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Department of Computer Science and Engineering

Begum Rokeya University, Rangpur.

2nd Year 2nd Semester Final Examination, 2013 (Session: 2011-12)

Course Title: Database Management System

Course Code: CSE2201

Full Marks: 50

Answer Any Five from the Given Questions

(Note: Numbers in the right margin indicate marks for each question.)

1. (a) What is data independence? Explain the difference between physical and logical data independence with example. 3

- (b) Consider a relational table: 5

Professor(professor name, professor id, professor office id, student id, student name, student office id, student designated refrigerator id, refrigerator owner id, refrigerator id, refrigerator size, secretary name, secretary id, secretary office)

Suppose the data has the following properties:

- (i) Professors and secretaries have individual offices, students share offices.
- (ii) Students can work for multiple professors.
- (iii) Refrigerators are owned by one professor.
- (iv) Professors can own multiple refrigerators.
- (v) Students can only use one refrigerator.
- (vi) The refrigerator the student uses must be owned by one of the professors they work for.
- (vii) Secretaries can work for multiple professors.
- (viii) Professors only have a single secretary.

Put this table into 3rd normal form by writing out the decomposed tables; designate keys in your tables by underlining them. Designate foreign keys by drawing an arrow from a foreign key to the primary key it refers to. Note that some of the properties listed above may not be enforced (i.e., guaranteed to be true) by a 3NF decomposition.

2. (c) What are the components of a query processor? Explain them briefly 2

2. (a) What is data mining? Distinguish between Information Retrieval System and Database System? Explain view serializability with example. 4

- (b) Describe at least three tables that might be used to store information in a social networking system such as Facebook 4

- (c) Briefly explain E-R data model. 2

3. (a) What are the integrity constraint that SQL supports? Briefly explain each of them. 4

- (b) What is the difference between inner join and outer join explain with example. 4

- (c) Consider wholesaler of book schema. Book(Book_id, book_title, publisher, book_price) 2

(i) Implement procedure which print details of books whose price is more than average price.

(ii) Write a trigger such that if record is deleted from book table, insert old record in book backup table.

4. (a) Consider an example table storing bank accounts in Google's Big Table system: 2

Key	Value
"adam"	\$300
"evan"	\$600
"sam"	\$9000

The bank programmer implements the deposit function as follows:

```
function deposit(account, amount):
    currentBalance = bigtable.get(account)
    currentBalance += amount
    bigtable.put(account, currentBalance)
```

~~A~~ (i) Given the table above, a user executes deposit("sam", \$500). The program crashes somewhere during execution. What are the possible states of the "sam" row in the table? Provide a short explanation for your answer.

(ii) Given the table above, a user executes deposit("sam", \$500). The program completes. Immediately after the program completes, the power goes out in the BigTable data center, and all the machines reboot. When BigTable recovers, what are the possible states of the "sam" row in the table? Provide a short explanation for your answer.

- (b) List the ACID properties. Explain the usefulness of each.

5. (a) Suppose that we have a relation marks(ID, score) and we wish to assign grades to students based on the score as follows: grade F if score < 40, grade C if $40 \leq \text{score} < 60$, grade B if $60 \leq \text{score} < 80$, and grade A if $80 \leq \text{score}$. Write SQL queries to do the following:

- a. Display the grade for each student, based on the marks relation.
b. Find the number of students with each grade.

(b) The SQL like operator is case sensitive, but the `lower()` function on strings can be used to perform case insensitive matching. To show how, write a query that finds departments whose names contain the string "sci" as a substring, regardless of the case.

(c) Briefly explain the fundamental operations in the relational algebra with illustrations

6.

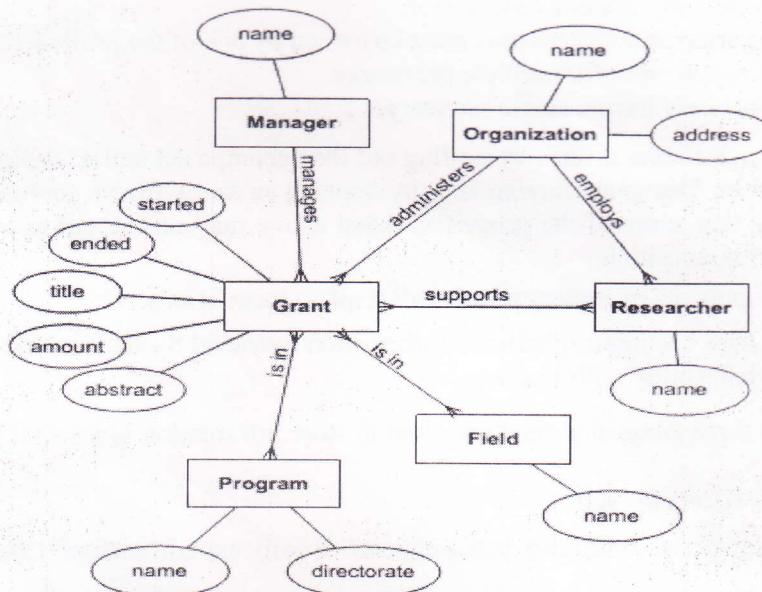


Figure 1: An entity-relationship diagram for the NSF database.

In the above figure-1 of National Science Foundation (NSF) Six Entities are defined:

- Grants, with their associated meta-data (e.g., amount of funding, start and end date, the researchers who work on them, etc.)
- Organizations (e.g., universities) which receive grants,
- Researchers who receive grants,
- Programs run by the NSF that award grants,
- Managers at NSF who run programs that award grants, and
- Fields (research areas) that describe high level topic-areas for grants.

(i) Write the DDLs to instantiate the entities in Table.

(ii) Write a query to find the title and amount of the grants for which "Professor Stone braker" is the principal investigator (PI).

(iii) Write a query that finds the number of times an MIT researcher has received a grant over \$1 million since 1/1/2008. Retrieve the name of the researcher and the number of such grants awarded.

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(2)

(iv) Show what the SELECT ... WHERE ... IN query above would look like when the IN portion of the query is "un-nested" by rewriting it as a join that does not contain a sub query. Use PREDICATE in your query to denote the conditions in the WHERE predicate of the original sub query.

7. (a) What is Transaction?

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(b) Let $r(A, B)$ and $s(A, C)$ be two relations with the following characteristics: $|r| = 45.000$, $|s| = 20.000$, A is primary key in both relations and equally distributed between 1 and 1.000.000, and s has a primary B+ tree index on attribute A with 100 search-key/pointer pairs per node. A single block can contain 25 tuples of r, 30 tuples of s, or 1 node of the index.

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(i) Determine the number of blocks needed for r, s, and the index, respectively.

(ii) Determine the access strategy and determine the number of block IOs for the following selection queries:

- $\sigma_A = 100.000(s)$
- $\sigma_A < 100.000(s)$
- $\sigma_A > 100.000(s)$

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(c) What is database lock? What are the types of Lock

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**Department of Computer Science and Engineering
 Begum Rokeya University, Rangpur
 2nd year 2nd Semester Final Examination-2013**

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Session: 20011-2012

Course Title: Operating System and Systems Programming Course Code: CSE 2205

Time: 3.0 Hours

Full Marks: 50

[N.B. Answer any Five (5) Questions, Number of each question is indicated to the right]

1. a) What is an operating System? What are goals of OS? 2
b) How does a modern computer work? 2
c) What are the advantages of multiprocessor system? 2
d) Define Boot startup program, Caching, Interrupt vector and Open source OS. 4

2. a) What are the services that are provided by an operating system? 4
b) What do you mean by the following function 3
 BOOL ReadFile c (HANDLE file, LPVOID buffer, DWORD bytes to
 Read, LPDWORD bytes Read, LPOVERLAPPED ov);
c) Define System calls. Write different types of system call with their function. 3

3. a) Explain the concept of process. What are different process states? 1+3=4
b) What is degree of multiprogramming? 1
c) Describe the differences among short-term, medium-term and long-term 3
 scheduling.
d) What is IPC? What are the reasons for providing an environment that allows 2
 process cooperation?

4. a) What are the differences between preemptive and non-preemptive scheduling? 2
b) Consider the following set of processes, with the length of CPU burst given in 8
 milliseconds:

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to arrive in the order P1, P2, P3, P4, P5 all at time 0.

i. Draw four Gantt charts that illustrate the execution of these processes using
the following scheduling algorithms: FCFS, SJF, priority (a smaller priority
number implies a higher priority), RR (quantum =1).

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- ii) What is the turnaround time of each process for each of the scheduling algorithms in part (i)? 2
 - iii) What is the waiting time of each process for each of the scheduling algorithms in part (i)? 2
 - iv) Which of the algorithms results in minimum average waiting time? 2

 - 5. a) What criteria should be included in CPU scheduling? 4
 - b) List differences between logical and physical address. 3
 - c) What do you mean by race condition? Explain with example. 3

 - 6. a) What are the requirements of solution to the critical section problem? 3
 - b) What do you mean by semaphore? Explain with example. 3
 - c) What is segmentation? Why are segmentation and paging sometimes combined into one scheme? 1+3=4

 - 7. a) What do you mean by a deadlock? Is it possible to have a deadlock involving only one process? Explain your answer. 2+3=5
 - b) Consider the following snapshot with 5 processes P0 through P4 and 3 resources types: A (10 instances), B (5 instances) and C (7 instances). 5

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	0	4	3	3			

Answer the following questions using Banker's algorithm

- i) What is the content of the matrix need?
- ii) Is the system in a safe state?
- iii) If a request from process P1 arrives for (1, 0, 2) can the system grant it immediately? Why?

Semester Final Examination-2013 2nd year 2nd Semester Year Session: 2011-2012

Course Title: Microprocessor & Assemble Language Course Code: CSE 2203

Time: 3.0Hours Full Marks: 50

[N.B. Answer any Five (5) Questions, Number of each question is indicated to the right]

1. (a) Write down the difference between microprocessor and microcontroller. 3
- (b) Explain in brief about the era of microprocessor 4
- (c) List the features of 8086 microprocessor. 3
2. (a) Explain the architecture of 8086 with the help of proper block diagram. 6
- (b) What is instruction queue? Explain its advantage. 2+2=4
3. (a) What are segment registers? Explain the purpose of them. 2+3=5
- (b) What is the purpose of pointers and index registers? What is the function of flag register? 3+2=5
4. (a) What do you mean by interrupt? What are the sources of interrupts in 8086? 2+3=5
- (b) How physical address is generated in 8086? 2
- (c) Draw and explain the interrupt acknowledge cycle of 8086 3
5. (a) What are the different modes of operation of 8086 microprocessor? 2
- (b) Explain the signals with common functions in all modes of 8086 operation. 5
- (c) Write an 8086 assembly language program to generate a delay of 1 minute if 8086 system frequency is 10MHz. 3
6. (a) Explain in detail various fields of machine language instructions for 16-bit instruction format. 6
- (b) What is mean by modular programming? Explain the differences between a procedure and a macro. 1+3=4
7. (a) At a certain instant during the execution of a program the 8086 processor has the following data in the register:
AX =1234H; BX=5678H; SI=ABCDH; DI=CDEFH; CS=3456H and IP=789AH; DS= ES=4567H; state the addressing modes used and work out the addresses of source and destination of data, when each of the following instructions are executed:
(i) MOV AX BX; (ii) MOV [BX] AX; (iii) LODSW.
 (b) Which are correct or not correct instructions and why?
(i) POP CS; (ii) MOV BL, SI; (iii) XCHG [SI] [DI]; (iv) ADD [DI] AL. 4

[Answer any **five** questions of the following. Each question carries a total of 10 marks]

1. (a) Define polar form of a complex number. Express $-\sqrt{6} - \sqrt{2}i$ in polar form. (3)
- (b) For two complex numbers z_1 and z_2 , prove that - (4)
 - i. $|z_1 z_2| = |z_1| \cdot |z_2|$
 - ii. $|z_1 - z_2| \geq |z_1| - |z_2|$
- (c) Prove that $\lim_{Z \rightarrow 0} \frac{\bar{Z}}{Z}$ does not exist. (3)
2. (a) State the necessary and sufficient condition for a function to be analytic in a region. (5)
Prove the sufficient conditions for a function to be analytic in a region.
- (b) Show that $f(z) = |z|^2$ is differentiable at $z = 0$ but not analytic. (5)
3. (a) State and prove Taylor's theorem. (5)
- (b) Expand $f(z) = \frac{1}{(z+2)(z+4)}$ in a Laurent series valid for (i) $2 < |z| < 4$ (5)
(ii) $1 < |z+1| < 3$
4. (a) Evaluate the coefficient of Fourier series a_0, a_n , and b_n on the interval $(-\pi, \pi)$. (5)
- (b) Find the Fourier series of the following function (5)

$$f(x) = e^x, -\pi \leq x \leq \pi$$

5. (a) State and prove the convolution theorem for Fourier transform. (5)
- (b) Find the Fourier transform of $f(x) = \begin{cases} 1-x^2 & \text{when } |x| < 1 \\ 0 & \text{when } |x| > 1 \end{cases}$ (5)
Find the reciprocal relation and also show that

$$\frac{3\pi}{16} = \int_0^\infty \frac{\sin x - x \cos x}{x^3} \cos \frac{x}{2} dx$$

6. (a) Define residue. State and prove Cauchy's residue theorem. (5)
- (b) Evaluate the following integrals using Cauchy's residue theorem- (5)

$$\oint_c \frac{e^{-iz}}{(z+3)(z-i)^2} dz; \quad c: z = 1 + 2e^{i\theta}, 0 \leq \theta \leq 2\pi$$

7. (a) Define Laplac transformation. Prove that, $\mathcal{L}\{\sin at\} = \frac{a}{s^2+a^2}$ if $s > 0$. (4)
- (b) Find (6)
 - i. $\mathcal{L}\{5e^{3t} + t^6 - 3 \sin 2t - 5 \cos 2t\}$
 - ii. $\mathcal{L}\{t^2 \sin 4t\}$

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Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

2nd year 2nd Semester Final Examination-2013

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Session: 2011-2012

Course Title: Introduction to Business

Course Code: BUS 2123

Time: 3.0Hours

Full Marks: 50

[N.B. Answer any Five (5) Questions, Number of each question is indicated to the right]

1. (a) "No country can develop industrially without proper management"- 3
Elaborate this statement.
- (b) Do you agree that a manager can be successful without having necessary skill? How such skills can be acquired? 4
- (c) Show the management process with the help of a diagram. 3
2. (a) What is physical environment? 2
- (b) Discuss the factors of external environment. 4
- (c) "Management is universal" discuss the statement. 4
3. (a) What are the conditions needs to be followed to make effective decision? 3
- (b) How many types of decision? Show with a diagram. 3
- (c) Discuss the decision making process. 4
4. (a) Explain the motivation process with the help of a diagram. 3
- (b) What do you understand by the "Two-Factor Theory" of motivation? 4
- (c) Discuss the financial techniques of motivation. 3
5. (a) Define employee centered leadership. 2
- (b) Distinguish between leadership and managership. 3
- (c) What do you mean by leadership style based on authority? 5
6. (a) How can you distinguish between mission and vision? 2
- (b) Describe the "SWOT" analysis. 4
- (c) What do you mean by strategies planning process? 4
7. (a) Write short notes: 6
 (a) HRM; (b) PERT; (c) CPM; (d) MIS. 2.5x4=10

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Department of Computer Science & Engineering

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Begum Rokeya University, Rangpur

2nd year 2nd Semester Final Examination-2013

Session: 2011-2012

Course Title: Sociology

Course Code: SOC 2223

Time: 3.0Hours

Full Marks: 50

[N.B. *Answer any Five (5) Questions, Number of each question is indicated to the right*]

1. (a) Define sociology. What are the major theoretical perspectives that sociologists follow in explaining social issues? 10
2. (a) Can you think of a CSE student studying sociology? Why it is essential to study sociology in computer science and engineering discipline? 10
3. (a) What are the main features of capitalism? Discuss about the factors responsible for the origin and growth of capitalism. 10
4. (a) What is stratification? Briefly discuss about the major theories of stratification. 10
5. (a) What is crime? What are the causes of crimes in Bangladesh? 10
6. (a) Define technology. Critically discuss about the positive and negative impact of technology on the society. 10
7. (a) What are the differences between research method and Research Methodology? Identify the steps of social research which a researcher must follow. 10

Department of Computer Science & Engineering

Begum Rokeya University, Rangpur

2nd year 2nd Semester Final Examination-2013

Session: 2011-2012

Course Title: Chemistry

Course Code: CHM 1224

Time: 3.0Hours

Full Marks: 50

[N.B. Answer any Five (5) Questions, Number of each question is indicated to the right]

1. (a) What is chemical bonding? How many bonds are possible in a chemical species? Explain one of them. 1+1+3=5
- (b) Why are noble gases chemically inert? 2
- (c) Describe the Rutherford's atomic model. 3
2. (a) What do you mean by quantum number? Explain four quantum numbers with their significance. 1+3=4
- (b) Define the following terms: electronegativity; ionization potential and electron affinity. 3
- (c) What are chelate complexes? Give an example of coordination complexes where coordinate number is two, four and five. 1+3=4
3. (a) What do you mean by electrochemical cell and E.M.F? 3
- (b) Give some applications of the E.M.F. measurements. 4
- (c) What are the relation between solubility and solubility product constant? 3
4. (a) Discuss the molar orbital theory. 4
- (b) Write some applications of IR and UV-VIS spectroscopy. 3
- (c) Derive Schrödinger's wave equation. 3
5. (a) What is chemical equilibrium? Derive the relation between K_p and K_c . 1+3=4
- (b) Define reaction rate and reaction order of a reaction. Show that for first order reactions the half life period is independent of the initial concentration. 2+2=4
- (c) Half life of a substance in a first order reaction is 15 minutes. Calculate the rate constant. 2
6. (a) How you synthesis proteins and what could is the use of proteins? 3+2=5
- (b) Write the differences between inductive effect and electrometric effect? 2
- (c) Give the mechanism of Kobl reaction. 3
7. (a) What is modern periodic law? How it is superior to Mendeleef's periodic table? 1+3=4
- (b) Define isotope, isotope and isobar with examples. 3
- (c) Discuss the electron gas model for the formation of metallic bond. 3