EASTERN UNIVERSITY, SRI LANKA
SECOND YEAR SECOND SEMESTER EXAMINATION IN SCIENCE (2005/2006)
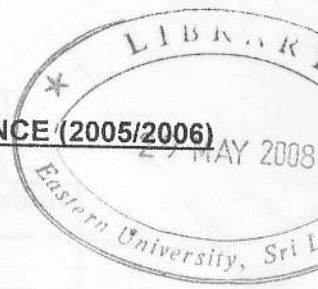**(MARCH/APRIL, 2008)**
CS 203 – DATABASE DESIGN
(PROPER & REPEAT)

Answer all Questions

Time: 02 Hours

Question (01)

(a) Why do we need a Data Base Management System? State your reasons. List the steps in designing a database. Briefly explain each step.

(b) What are *Data Definition Language(DDL)* and *Data Manipulation Language(DML)*? Write five DDL commands and five DML commands. What are *Views*? Write the syntax of the *View command.*

(c) Define the following terms: relation,tuple,attribute,domain,degree,data security,data intergrity.

(d) Differentiate between *primary key* and *alternate key*.What do you understand by the terms *Candidate key* , *Cardinality of a relation* and *Data Redundancy* in relational database?

(e) Explain *Hierachical data model*, *Netwok data model*, *Relational data model* with diagrams.

(f) Explain the *operations(Projection,Selection,Union,Difference,Intersection,Cartesian product*)used in *Relational Algebra*.Explain each with sample expressions.

Question (02)

(a)

Consider the following tables CONSIGNOR and CONSIGNEE. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii).

TABLE : CONSIGNOR

CnorID	CnorName	CnorAddress	City
ND 01	R Singhal	24, ABC Enclave	New Delhi
ND 02	Amit Kumar	123, Palm Avenue	New Delhi
MU 15	R Kohli	5/A, South Street	Mumbai
MU 50	S Kaur	27 – K, Westend	Mumbai

TABLE : CONSIGNEE

CneeID	CnorID	CneeName	CneeAddress	CneeCity
MU 05	ND 01	Rahul Kishore	5, Park Avenue	Mumbai
ND 08	ND 02	P Dhingra	16/1, Moore Enclave	New Delhi
KO 19	MU 15	A P Roy	2A, Central Avenue	Kolkata
MU 32	ND 02	S Mittal	P 245, AB Colony	Mumbai
ND 48	MU 50	B P Jain	13, Block D, A Vihar	New Delhi

(i)   To display the names of all Consignors from Mumbai.

(ii)   To display the CneeID, CnorName, CnorAddress, CneeName CneeAddress for every Consignee.

(iii) To display consignee details in ascending order of CneeName.

(iv)   To display number of consignors from each city.

(v)   SELECT DISTINCT City FROM CONSIGNEE ;

(vi)   SELECT A. CnorName , B.CneeName
        FROM Consignor A, Consignee B
        WHERE CneeCity NOT IN ('Mumbai', Kolkata') ;

(vii) SELECT CneeID, CneeName FROM Consignee
        WHERE ConrID = 'MU15' OR CnorID = 'ND01' ;

(b)

Study the following tables DOCTOR and SALARY and write SQL command for the questions (i) to (iv) and give outputs for SQL queries (v) and (vi) :

TABLE : DOCTOR

ID	NAME	DEPT.	SEX	EXPERIENCE
101	John	ENT	M	12
104	Smith	ORTHOPEDIC	M	5
107	George	CARDIOLOGY	M	10
114	Lara	SKIN	F	3
109	K George	MEDICINE	F	9
105	Johnson	ORTHOPEDIC	M	10
117	Lucy	ENT	F	3
111	Bill	MEDICINE	F	12
130	Morphy	ORTHOPEDIC	M	15

TABLE : SALARY

ID	Basic	Allowance	Consultation
101	12000	1000	300
104	23000	2300	500
107	32000	4000	500
114	12000	5200	100
109	42000	1700	200
105	18900	1690	300
130	21700	2600	300

(i) Display NAME of all doctors who are in "MEDICINE" having more than 10 years experience from the table DOCTOR.

(ii) Display the average salary of all doctors working in "ENT" department using the tables DOCTOR and SALARY. Salary = BASIC + ALLOWANCE.

(iii) Display the minimum ALLOWANCE of female doctors.

(iv) Display the highest consultation fee among all male doctors.

(v) SELECT count (*) FROM DOCTOR WHERE SEX = "F".

(vi) SELECT NAME, DEPT, BASIC FROM DOCTOR,
SALARY WHERE DEPT = "ENT" and DOCTOR.ID = SALARY.ID

Question (03)

(i) Convert the following E-ER diagram to the relational model.
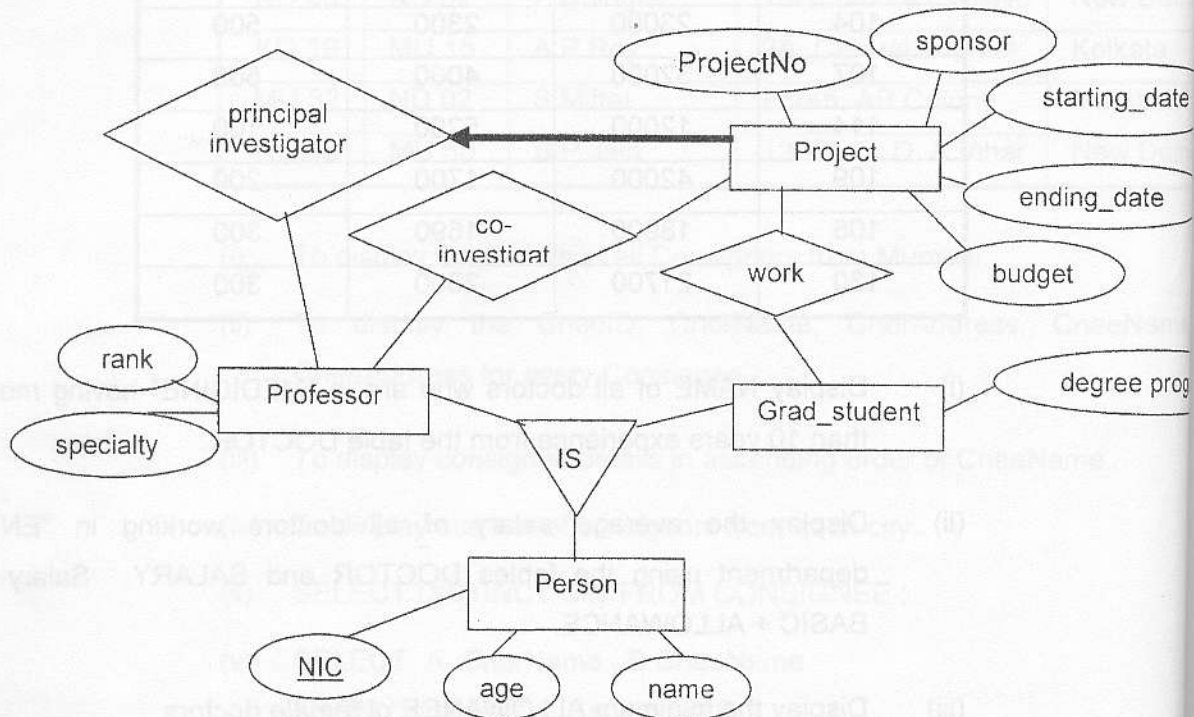
Professor and Grad_student covers Person

(ii) Consider the following requirements for a university database:

- A Person has a NIC (unique), age and a name.
- Professor is a Person with the following attributes: rank and research specialty
- Projects have a project number (unique), a sponsor (e.g. NSF), a starting date ending date and a budget.
- Graduate students are also persons. Graduate students need to store information about the degree program (e.g. M.S. or Ph.D.) that they a enrolled.
- Each project is managed by one professor (known as the project's principa investigator).
- A project must have a principal investigator.
- Each project is worked on by one or more professors (known as co investigators).
- Professors can manage and/or work on multiple projects.
- Each project is worked on by one or more graduate students (known a project's research assistants).

- Graduate students can work on multiple projects.

Draw an E-ER diagram for the above requirements.

Question (04)

(i) (a) What is normalization and what are the different forms of normalizations?

(b) What is 1 NF (Normal Form)? What is 2NF (second Normal Form) ?

(c) What is Fully Functional dependency? What is Transitive dependency?

(d) What is 3NF(third Normal Form)? What is BCNF (Boyce-Codd Normal Form)?

(e) Choose a key and write the dependencies for the following relation:
GRADES (StudentID, Course#, Semester#,Grade).
In what normal form is this relation.

(ii) Assume that there are only 5 records in the following:
Employee(Fname, Lname, Minit, Ssn, Sex, Salary, SupperSsn, Dno)

(a)

Fname	Minit	Ssn	Sex	Salary	SupperSsn	Dno
Sunil	T	334555	M	40000	88866	5
Amila	S	987615	F	43000	54321	4
Mahepala	K	668445	M	38000	33455	5

Write *Relational algebra* **expression** to get the above output using the above Relation.
Employee:

(b)

Lname	Fname	Salary
Ganepola	Mahepala	38000
Perera	Sunil	40000
Munasinghe	Amila	43000
Perera	Sagarika	25000
Karunanayake	Jeeva	55000

Write *Relational algebra* **expression** to get the above output using the above *Relation*: