15 Batch

Session: 2020-2021

Exam: 2022

Jatiya Kabi Kazi Nazrul Islam University
Department of Computer Science and Engineering
2nd Year 2nd Semester Final Examination, 2022
Session: 2020-2021
Course: CSE- 229 (Engineering Ethics and Cyber Law)

Full Marks: 60 **Time: 3 hours**

Answer any five of the following questions:

1.	a)	Label the general categories of cybercrime.	3
	b)	What is code of ethics? Write a note on Ethics in Business.	4
	c)	What are the ethics that computer professional should follow? List and explain.	5
2.	a)	What are the pillars of work ethic?	3
	b)	Differentiate between morals and ethics.	3
	c)	What are the different psychological issues in Meta-ethics?	2
	d)	What are the various crimes happening using computers?	4
3.	a)	What do you mean by ethical issues? Write the main ethical issues in research.	3
	b)	Write the different types of cyber-attacks.	3
	c)	What is the present status of cyber law in Bangladesh?	3
	d)	What is the role of the digital forensic Lab in investigating cybercrimes in BD?	3
4.	a)	Write a note on cyber law and describes its advantages and disadvantages	4
	b)	What are the essential components of cyber security? Describe criminalization through online speech on social media.	4
	c)	What are the key components of digital security act of Bangladesh Government? Explain.	4
5.	a)	Define cyberspace. Explain jurisdiction in cyberspace.	4
	b)	Write about Software development and licensing agreements.	3
	c)	What are Intellectual Property Rights (IPR) in Cyberspace?	2
	d)	Mention different types of intellectual property rights.	3
6.	a)	What is the difference between IP and IPR? ~~patents~~	3
	b)	Write the differences between copyrights and patents.	3
	c)	What is piracy? Mention the types of piracy. How can it be prevented?	3
	d)	What do you mean by Software Piracy and trademarks?	3
7.	a)	What do you mean by Cyber tribunal? Write the effectiveness of the Cyber Tribunal in BD.	4
	b)	Write the advantages of e-commerce. What are B2B, B2C, C2B, and C2C in E-commerce Business?	2 + 4
	c)	What are cultural differences and similarities?	2
8.	a)	What is computer and information ethics?	1
	b)	How do yoga and meditation help in professional excellence and stress management?	2
	c)	**Choose the correct answer to the following questions:**	9
	i).	One of the most important issues faced by the world is that _____.	

(a) Computer ethics
(b) Confidentiality

(c) Environmental deterioration
(d) Conflict of interest

ii). Which one does fall under computer ethics?

a) Computers can be used for robbery, crime, and blackmailing others.
b) Hacking is used to access private information
c) A leak of such information of individual leads to harassment in terms of repeated phone calls.
d) Above all

iii) The aim of _____ is to do whatever possible to avoid any kind of harm or accident.

a) Minimalist
b) Reasonable care
c) Beyond one's duty
d) None

iv) The prime responsibility of any professional is _____.

a) Confidentiality
b) Conflict of interest
c) Environmental ethics
d) Computer ethics

v) Which of the following is not done by cybercriminals?
a) Unauthorized account access
b) Mass attack using Trojans as botnets
c) Email spoofing and spamming
d) Report vulnerability in any system

vi) Which of the following is not an example of a computer as a weapon in cyber-crime?
a) Credit card fraudulent
b) Spying on someone using a keylogger
c) IPR Violation
d) Pornography

vii) Which of the following is not a type of cyber-crime?
a) Data Theft
b) Forgery
c) Damage to data and systems
d) Installing antivirus for protection

viii) The factor that affects ethical and unethical behavior. . . .

a) Ethical dilemma
b) Diversity
c) Teamwork
d) Open communication
e) none of these

ix) Installing antivirus for protection
One who believes in making decisions for the good of many people is known as _____
a) utilitarianism
b) teleology
c) deontology
d) egoism
e) None of these

B.Sc (Engg.) 2nd Year 2nd Semester Final Exam
Dept. Of Computer Science and Engineering
Jatiya Kabi Kazi Nazrul Islam University
Course: CSE 225(Computer Architecture and Organization)

Marks: 60 Time: 3hours

Answer any five question from the following

1	a.	What is computer architecture? What are the limitations of computer?	4
	b.	What are the differences between second generation computer and third generation computer?	3
	c.	Discuss about the organization of first-generation computer.	5
2	a.	What is the benefit of using a multiple-bus architecture compared to a single-bus architecture?	3
	b.	What is the general relationship among access time, memory cost and capacity?	4
	c.	Briefly explain about technologies for building processors and memory.	5
3	a.	What are the differences between fixed point numbers and floating point numbers?	3
	b.	What is the function of status register, stack pointer and program counter?	3
	c.	What is instruction set? What are the requirements to be satisfied by an instruction set?	4
	d.	Discuss about representations of data.	2
4	a.	Differentiate between SIMD and MIMD.	3
	b.	Describe the techniques for handling data and instruction hazards in pipelining.	4
	c.	Briefly explain about Binary Addition and Subtraction MIPS architecture.	5
5	a.	Discuss about basic structure of a microprogrammed control unit.	6
	b.	How do you differing horizontal microinstruction from vertical microinstruction?	3
	c.	Draw the floating-point number format. Define exponent and mantissa.	3
6	a.	Draw and discuss the control signals that implement an addition instruction of the form ADD A,B.	5
	b.	What is interrupt? Discuss about different types of interrupt.	4
	c.	How do you increase performance of your personal computer?	3
7	a.	Describe the role of cache memory in pipelined system.	3
	b.	What are the main differences between CISC and RISC?	4
	c.	Briefly explain about hardware multithreading and multicore processors.	5
8	a.	What are the reasons for using virtual memory?	3
	b.	Discuss about typical CPU with the general register organization.	5
	c.	What is parallel processing? How processor level parallelism executes?	4

Department of Computer Science and Engineering

2nd year 2nd semester Final Examination-2022

Course: MATH-275 (Complex variable, Laplace transformation and Fourier analysis)

Time: 3 hours Full Marks: 60

There are 8 Sets of questions out of which 5 should be answered.

1. a) Define complex number and conjugate of a complex number. Prove that the sum and product of a complex number and its conjugate are real numbers. 4

b) Define modulus and argument of a complex number. For any complex numbers z_1 and z_2, prove that

(i) $|z_1 z_2| = |z_1| + |z_2|$ (ii) $Arg(z_1 z_2) = Arg(z_1) + Arg(z_2)$ 4

c) Find the equation of circle of radius 4 and center at (-2, 1). 4

2. a) Define Limit. Prove that $\lim_{z \to z_0} z^2 = (z_0)^2$ 1+3=4

b) Prove that $\lim_{z \to z_0} (f(z).g(z)) = \lim_{z \to z_0} f(z). \lim_{z \to z_0} g(z)$ 4

c) Prove that $f(z) = z^2$ Is uniformly continuous on $|z| < 1$. 4

3. a) Evaluate $\int_{(0,3)}^{(2,4)} (2y + x^2)dx + (3x - y)dy$ along: 7

(i) the parabola $x = 2t, y = t^2 + 3$;

(ii) straight lines from (0,3) to (2, 3) and then from (2,3) to (2,4);

(iii) a straight line from (0, 3) to (2, 4).

b) State Cauchy theorem. Evaluate $\oint_C \frac{dz}{z-a}$ where C is any simple closed curve and $z = a$ is (i) outside C, (ii) inside C. 5

4. a) Define complex line integration. If $f(z)$ is analytic in a simply-connected region R. Prove that $\int_a^b f(z)dz$ is independent of the path in R joining any two points a and b in R. 2+4=6

b) If $f(z)$ is analytic inside and on a simple closed curve C and a is any point inside C, Then prove that $f'(a) = \frac{1}{2\pi i} \oint_C \frac{f(z)}{(z-a)^2} dz$. 6

5. a) State and prove Taylor's theorem 1+5=6

b) Evaluate $\oint_C \frac{\cos \pi z)}{z^2-1} dz$ where C is

(i) The circle $|z| = 2$ (ii) The rectangle with vertices $-i,\ 2-i,\ 2+i,\ i$ 3+3=6

6. a) Prove that

$L[f^n(t)] = s^n L[f(t)] - s^{n-1} f(0) - s^{n-2} f'(0) - s^{n-3} f''(0) - \cdots - f^{n-1}(0)$ 5

b) Find the Laplace transform of (any two) 7

(i) $1 + \cos 2t$ (ii) $t^2 e^t \sin 4t$ (iii) $\frac{\sin 2t}{t}$

7. a) Using Laplace transform prove that $\int_0^\infty \frac{e^{-at} - e^{-bt}}{t} dt = \log \frac{b}{a}$. 6

b) Find the inverse Laplace transform of $\frac{2s^2-6s+5}{s^3-6s^2+11s-6}$. 6

8. a) Define Fourier's series and find the Fourier's coefficients. 6

b) Find the Fourier series expansion of the periodic function $f(x)$ of period 2π where $f(x) = x^2$ for $-\pi < x < \pi$, Hence find the sum of the series $1 - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \cdots$. 6

Jatiya Kabi Kazi Nazrul Islam University
Dept. Of computer Science and Engineering
2nd year 2nd semester Final Examination-2023
Course Title: Database Management System
Course Code: CSE-223

Total Marks: 60 **Time: 3 hours**

Answer any Five from the following questions

1. a) What is a Database Management System (DBMS), and why is it important in modern computing? 4
   b) List and explain some significant differences between file-processing system and DBMS. 4
   c) There are different types of database-system users, differentiated by the way they expect to interact with the system. Explain each of them. 4

2. a) List two reasons why null values might be introduced into the database. 2
   b) Discuss the relative merits of procedural and nonprocedural languages. 2
   c) Consider the SQL query 5
   select distinct p.a1
   from p,r1,r2
   where p.a1=r1.a1 or p.a1=r2.a1
   Under what conditions does the preceding query select values of p.a1 that are either in r1 or in r2? Examine carefully the cases where one of r1 or r2 may be empty.
   d) Show that, in SQL, <> all is identical to **not in**. 3

3. a) List some common data types supported by SQL. 3
   b) Consider the following **Bank Database** 6

branch(branch name, branch city, assets)
customer (customer name, customer street, customer city)
loan (loan number, branch name, amount)
borrower (customer name, loan number)
account (account number, branch name, balance)
depositor (customer name, account number)

   i. Write an SQL query to find the name of all customers whose balance is over 900000 and whose branch name is Trishal.
   ii. Write an SQL query to find all customer who have a loan but not an account at the bank

   c) In what ways data mining and data warehousing are closely connected to DBMS? 3

4. a) What are the different types of attributes in the ER model? Provide examples for each type. 4
   b) Draw an ER diagram for a simple library database that includes entities for books, authors, and borrowers. Include relationships and cardinalities. 5
   c) Explain what a weak entity is and how it differs from a strong entity. 3

5. a) What are the significances of triggers in DBMS? Write an example of trigger with proper syntax. 4
   b) Define the concept of roles in the context of database privileges. Give an example of it. 4
   c) Explain how the concept of privileges contributes to the overall security of a database. 4

6. a) Consider the following **University Database** 6

department(dept_name, building, budget)
course(course_id, title, dept_name, credits)
instructor(ID, name, dept_name, salary)
section(course_id, sec_id, semester, year, building, room_number, time_slot_id)
teaches(ID, course_id, sec_id, semester, year)

Write the SQL queries for each of the following condition.

I. Find those branches where the average account balance is more than Tk. 3000. Find the names of all instructors who have a higher salary than some instructor in 'Comp. Sci'.

II. Find the name of all instructors in the university who have taught some course, find their names and course_id.

b) Explain how integrity constraints guard against accidental damage to the database. 3

c) How SQL aggregation handles queries on relation containing null values? 3

7. a) Design a database for an automobile company to provide to its dealers to assist them in maintaining customer records and dealer inventory and to assist sales staff ordering cars. 9
Each vehicle identified by a vehicle identification number (VIN). Each individual vehicle is a particular model of a particular brand offered by the company (e.g., the XF is a model of the car brand Jaguar f Tata Motors). Each model can be offered with a variety of options, but an individual car may have only some (or none) of the available options, as well as information about individual dealers, customers, and cars.
Your design should include and E-R diagram, a set of relational schemas, and a list of constraints, including primary-key and foreign-key constraints.

b) Use Armstrong's axioms to prove the soundness of the decomposition rules. 3

8. a) Suppose that we decompose the schema *r(A,B,C,D,E)* into 5
r1(A,B,C)
r2(A,D,E)
Show that this decomposition is a lossless decomposition if the following set F of functional dependencies holds:
A->BC
CD->E
B->D
E->A

b) Consider the following two transactions: 7
T_{13}: read(A);
Read(B);
If A=0 then B:=B+1
Write(B).
T_{14}: read(B);
Read(A);
If B=0 then A:=A+1
Write(A).
Let the consistency requirement be A=0 V B=0, with A=B=0 the initial values.
i) Show that every serial execution involving these two transactions preserve the consistency of the database.
ii) Show a concurrent execution of T_{13} and T_{14} that produces a non-serializable schedule.

Jatiya Kabi Kazi Nazrul Islam University

Dept. of Computer Science and Engineering

2nd Year 2nd Semester Final Examination-2022

Course: CSE-221 (Algorithms)

Time: 3 Hours **Full Marks: 5 × 12=60**

[Answer any 5 (five) of the following questions]

1. (a) Definealgorithm? Why is it important in solving computational problems? 3
   (b) What do you know about algorithmic complexity? Write the differences between "Big Theta" and "Big Omega" notation? 1+2
   (c) Discuss the repeat-until statement used in the algorithm with a proper example. 3
   (d) If $f(n) = a_m n^m + a_{m-1} n^{m-1} + \cdots + a_1 n + a_0$, then prove that $f(n) = O(n^m)$. 3

2. (a) What do you know about divide-and-conquer strategy for algorithms? Solve the following recurrence relation for $a = 28, b = 3$ and $f(n) = cn^3$. 1+3

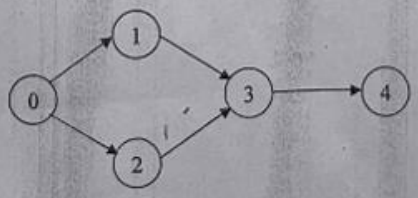
$$T(n) = \begin{cases} T(1) & n = 1 \\ aT(n/b) + f(n) & n > 1 \end{cases}$$

   (b) Write the quicksort algorithm to sort n elements using the divide and conquer strategy. 5
   (c) Show how the min-max algorithm is used to get the maximum and minimum from the dataset: 51, 115, 8, 31, 41, 35, 122, 110, 5. 3

3. (a) Construct the string matching automation for the pattern **P=ababac** and illustrate its operation on the text string **T=abababababacba**. 4
   (b) Write down the advantages of preprocessing of text and pattern in string matching. 2
   (c) Write down the number of hits does the following string matching algorithms encounter in the text T=acbccbbccbcb when looking for the pattern **P=bccb** and also write down their procedure. 6
   (i) Naïve string matching
   (ii) KMP

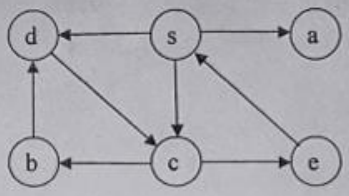
4. (a) Write the recursive backtracking algorithm to solve n-Queen problem. 4
   (b) Consider a sum of subset problem: $n = 4, (w_1, w_2, w_3, w_4) = (11, 13, 24, 7)$ and $m = 31$. Find all subset of w_i whose sums are m. Also, draw the possible solution space tree using fixed and variable tuple size formulation of this problem and indicate answer node.Indicate the nodes numbered in depth-first search manner of the one tree. 5
   (c) Draw a state space tree for mColoring when $n = 4$ and $m = 3$ where n represents number of nodes in a graph and m represents the number of colors. 3

5. (a) Define dynamic programming. Given two sequences of characters. Find out the length along with procedure of the longest common subsequence of both sequences. 4
   (i) a1b2c3d4e
   (ii) z1yy2xx3w4
   (b) Write down the minimum number of insert, remove or delete operations required to convert "cseb" to "cfcbk" with procedure. 4
   (c) A topological sort or topological ordering of a directed graph is a linear ordering of its vertices such that for every directed edge u and v from vertex u to vertex v, u comes before v in the ordering. 4



Find out the topological ordering of the graph using Kahn's algorithm.

6. (a) Consider the following directed graph with unit weight. 6



(i) Give the visited node order for breadth first search and depth first search, starting with 's'.
(ii) Find the shortest path from source 's' to destination 'd'.

(c) Consider the following adjacent list for directed graph. 6

adj(y)=[x],
adj(x)=[z],
adj(z)=[y,w],
adj(w)=[x],
adj(s)=[z,w],
adj(v)=[s,w],
adj(t)=[u,v],
adj(u)=[v].

(i) Construct a graph from the above information.
(ii) Identify the tree edge, back edge, cross edge and forward edge for the graph.

7. (a) What is the branch and bound method? Write the disadvantages of FIFOBB and LIFOBB. 4
How can you speed up the search procedure in FIFOBB and LIFOBB?

(b) State Least Cost search technique. Write the algorithm of LC search technique. 4

(c) Draw the portion of state space tree generated by the FIFO Branch-and-Bound technique for the job sequencing with deadlines instances $n = 4$, $(p_1, p_2, \ldots, p_4) = (5, 10, 6, 3)$, $(t_1, t_2, \ldots, t_4) = (1,2,1,1)$, and $(d_1, d_2, \ldots, d_4) = (1, 3, 2, 1)$. Use fixed tuple size formulation to solve this problem. 4

8. (a) Define P, NP, NP-Hard and NP-complete problems with example. 4

(b) Consider the following recurrence relation. 3

$$T(n) = \begin{cases} 2T(n/2) & n > 2 \\ 1 & n = 2 \\ 0 & n = 1 \end{cases}$$

When $n = 2^k$ for some positive integer k. Now prove that $T(n) = 3n/2 - 2$.

(c) Explain - All NP-complete problems are NP-hard, but some NP-hard problems are not known to be NP-complete. 3

(d) What do you know about decision problems and optimization problems? Give examples. 2

**** End ****

14 Batch

Session: 2019-2020

Exam: 2021

Jatiya Kabi Kazi Nazrul Islam University

Dept. of Computer Science and Engineering

2nd Year 2nd Semester Final Examination-2021

Course: CSE-221 (Algorithms)

Full Marks: 5 × 12 = 60 **Time: 3 Hours**

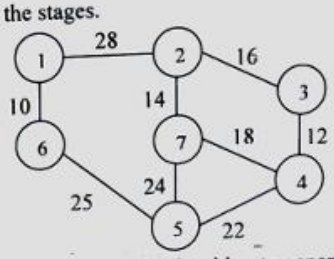
[Answer any five of the following questions]

1. (a) What is algorithm? What are the criteria that an algorithm must satisfy? 3
   (b) How do you measure algorithmic complexity? Write the differences between "Big O" and "Big Omega" notation? 1+3
   (c) Define algorithm strategy. List at least five names of algorithmic strategies. 2
   (d) Solve the following recurrence relation for $a = 1, b = 2$ and $f(n) = c$. 3

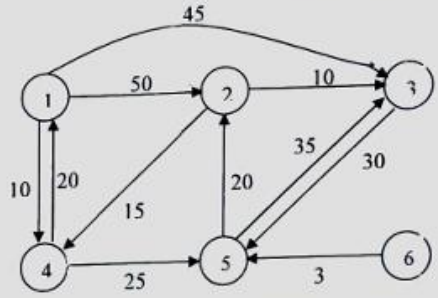
$$T(n) = \begin{cases} T(1) & n = 1 \\ aT(n/b) + f(n) & n > 1 \end{cases}$$

2. (a) Explain divide-and-conquer strategy for algorithm. Write control abstraction of this strategy. 2+2
   (b) Write the mergesort algorithm to sort n elements using divide and conquer strategy. 5
   (c) Show the steps of quicksort algorithm for sorting the following sequence 5,15,8,3,4,3,12,10. 3

3. (a) Find the minimum cost spanning tree of the following graph using Prim's algorithm. Show all the stages. 3

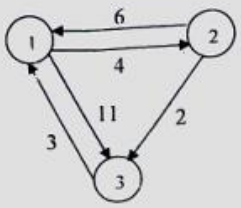


   (b) Write the greedy algorithm to generate the shortest path. 4
   (c) Find the shortest path from vertex-1 to all destinations of the following graph. 3



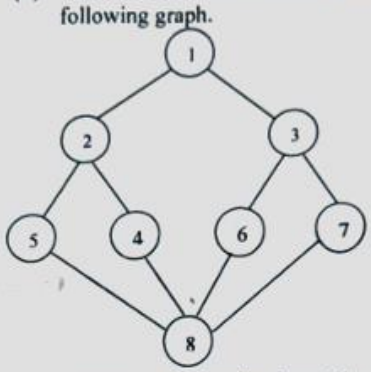
   (d) What do you mean by feasible solution and optimal solution? 2

4. (a) What is knapsack problem? Consider the following instance of the knapsack problem: $n = 5$, $m = 60$. $(p_1, p_2, \ldots, p_5) = (30, 40, 45, 77, 90)$, and $(w_1, w_2, \ldots, w_5) = (5, 10, 15, 22, 25)$. Find the optimal solution of this knapsack problem. 4
   (b) Briefly describe travelling salesperson problem. State the difference between Dynamic programming and Greedy method. 1+2
   (c) Write the algorithm of all pair shortest path problem? Calculate the cost matrix A^0, A^1, A^2 and A^3 for the following graph. 2+3

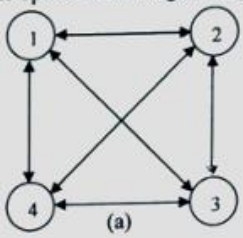


5. (a) Define the terms: Problem state, Solution states, Answer states, State space tree, Live node. 3
Dead node.

(b) Find the order of vertices using BFS and DFS and draw the corresponding spanning tree of the following graph. 4



(e) Consider the following directed graph of Figure (a) and its length is given by the matrix Figure (b). Find the optimal tour length and path of the graph. 5



(a)

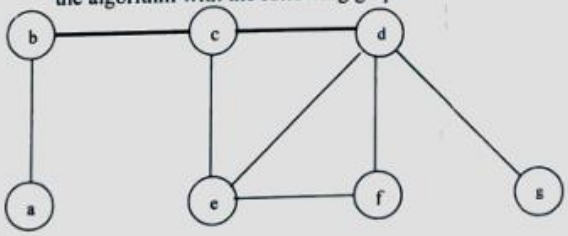
$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 11 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$

(b)

6. (a) What is backtracking? State 4-queens problem and draw a solution space of the problem where nodes are numbered in depth first search manner. 4

(b) Consider a sum of subset problem: $n = 4, (w_1, w_2, w_3, w_4) = (11, 13, 24, 6)$ and $m = 30$. Find all possible subsets of w that sum to m. Also, draw the possible solution space organization of this problem and indicate answer nodes. 4

(c) What is vertex-color problem. Write the algorithm of solving vertex-color problem. Explain the algorithm with the following graph. 4



7. (a) Write the basic difference between Backtracking and Branch-and-Bound strategy. Which one is better for 4-queens search problem and why? 2+2

(b) State Least Cost search technique. Write the algorithm of LC search technique. 4

(c) Draw the portion of state space tree generated by FIFO Branch-and-Bound technique for the job sequencing with deadlines instances n=5, $(p_1, p_2, \ldots, p_5) = (6,3,4,8,5)$, $(t_1, t_2, \ldots, t_5) = (6,3,4,8,5)$, and $(d_1, d_2, \ldots, d_5) = (6,3,4,8,5)$. Use variable tuple size formulation to solve this problem. 4

8. (a) Define P, NP, NP-Hard and NP-complete problems with example. Draw an appropriate figure to show the relation among them. 4

(b) State the functions introduced to specify non-deterministic algorithm? 3

(c) Categorize problems according to computing time? State them with example. 3

(d) What is the constraint of dirty sock problem? 2

***** End ****

2nd Year 2nd Semester B.Sc (Engg.) Final Examination
Course: CSE-227 (Digital Electronics and Pulse Technique)
Session: 2019-2020

Full Marks: 60

Duration: 3 hours

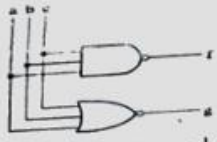
(Answer any *five* from the following questions)

01. a) What do you mean by the following terms? 4
i)Noise –margin ii) Noise Immunity iii) Propagation delay iv) Fan-out
b) Using a diode draw a circuit from which you can get HIGH output only when both inputs are HIGH. Explain its operation. 3
c) Using a transistor draw a circuit from which you can get LOW output only when both inputs are LOW. Explain the circuit operation. 3
d) How can a transistor act as a switch? 2

02. a) Describe the differences between current sinking and current sourcing action for a logic family. 3
b) Explain TTL NAND gate with totem pole output circuit diagram. 4
c) Draw basic ECL circuit with emitter followers and explain its operation. 3
d) What do you mean by I^2L? 2

03. a) What are SRAM and DRAM? What are the advantages of SRAMs over DRAMs? 3
b) Describe the operation of a CMOS NOR gate with circuit diagram. 4
c) What do you mean by LED? Sketch necessary diagrams to show the construction and operation of a LED. 5

04. a) By means of a timing diagram, show the signals of the outputs f and g in following figure as functions of the three inputs a, b, and c. Use all eight possible combinations of a, b, and c. 2



b) Draw a R/2R ladder Digital-to-Analog converter and derive its voltage equation. What are the advantages of R/2R ladder DAC over binary-weighted resistors DAC? 5
c) What do you mean by counter-type ADC? Describe the operation of digital-ramp ADC. 5

05. a) Draw a pulse and describe its characteristics and from it define duty cycle. 5
b) Draw a linearizing circuit for a sweep generator. 2
c) Draw and explain the operation of an adder and a subtractor using Op-Amp. 3

06. a) Draw the block diagram of a 555 timer IC. 3
b) Describe how IC 555 timer is used as astable multivibrator, draw the waveforms and derive expression for the frequency. 5
c) Draw the circuit diagram of a transistor blocking oscillator and describe its operation. 4

07. a) Do you think diode is essential electronic device for wave shaping circuit? If yes, prove it. 3
b) What is switching circuit? Why are electronic switches preferred to other types of switches? 3
c) Draw and discuss a timing circuit using transistor which can be used as a "flip-flop". 3
d) Describe the function of a Sample and Hold (S/H) circuit. Why is it important in analog to digital conversion? 3

08. Write short notes on (any two): 12
i) Schmitt trigger ii) PLA's iii) LCD.

Dept. of Computer Science and Engineering
Jatiya Kabi Kazi Nazrul Islam University
B.Sc(Engg.) 2nd Year 2nd Semester Final Exam.— 2021
Session: 2019-2020
Course: CSE 225(Computer Architecture and Organization)

Marks: 60 Time: 3 hours

(Answer any five question from the following)

1 a) What are the main differences between Computer Organization and Architecture? Why we need to learn the basics of Computer Organization and Architecture as a Computer Science and Engineering student? 4
b) Draw the structure of IAS computer and explain its components. 4
c) Explain different bus interconnection methods. 4

2 a) Explain the instruction set of Intel 8085 Microprocessor. 6
b) Explain cache coherence. 2
c) What do you mean by Parallel processing? What are the features of it? 4

3 a) What are the differences between user programs and supervisor programs? 3
b) Discuss about the overlapping instructions in a two-stage instruction pipeline. 3
c) What is instruction set? What are the requirements to be satisfied by an instruction set? 4
d) When mantissa is said to be normalized? 2

4 a) Write down the function of the following operation: 4
i. Load ii. Return iii. Execute iv. Compare.
b) Draw and discuss the control signals that implement an addition instruction of the form ADD A,B. 6
c) Define vertical microinstruction. 2

5 a) What do you mean by Bus Arbitration? Explain different bus arbitration method. 4
b) What is DMA? Explain DMA technique with suitable diagram. 4
c) How we can handle multiple interrupts? 4

6 a) What is address translation? What are the stages that address translation is carried out? 4
b) Discuss about the structure of a dynamic address-translation system. 4
c) What are the differences between preemptive allocation and non-preemptive allocation? 4

7 a) Discuss about a system's interconnection structures. 4
b) What is bus arbitration? Discuss about bus arbitration using daisy chaining. 4
c) Discuss about programmed IO with separate memory and IO address spaces. 4

8 a) What are the differences between serial-access memory and random-access memory? 4
b) What are the differences between fixed-point and floating-point numbers? 4
c) Discuss about the logical structure of four-bit ripple-carry adder. 4

Department of Computer Science and Engineering
Jatiya Kabi Kazi Nazrul Islam University
2nd year 1st Semester Final Examination— 2021
Course: CSE 223 (Database Management System)
Session: 2019-2020

Time: 3 hours **Marks: 60**

(Answer any five questions)

1. a) Define the terms instance and schema. 2
   b) Write major advantages and disadvantages of a database system. 4
   c) What are the responsibilities of database management system? 2
   d) Explain the different types of database system users. 4

2. a) Write down the difference between DDL and DML? 4
   b) List four significant differences between a file-processing system and a DBMS. 4
   c) Describe different state of a transaction. 4

3. a) Describe the responsibilities of storage manager? 4
   b) Consider the following expressions, which use the result of a relational algebra operation as the input to another operation. For each expression, explain in words what the expression does. 6
      i. $\sigma_{year \geq 2009}(takes) \bowtie student$
      ii. $\sigma_{year \geq 2009}(takes \bowtie student)$
      iii. $\Pi_{ID,name,course\ id}(student \bowtie takes)$
   c) Define agregrate function. 2

4. a) Construct an E-R diagram for a bank database having customer, loan, account, employee and branch as entity types. A customer has an account in a particular branch of the bank. The customer can also borrow loan from the bank. The bank has a number of employees working in different branches of the bank. Add appropriate attributes for each entity type. Represent the key attributes, weak entity types (if any), cardinality ratios, and role names of each entity type. Make appropriate assumption to complete the specification. 6
   b) Explain the distinctions among the terms primary key, foreign key, candidate key and super key. 6

5. Consider the bank database. Give an expression in the relational algebra for each of the following queries. 12

   branch(*branch_name*, *branch city*, *assets*)
   customer (customer_name, *customer street*, *customer city*)
   loan (*loan_number*, *branch name*, *amount*)
   borrower (*customer_name*, *loan number*)
   account (*account_number*, *branch name*, *balance*)
   depositor (*customer_name*, *account number*)

   i. Given your choice of primary keys, identify appropriate foreign keys.
   ii. Find the names of all branches located in "Chicago".
   iii. Find the names of all borrowers who have a loan in branch "Downtown".
   iv. Find the names of all depositors who have an account with a value greater than $6,000 at the "Uptown" branch.
   v. Find all loan numbers with a loan value greater than $10,000.

6. a) Why **with** clause is needed for any database. 4
b) Write down a SQL query to **create** and **drop** a table in a database. 4
c) Write down the responsibility of DBA. 4

7. a) What are the basic domain types in SQL? 2
b) What is transaction? Explain the ACID properties of the transaction. 5
c) Define the terms atomicity and durability. Explain the shadow-copy technique for implementing atomicity and durability. 5

8. a) Give the differences between superkey and candidate key. 2
b) What is integrity constraint? Explain different types of constraints on a single relation. 4

c) Consider the following bank database, where primary keys are underlined. Give an expression in SQL for each of the following queries: 6
branch(branch_name, brabch_city, assets)
customer(customer_name, customer_street, customer_city)
loan(loan_number, branch_name, amount)
borrower(customer_name, loan_number)
account(account_number, branch_name, balance)
depositor(customer_name, account_number)
Find the names of all customers in alphabetic order who have a loan at the Perryridge branch.
(i) Find the average account balance at each branch.
(ii) Find the branch that has the highest average balance.
(iii) Find all the customers who do have both a loan and an account at the bank.

Department of Computer Science and Engineering

2nd year 2nd semester Final Examination-2021

Session: 2019-2020

Course: MATH-275 (Complex variable, Laplace transformation and Fourier analysis)

Time: 3 hours

Full Marks: 60

Answer any five of the following questions

1. a) Define conjugate of a complex number. Express $\frac{(\cos\theta + i\sin\theta)^n}{(\sin\theta + i\cos\theta)^4}$ in the form $x + iy$. 4

   b) Define modulas of a complex number. For any complex numbers z_1 and z_2, prove that $|z_1 + z_2| \leq |z_1| + |z_2|$ 4

   c) Find the polar form of the complex number $\left(\frac{2+i}{3-i}\right)^2$. 4

2. a) Define a complex function. Prove that $\lim_{z \to z_0} [f(z).g(z)] = \lim_{z \to z_0} f(z). \lim_{z \to z_0} g(z)$ 1+3=4

   b) If $\lim_{z \to z_0} f(z)$ exists, then prove that prove that its value is unique. 4

   c) If $f(z)$ and $g(z)$ are continuous at z_0, then prove that $f(z) + g(z)$ is continuous at z_0. 4

3. a) Define analytic function. If $w = f(z) = u(x,y) + i\,v(x,y)$ satisfy the C-R equations $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}$ and $\frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x}$ in a region R and partial derivatives $\frac{\partial u}{\partial x}$, $\frac{\partial v}{\partial y}$, $\frac{\partial u}{\partial y}$, and $\frac{\partial v}{\partial x}$ are continuous in R, then prove that $f(z)$ is analytic in R. 1+5=6

   b) Define singular point of a function. Prove that $u = e^{-x}(x\sin y - y\cos y)$ is harmonic. 1+2+3=6

4. a) State Green's theorem and verify it for $\oint_C (2xy - x^2)dx + (x + y^2)dy$ where C is the closed curve in the region bounded by $y = x^2$ and $x = y^2$. 1+5=6

   b) State Cauchy's theorem and prove it for a triangle. 1+5=6

5. a) If $f(z)$ is analytic inside and on a simple closed curve C and a is any point inside C, Then prove that $f^n(a) = \frac{n!}{2\pi i}\oint_C \frac{f(z)}{(z-a)^{n+1}}\,dz$ 6

   b) Prove that all roots of the equation $z^7 - 5z^3 + 12 = 0$ lie between the circles $|z| = 1$ and $|z| = 2$. 6

6. (a) State and prove Laurents theorem. 6

   (b) Expand $f(z) = \frac{z}{z^2 + 5z + 6}$ in a Laurent series valid for 3+3=6

   (i) $2 < |z| < 3$ (ii) $|z| > 3$

7. a) Define Laplace Transform of a function. Determine the Laplace transforms of sin(at) and cos(at). 7

   b) If $L\{f(t)\} = F(S)$, then $L\{tf(t)\} = -F'(s) = -\frac{d}{dx}F(S)$. 5

8. a) Obtain the Fourier series of the function $f(x) = \begin{cases} 0; & -\pi \leq x \leq 0 \\ 1; & 0 \leq x \leq \pi \end{cases}$ 1+5=6

   b) Given that $f(x) = x + x^2$ for $-\pi < x < \pi$, find the Fourier series of $f(x)$ and prove that $\frac{\pi^2}{6} = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \cdots$. 6

13 Batch

Session: 2018-2019

Exam: 2020

Jatiya Kabi Kazi Nazrul Islam University

Dept. of Computer Science and Engineering
2nd Year 2nd Semester Final Examination-2020
Course: CSE-221 (Algorithms)

Time: 3 Hours

Full Marks: 5 × 12 = 60

[Answer any five of the following questions]

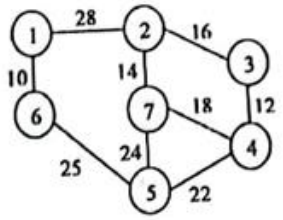
1. a) Define algorithm. Write in details at least 3 types of problem are solved by algorithms with examples? 4
   b) Discuss "Big O" notation with example. 3
   c) Define algorithm strategy. List some name of algorithmic strategies. 2
   d) Solve the following recurrence relation for a=5, b=4 and $f(n) = cn^2$ 3

$$T(n) = \begin{cases} T(1) & n = 1 \\ aT(n/b) + f(n) & n > 1 \end{cases}$$

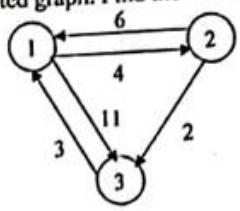
2. a) What do you know about divide-and-conquer strategy for algorithm? Write control abstraction of this strategy. 4
   b) Write a recursive algorithm that finds the maximum and minimum of a set of elements using divide-and-conquer strategy. 4
   c) How does merge sort algorithm works? Show that the complexity of merge sort algorithm when n is a power of 2 i.e. $n=2^k$. 4

3. a) What do you mean by greedy method? What do you mean by feasible solution and optimal solution? 3
   b) Consider the following instance of the knapsack problem: $n=7$, $m=20$, $(p_1, p_2, \ldots p_7)$ = $(10,5,15,7,6,18,3)$, and $(w_1, w_2, \ldots w_7) = (2,3,5,7,1,4,1)$. Find the optimal solution to this knapsack problem. 4
   c) What do know about Tree Vertex Splitting Problem? Write the algorithm for TVSP. 5

4. a) Briefly describe travelling salesperson problem. State the difference between Dynamic programming and Greedy method. 4
   b) Find the feasible solution for the job sequencing with deadline problem where $n=4$, $(p_1, p_2, p_3, p_4) = (100,10,15,27)$ and $(d_1, d_2, d_3, d_4) = (2,1,2,1)$. Also indicate the optimal solution among the feasible solution. 4
   c) Find the minimum cost spanning tree of the following graph using Prim's algorithm. Show the all states. 4



5. a) What do you know about 'principles of optimality'? 1
   b) State 0/1 knapsack problem. State the recurrence equation to solve 0/1 knapsack problem. 3
   c) In a 0/1 knapsack problem, consider the case in which n=3, w_1=2, w_2=3, w_3=4, p_1=1, p_2=2, p_3=5, and m=6. Compute $g_0(6)$. 4
   d) Consider the following directed graph. Find the value of the matrix A^0, A^1, A^2, and A^3. 4



6. a) Write the basic difference between Breadth-First search and Depth-first search technique. 2

b) Find the DFS and BFS spanning tree of the graph as shown in Figure (a). 2

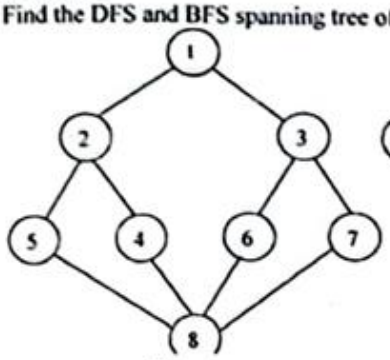


Figure:a

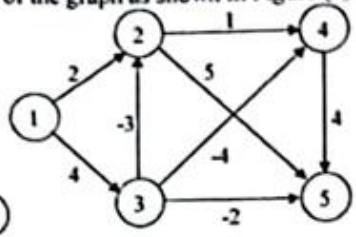
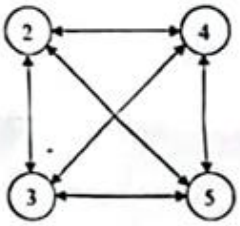


Figure:b

c) Find the shortest path from node 1 to every other node in the graph of the following figure using Bellman and Ford algorithm (See Figure: b). 3

d) Consider the following directed graph of flowing Figure and its length is given by the matrix Figure (b). Find the optimal tour of the graph. 5



a

$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$

(b)

7. a) What is bouncing function? Why is it used? State m-coloring problem with example. 4

b) What is LC search? Write the algorithm of LC search technique. 4

c) Draw the portion of state space tree generated by FIFO Branch-and-Bound technique for the job sequencing with deadlines instance $n=4$, $(p_1, p_2, p_3, p_4) = (5,10,6,3)$, $(t_1, t_2, t_3, t_4) = (1,2,1,1)$ and $(d_1, d_2, d_3, d_4) = (1,3,2,1)$. Use fixed-tuple size formulation to solve this problem. 4

8. a) Differentiate between the following items used in algorithm. 4

i) Polynomials and non-polynomials

ii) NP hard and NP complete

iii) Deterministic algorithm and non-deterministic algorithm.

b) What are the functions introduced to specify non-deterministic algorithm? 3

c) What do you mean by explicit constraint and implitic constraint? Give example. 2

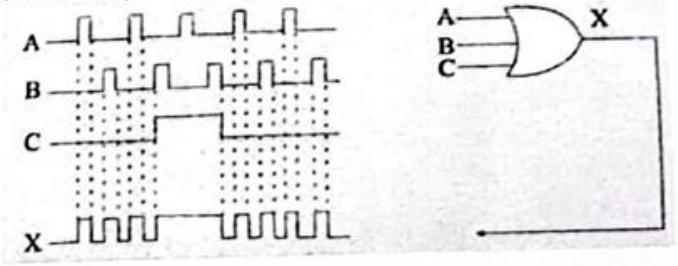
d) Categorize problems according to computing time? State them with example. 3

Jatiya Kabi Kazi Nazrul Islam University, Mymensingh
Department of Computer Science and Engineering
B.Sc. (Engg.) 2nd Year 2nd Semester Final Examination 2020
Session 2018-2019
Course Code: CSE 227; Course Title: Digital Electronics and Pulse Technique

Time: 3 (three) hours | Total Marks: 5 × 12 = 60

[Answer any 5 (five) of the following questions. You have to write the answers sequentially e.g., a) then b) then c) and so on.]

01. a) What do you mean by the following terms: Noise Immunity ,Propagation delay, current sinking, totem pole, universal gate — 5
b) Using diode draw a circuit from which you can get LOW output only when both inputs are LOW Explain its operation. — 3
c) For a three input OR-gate shown below figure, determine the output waveform. — 4



02. a) Describe the differences between fan-in and fan-out action for a logic family. — 3
b) Explain TTL NOR gate using transistor. — 4
c) What do you mean by comparator? Describe a voltage comparator using OP-AMP. — 5

03. a) What are SRAM and DRAM? What are the advantages of SRAMs over DRAMs? — 3
b) Describe the operation of a CMOS NAND gate with circuit diagram. — 4
c) What do you mean by LED? Sketch diagrams to show the construction and operation of a LED. — 5

04. a) Define-Full-scale output, resolution for a D/A converter. — 2
b) Draw a R/2R ladder Digital-to-Analog converter and derive its voltage equation. What are the advantages of R/2R ladder DAC over binary-weighted resistors DAC? — 5
c) What do you mean by counter-type ADC? Describe the operation of digital-ramp ADC. — 5

05. a) Draw a pulse and describe its characteristics and from its define duty cycle. — 4
b) Do you think diode is essential electronic device for wave shaping circuit? If yes, prove it. — 3
c) Draw and explain the operation of an adder and a subtractor using Op-Amp. — 5

06. a) What is multivibrator? — 2
b) Classify multivibrators and write some applications area for each of them. — 4
c) Design and describe the circuit operation of monostable multivibrator. — 6

07. a) Describe the function of a sample and hold circuit. Why is it important in analog to digital conversion? — 4
b) Draw and discuss the clipper and clamper circuit for the purpose of shaping a wave. — 6
c) Write some non-linear applications of OP AMPs. — 2

08. a) Design and describe clocked J-K flip-flop with timing diagram. — 5
b) What does it mean by the tern edge-triggered? — 2
c) How does a Schmitt-trigger logic device operate? Explain. — 5

Department of Computer Science and Engineering

2nd year 2nd semester Final Examination-2020

Course: MATH-275 (Complex variable, Laplace transformation and Fourier analysis)

Full Marks 60

Time: 3 hours

There are 8 Sets of questions out of which 5 should be answered.

1. a) Define complex number, its modulus and argument with example.
   b) Find the equation for a circle of radius 4 with centre $(-2,1)$.
   c) Prove that $\arg(z_1 z_2) = \arg(z_1) + \arg(z_2)$ where z_1 and z_2 are any complex numbers.

2. a) Define limit of a complex function. Prove that
$$\lim_{z \to z_0} [f(z) + g(z)] = \lim_{z \to z_0} f(z) + \lim_{z \to z_0} g(z)$$
   b) If $f(z) = z^2$ is a complex function, prove that $\lim_{z \to z_0} f(z) = z_0^2$
   c) Prove that $f(z) = \frac{1}{z}$ is not uniformly continuous on $|z|<1$.

1+3=4

3. a) Define C-R equation and find the necessary condition that the function $w = f(z) = u(x,y) + iv(x,y)$ is analytic in a region R. 1+5=6
   b) Define harmonic function and show that the function $u = e^{-x}(x\,siny - y\,cosy)$ is harmonic. 1+5=6

4. a) State and prove Green's theorem if C is a simple closed curve which has the property that any straight line parallel to the coordinate axes cuts C in at most two points. 1+5=6
   b) State Cauchy's theorem and use it to prove that $\int_a^b f(z)dz$ is independent of path from a to b in the region R, if $f(z)$ is analytic in a simply-connected region R. 1+5

5. a) If $f(z)$ is analytic inside and on a simple closed curve C and a is any point inside C, Then prove that $f(a) = \frac{1}{2\pi i}\oint_C \frac{f(z)}{z-a}\,dz$
   b) Find the value of $\oint_C \frac{\sin^6 z}{(z-\frac{\pi}{6})^3}dz$ where C is the circle $|z| = 1$

1+5

6. a) State and prove Taylors theorem.
   b) Expand $f(z) = \frac{1}{(z+1)(z+3)}$ in a Laurent series valid for $1 < |z| < 3$

7. a) Define Laplace Transform of a function. Find the Laplace Transform of any two from the following functions. 1+6
   (i) $cos\,at$ (ii) $t\,sin\,at$ (iii) e^{at}
   b) Find the solution of $y'' + 25y = 10\cos 5t$ with the condition $y(0) = 2,\ y'(0) = 0$ by using Laplace transform.

8. a) Define Fourier's series for the function $f(x)$ in the interval $(-\pi,\pi)$ and find Fourier constants.
   b) Given that $f(x) = x + x^2$ for $-\pi < x < \pi$, find the Fourier series of $f(x)$.

Jatiya Kabi Kazi Nazrul Islam University
Department of Computer Science & Engineering
2nd Year 2nd Semester Final Examination 2020
Course Code: CSE-225 (Computer Organization and Architecture)
Session: 2018-2019

Time: 3.00 hours | Total Marks: 60

(Answer any five questions of the following)

1. (a) What are the main differences between Computer Organization and Architecture? Why we need to learn the basics of Computer Organization and Architecture as a Computer Science and Engineering student? 4
   (b) Draw the structure of IAS computer and explain its components. 4
   (c) Explain different bus interconnection methods. 4

2. (a) Explain the instruction set of Intel 8085 Microprocessor. 6
   (b) How many types of Cache? Describe each type. 2
   (c) What do you mean by Parallel processing? What are the features of it? 4

3. (a) Explain the instruction set of 8086. 4
   (b) Explain string manipulation Instructions. 4
   (c) Draw and describe the physical memory organization 8086. 4

4. (a) What is PLA? Explain instruction cycle state diagram with interrupt. 4
   (b) Explain microprogram control with suitable example. 4
   (c) Explain the major functions of an I/O module. 4

5. (a) What do you mean by Bus Arbitration? Explain different bus arbitration method. 4
   (b) What is DMA? Explain DMA technique with suitable diagram. 4
   (c) How we can handle multiple interrupts? 4

6. (a) Draw and explain the working principle of DMA controller. 6
   (b) What do you mean by RISC & CISC? Discuss the advantages and disadvantages of RISC & CISC processor. 3
   (c) What is Interrupt? How many types of Interrupt? Describe each type. 3

7. (a) What are the differences of Hardware and Micro-programmed control unit? 3
   (b) What do you mean by PSW? Explain common fields or flags. 4
   (c) Explain the instruction cycle state diagram. 5

8. (a) Why we use mapping function? What are the different mapping functions available? Explain any two of them. 6
   (b) Draw the internal block diagram of memory chip and explain its function. 4
   (c) Draw 128 x 8 Memory Chips block diagram. 2

Jatiya Kabi Kazi Nazrul Islam University

Dept. of Computer Science and Engineering
2nd year 2nd semester Final Examination-2001
Course: CSE-223 (Database Management System)

Time: 3 hours

Total Marks: 60

Answer any five of the following questions

1. a) What do you understand by DBMS? What kind of problem would we face to deal with data if we do not have database management system? 4
   b) Write and explain five main responsibilities of database administrator (DBA). 4
   c) There are different types of database-system users, differentiated by the way they expect to interact with the system. Explain each of them. 4

2. a) Consider the following University Database, where the primary keys are underlined: 9

   department(deptname, building, budget)
   course(courseid, title, dept_name, credits)
   instructor(ID, name, dept_name, salary)
   section(courseid, secid, semester, year, building, roomnumber, time_slot_id)
   teaches(ID, courseid, secid, semester, year)

   Give an expression in SQL for each of the following queries:
   i. Find the average salary of instructors in each department.
   ii. To find the name of all instructors in the university who have taught some course, find their names and course id.
   iii. Find the names of all departments whose building name includes the substring 'Watson'

   b) Which level of abstraction describe about what data are stored in the database, and what relationship exist among those data? 3

3. a) List some common data types supported by SQL. 3
   b) Consider the following bank database 6

   branch(branch name, branch city, assets)
   customer (customer name, customer street, customer city)
   loan (loan number, branch name, amount)
   borrower (customer name, loan number)
   account (account number, branch name, balance)
   depositor (customer name, account number)

   i. Write an SQL statement to insert a tuple in account relation where the account number is "A-1001" branch name is Mymensingh branch and balance is 1000.
   ii. Write an SQL query to find all customer who have both a loan and an account at the bank

c) What do you mean by data mining and data warehousing? 3

4. a) What are outer join operations and how are they different from inner join operations? 4

b) Let consider two entity sets, customer and loan, related through a binary relationship set borrower. The attributes associated with customer are customer_name, social_security_number, customer_street, and customer_city. The attribute associate with loan are loan_number and amount. The relationship set borrower is many to many. Now you have to draw an E-R diagram for this relationship. 6

c) Define simple and composite attributes. 2

5. a) Explain how integrity constraints guard against accidental damage to the database. 4

b) SQL offers five built-in aggregate functions, list them. Explain aggregation with grouping. 5

c) Differentiate between *having* and *where* clause in SQL. 3

6. a) What is PL/SQL? Write down the features of PL/SQL. 4

b) With example explain the basic structure followed in PL/SQL. 4

c) What is a PL/SQL cursor? Explain different types of cursor with examples. 4

7. a) Classify and explain the failures occurred in database system. 4

b) Draw a simple abstract transaction model where all possible transaction states must be present and explain each of them. 6

c) What are the purpose of the word commit and rollback in DBMS? 2

8. a) What do you understand by ACID properties of transaction? Explain each properties with proper example. 6

b) Multiple transaction are allowed to run concurrently in a system, what are the advantages and challenges to do that? 4

c) Define *conflict equivalent* and conflict *serializable*. 2

50

12 Batch

Session: 2017-2018

Exam: 2019

Selim Sir (12th batch)

Jatiya Kabi Kazi Nazrul Islam University
Department of Computer Science and Engineering
Second year Second Semester Final Examination, 2019
Course: CSE-221: Algorithms

Time: 3 hours **Marks: 60**

(Answer any 5 questions)

1. a) What is an algorithm? Write down the characteristic of an algorithm. 3
   b) Define time and space complexity of an algorithm. 3
   c) How to determine complexity of 4
      i) if-then-else statements
      ii) nested loops 2
   d) What is Pseudo code?

2. a) Define asymptotic notation: O-notation and Θ-notation. 2
   b) Briefly describe Master Theorem for complexity analysis. 4
   c) Determine complexity of the following recurrences using Master Theorem. 6
      i) $T(n) = 8T\left(\frac{n}{2}\right) + 1000n^2$
      ii) $T(n) = 2T\left(\frac{n}{2}\right) + 10n$

3. a) What is recursion? Write down BINARY_SEARCH algorithm using recursion. 4
   b) Simulate operation of PARTITION method of QUICK SORT for following array of elements considering last element as pivot. 8

2	8	7	1	3	5.	6.	4

   Show that the worst case complexity of QUICK SORT is $O(n^2)$

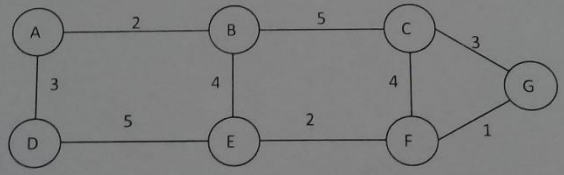
4. a) How does Divide-and-Conquer method work? 2
   b) Write down an algorithm to find the maximum and minimum number from a given set of numbers using Divide-and-Conquer method. 6
   c) Write algorithm of MERGE sort and mention its complexity. 4

5. a) Consider two DNA sequence: X=ACCGATCG and Y=GACAT. Find a maximum length common sub-sequence of X and Y. 6
   b) Find Huffman code for message containing letters as given below: 6

Alphabet	a	b	c	d	e	f	g
Frequency	4	5	7	8	10	12	20

6. a) What is Dynamic Programming? Write down the general procedure of dynamic programming. 3
   b) Write down the procedure to find n-th Fibonacci number using Dynamic Programming. 5
   c) Write down the procedures of PUSH and POP operations of STACK. 4

7. a) Consider a network consists of 7 routers that are connected according to a predefined topology as represented in Figure 3. Suppose router A tries to send ita packet to router G; but there are many ways that the packet is forwarded to it. Now find the shortest route in order to send packets to G as well as other routers. Assume each node represents a router and the value between any two connections represents the cost. 6



   b) Can we solve an all pairs shortest paths problem by running a single-source shortest paths algorithm |V| times, once for each vertex as the source? If we can, then how? If we cannot, then why? Mention briefly. 3

c) Determine the square of matrices that minimizes the number of scalar multiplications from two pre-calculated tables shown below. 3

	1	2	3	4	5
1	0	50	150	90	190
2		0	50	30	90
3			0	20	40
4				0	200
5					0

(a) Cost table

	1	2	3	4	5
1		1	2	2	2
2			2	2	2
3				3	4
4					4
5					

(b) Key table

8. a) Show the Euler diagram for P, NP, NP-complete and NP-hard set of problems. List some commonly known problems that are NP-complete. 5

b) Using backtracking approach, find an arrangement of 8-queens in an 8x8 square board so that no two queens are attacking one another. 5

c) Differentiate between greedy and dynamic programming algorithms. 2

Pronab Sir
(13 batch)

Jatiya Kabi Kazi Nazrul Islam University
Dept. Of Computer Science and Engineering
2nd Year 2nd Semester Final Examination-2019
Course: CSE 225(Computer Architecture and Organization)

Marks: 60 Time: 3 hours

[Answer any five (5) questions of the following]

1. a) Using a diagram define and explain the main structural components of a computer. 4
   b) Compare and contrast between computer organization and computer architecture. 3
   c) Write the assembly code to implement the expression=(A+B)*(C+D) on 3,2,1, and 0 address machines. 5

2. a) Define instruction and instruction cycle. 3
   b) Discuss about overall organization of the power PC 5
   c) What are the differences between pipelined instruction processing and superscalar pipelined instruction processing? Explain with exact figures. 4

3. a) Define fixed point and floating point numbers with example. 4
   b) What is the function of ripple carry adder? Given that multiplicand (M)1 1 0 1 multiplier(Q) 1 0 1 1 find multiplication using serial multiplier. 4
   c) Discuss about a common circuit that can perform addition and subtraction. 4

4. a) Briefly explain the two basic approaches used to minimize register to memory operations on RISC machines. 3
   b) Explain the statement: "Pipelining is a means for improving performance by overlapping the execution of machine instructions". Use diagrams if required. 4
   c) Draw the timing diagrams and explain the synchronous and asynchronous schemes function for data transfers over a bus. 5

5. a) Draw and discuss the control signals that implement an addition instruction of the form ADD A,B. 5
   b) How do you differing horizontal microinstruction from vertical microinstruction? 3
   c) Discuss about the structure of an m-stage pipeline. 4

6. a) What are the main functions of an input output (I/O) module? List the steps followed in an I/O operation through such modules. 3
   b) Using a diagram briefly explain the changes in the memory and registers of a microprocessor when an interrupt occurs. 5
   c) Explain the direct memory access I/O operation. How is it related to a "cycle stealing"? 4

7. a) Define memory. What are the goals of a memory system? 3
   b) Define performance and cost of a memory. What are the differences between 1-D random access memory unit and 2-D random access memory unit? 5
   c) Discuss about the organization of a serial-access memory unit. 4

8. a) Define Virtual memory. What are the reasons for using virtual memory? 3
   b) Define address translation, base addressing and effective addressing. 4
   c) Discuss about the structure of a dynamic address-translation system. 5

Indrani Ma'am
(12 batch)

Jatiya Kabi Kazi Nazrul Islam University
Department of Computer Science and Engineering
2nd year 2nd Semester Final Examination, 2019
Course: CSE-223: Database Management System

Time: 3 hours **Marks: 60**

(Answer any five questions of the Following)

1. a) What is DBMS? List down some advantage and disadvantage of database system? **2+4**
   b) List five responsibilities of a database-management system. For each responsibility, explain the problems that would arise if the responsibility were not discharged. **4**
   c) List two reasons why null values might be introduced into the database. **2**

2. a) Write down the difference between DDL and DML? **4**
   b) List four significant differences between a file-processing system and a DBMS. **4**
   c) Describe the responsibilities of storage manager? **4**

3. a) Write some short note. **6**
      i. Multivalued attribute
      ii. Agregrate function
      iii. Nested query
   b) Draw the schema diagram for the following database: **6**

book (ISBN, title, year, price)
author (author-id, name, address, url)
warehouse (code, address, phone)
written-by (author-id, ISBN)
stocks (code, ISBN, number)

gid	first_name	last_name	birthday	favourite_tool
1	Albert	Einstein	1879-03-14	Mind
2	Albert	Slater	1973-10-10	Singlet
3	Christian	Slater	1969-08-18	Spade
4	Christian	Bale	1974-01-30	Videotapes
5	Bruce	Wayne	1939-02-19	Shovel
6	Wayne	Knight	1955-08-07	Spade

Gardeners Table

pid	gid	plant_name	fertilizer	planting_date
1	3	rose	yes	2001-01-15
2	5	daisy	yes	2020-05-16
3	8	rose	no	2005-08-10
4	9	violet	yes	2010-01-18
5	12	rose	no	1991-01-05
6	1	sunflower	yes	2015-08-20
7	6	violet	yes	1997-01-17
8	15	rose	no	2007-07-22

Planting Table

Figure 1: Join Tables

4. a) Write rollback and commit work. **1.5**
   b) Write SQL queries and output from that query of inner join and full outer join using Figure 1. **6**
   c) Write SQL queries create, alter, insert, update, delete, and drop Gardeners table in Figure 1. **3**
   d) What is view and why it needed? **1.5**

5. a) Consider the database schema below: **8**

employee (person-name, street, city)
works (person-name, company name, salary)
company (company-name, city)
manages (person-name, manager name)

Give relational algebra expressions for the following queries:

i. Find the names of all employees who live in the same city and on the same street as do their managers.
ii. Find the names of all employees in this database who do not work for "First Bank Corporation".
iii. Find the names of all employees who earn more than every employee of "Small Bank Corporation".
iv. Find the company with the most employees.

   b) Explain the difference between view serializability and conflict serializability. **4**

employee (employee-name, street, city)
works (employee-name, company name, salary)
company (employee-name, city)
manages (employee-name, manager name)

Figure 2: Banking database

6. Consider the banking database of Figure 2, where the primary keys are underlined. Give an expression in SQL for each of the following queries. 12

(i) Find the names and cities of residence of all employees who work "First Bank Corporation".
(ii) Find the names. street addresses, and cities of residence of all employees who work "First Bank Corporation" and earn more than $10,000.
(iii) Find all employees in the database who do not work for "First Bank Corporation".
(iv) Find all employees in the database who earn more than each employee of "Small Bank Corporation".
(v) Assume that the companies may be located in several cities. Find all companies located in every city in which "Small Bank Corporation" is located.
(vi) Find those companies who employees earn higher salary, on average, than the average salary at "Fist Bank Corporation".

7. a) Describe ACID properties with transaction example. 3
b) Write the state diagram of a transaction. 3
c) Describe the inconsistency state from following transaction: 3

T_1	T_2
read(A)	
A:=A-50	
	read(A)
	temp:=A*0.1
	A:=A-temp
	write(A)
	read(B)
write(A)	
read(B)	
B:=B+50	
write(B)	
commit	
	B:=B+temp
	write(B)
	commit

d) Describe cascadeless schedule and locking schedules. 3

8. a) A database is being constructed to keep track of the teams and games of a football league. A team has a number of players. For the team, we are interested to store team id, team name, address, date established, name of manager, and name of coach. For the player, we will store player id in team, date of birth, date joined, position etc. Each team plays games against other team in a round robin fashion. For each game, we will store game id, date held, score and attendance (an attribute to designate whether the participating teams have attended the game). Games are generally taking place at various stadiums of the country. For each stadium, we will keep its size, name and location. 8

Develop a complete E-R diagram (including cardinalities). Make reasonable assumptions during your development phases, if needed and state them clearly.

b) What do you mean by data mining and data warehouse? 4

Jannat Ma'am (12 batch)

JatiyaKabiKaziNazrulIslamUniversity
2nd Year 2nd Semester B.ScEngg.Final Examination-2019
Dept. of Computer Science and Engineering
Course: CSE-227 (Digital Electronics and Pulse Technique)
Session:2017-2018

Duration: 3 hours **Full Marks: 60**

(Answer any *five* from the following questions)

01.	a)	What do you mean by the following terms: Noise -margin, Noise Immunity ,Propagation delay, Fan-out	4
	b)	Using diode draw a circuit from which you can get HIGH output only when both inputs are HIGH. Explain its operation.	3
	c)	Using transistor draw a circuit from which you can get LOW output only when both inputs are LOW. Explain the circuit operation.	3
	d)	How can a transistor act as a switch?	2
02.	a)	Describe the differences between current sinking and current sourcing action for a logic family.	3
	b)	Explain TTL NAND gate with totem pole output circuit diagram.	4
	c)	Draw basic ECL circuit with emitter followers and explain its operation.	3
	d)	What do you mean by I^2L?	2
03.	a)	What are SRAM and DRAM? What are the advantages of SRAMs over DRAMs?	4
	b)	Discuss the basic concept and operation of charged couple devices (CCD).	4
	c)	What is meant by word size and word capacity? How it can be expanded?	4
04.	a)	Define-Full-scale output, resolution for a D/A converter.	2
	b)	Draw a R/2R ladder Digital-to-Analog converter and derive its voltage equation. What are the advantages of R/2R ladder DAC over binary-weighted resistors DAC?	5
	c)	What do you mean by counter-type ADC? Describe the operation of digital-ramp ADC.	5
05.	a)	What is comparator? Why it is so called?	4
	b)	Write some applications of comparator.	3
	c)	Explain the operation of VCO with required diagram.	5
06.	a)	Why 555 is known as timer IC?	2
	b)	Explain the circuit diagram of an astable multi-vibrator with application.	5
	c)	Derive the equation of pulse width of mono-stable blocking oscillator with emitter timing.	5
07.	a)	Do you think diode is essential electronic device for wave shaping circuit? If yes, prove it.	3
	b)	What is switching circuit? Why are electronic switches preferred to other types of switches?	3
	c)	Draw and discuss a timing circuit using transistor which can be used as a "flip-flop".	3
	d)	Describe the function of a Sample and Hold (S/H) circuit. Why is it important in analog to digital conversion?	3
08.		Write short notes on (any two): 6X2	12
	i)	Schmitt trigger	
	ii)	PLA's	
	iii)	LCD.	

Jatiya Kabi Kazi Nazrul Islam University
Department of Computer Science and Engineering
2nd year 2nd semester Final Examination-2019
Course: MATH-275 (Complex variable, Laplace transformation and Fourier analysis)

Time: 3 hours

Full Marks: 60

[Answer any 5 (five) questions of the following]

1. (a) Describe the region geometrically of (i) $|z-5i|<3$ (ii) $|z-i|\geq 4$ 4
   (b) Define analytic function. Is the function $f(z) = e^{z^2}$ analytic? Justify your answer. If z_1 and z_2 are two complex numbers then prove that 8
   $$|z_1 - z_2| \geq |z_1| - |z_2|$$

2. (a) Define limit. Suppose $lim_{z\to z_0} f(z) = A$ and $lim_{z\to z_0} g(z) = B$. Then prove that
   (i) $lim_{z\to z_0}[f(z) + g(z)] = A + B$ (ii) $lim_{z\to z_0} f(z).g(z) = A.B$ 1+3+3=7
   (c) Prove that $f(z) = z^2$ is uniformly continuous on $|z|<1$. 5

3. (a) Prove that , a function $f(z)$ which is differentiable at a point is also continuous there. But the converse is not necessarily true. 6
   (b) Show that $f(z) = \begin{cases} \frac{x^3(1+i)-y^3(1-i)}{x^2+y^2}, at\ z \neq 0 \\ 0 \qquad\qquad\quad , at\ z = 0 \end{cases}$ is continuous everywhere. Also show that the C-R equations are satisfied at origin, but is not analytic there. 6

4. (a) State and prove Green's theorem if C is a simple closed curve which has the property that any straight line parallel to the coordinate axes cuts C in at most two points. 6
   (b) State Cauchy's theorem 1
   (c) Let $f(z) = \begin{cases} \frac{(\bar{z})^2}{z}, when\ z \neq 0 \\ 0, \quad when\ z = 0 \end{cases}$
   Show that $f(z)$ satisfies Cauchy-Riemann equations at the origin, but $f'(0)$ does not exist. 5

5. (a) If $f(z)$ is analytic inside and on a simple closed curve C and a is any point inside C.
   Then $f^n(a) = \frac{n!}{2\pi i}\oint_C \frac{f(z)}{(z-a)^{n+1}}\, dz$ 6
   (b) Find the value of $\oint_C \frac{\sin^6 z}{(z-\frac{\pi}{6})^3} dz$ where C is the circle $|z| = 1$ 6

6. (a) Expand $\sin z$ into a Taylor series in powers of $z - \pi/2$. Also determine the region of convergence of the series. 4+2=6
   (b) State and prove Taylors theorem. 6

7. (a) Define Laplace transform. Prove that
   $$L[f^n(t)] = S^n L[f(t)] - S^{n-1}f(0) - S^{n-2}f'(0) - \ldots\ldots - f^{(n-1)}(0)$$ 4
   (b) Find the Laplace Transform of the following (any one) 4
   (i) $\frac{1-cost}{t}$ (ii) $\sin^3 2t$
   (c) Find the solution of $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + 2y = 5\sin t$ with the conditions $y(0) = y'(0) = 0$ by using Laplace transform. 4

8. (a) Define Fourier's series for the function $f(x)$ in the interval $(-\pi, \pi)$ and find Fourier constants. 6
   (b) Find the Fourier's series of $f(x) = \{x + x^2$ for $-\pi < x < \pi$ 6