deploy websites and service centers such as routing are collectively known as:
    a. Geographic Information Systems
    b. Geographic Information Science
    c. Geographic Information Services
    d. Geographic Information Society

20. The spatial operator ST_Intersection (x, y) fulfills the following criteria:
    a. Returns a geometry that covers the area shared by geometries x and y
    b. Returns a geometry that covers all the area covered by geometry x or geometry y
    c. Returns the geometry type of geometry x
    d. Returns a point guaranteed to be within the boundary of geometry x

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F.M. : 40

SECTION "B"
(Short answer question)
[6 Q.×4=24 marks]

Attempt any *SIX* questions.

1. Explain the different components of a DBMS. [4]

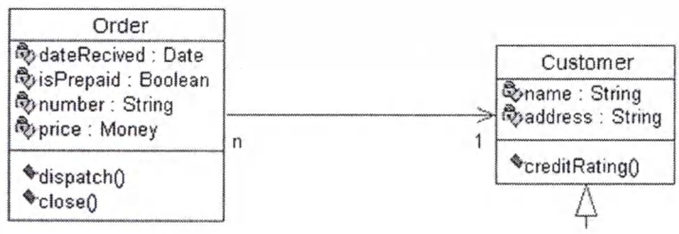
2. Describe many to one cardinality constraint in DBMS. Why are keys used in relational databases? [2+2]

3. How do you model spatial data in a SDBMS? How does SDBMS increase the productivity of GIS? [2+2]

4. Define spatial data mining and challenges associated with it. [2+2]

5. Write short notes on: [2+2]
   a. Symbols used in ER diagrams b. UML for database design

6. What is a nested sub query? For the given figure, label the different parts of diagram. [2+2]



7. Consider the following relations: [4]
   Member (mnum: integer, mname: string, sports: string, level: string)
   Club (name: string, meets at: time, room: string, iid: integer)
   Enrolled (mnum: integer, cname: string)
   Instructor (iid: integer, iname: string, deptid: integer)
   Write SQL statements to create each relation including appropriate primary and foreign keys.

SECTION "C"

(Long answer question)

[2 Q.×8=16 marks]

Attempt any *TWO* questions.

8. Suppose you are assigned the task to design a spatially enabled information system for Kirtipur Municipality with the following requirements. [8]

- A Municipality consists of wards and has a Mayor.
- A Municipality is accessed by roads with different categories.
- There are emergency-stations within each ward which are exclusively responsible for working during emergencies like fire, flooding, earthquake.
- The wards also contain facilities such as offices, hospitals, parks
- Finally, there are rivers that pass through the Municipality and also supply water to different facilities

Describe the steps involved in spatial database design for this project. Note: you need to explain upto physical data model, i.e. upto how values will be entered. Show how values will be entered for any one sample table only. Also, ER diagram must have pictogram.

9. Discuss the need for relational database in SDBMS. Define the basic operators in relational algebra. For the given tables, write the output for P×Q [3+3+2]

Table P (for EMPLOYEE)

ID	Name	Dept
1	Bill	A
2	Raunak	C
3	Lara	A

Table Q (for DEPARTMENT)

DID	DeptName
A	Technical
B	Sales
C	Human resource

10. Explain the SQL commands that constitute data manipulation language. For the given database, construct SQL statements to answer the questions below. [4+4]

Employee (employee-name, street, city)
Works (employee-name, company-name, salary)
Company (company-name, city)
Manages (employee-name, manager-name)

a. Find the names of all employees who work for 'First Bank Corporation'.
b. Find the names, street addresses, and cities of residence of all employees who work for 'First Bank Corporation' and earn more than $5000.
c. Give all managers of 'First Bank Corporation' a 5-percent raise.
d. Modify the database so that 'Anne' now lives in 'Newtown' where 'Anne' is an employee and 'Newtown' is a city