Dated: 10.03.2023   Maximum Marks: 20   Time Allowed: 01 Hour.

NOTE: ATTEMPT ANY TWO (02) QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

Q. No.		Question	CLO	Taxonomy Level	PLO	Marks
Q. 01	(a)	What are complements and why complements are used in digital computers? Define 1's, 2's, 9's and 10's complements with examples. Perform subtraction on the following decimal numbers using 9's and 10's complement methods. 85678-24567	1	C2	1	05
	(b)	Describe the difference between Canonical form and Standard form of Boolean expressions. Which form of Boolean expressions is obtained when reading and expression from truth table? Which form of Boolean expression is preferable when constructing logical diagrams.	1	C2	1	05
Q. 02		What is Boolean algebra? State rules, laws and theorems of Boolean Algebra. Prove DE Morgan's theorems for three variables of Boolean Algebra.	1	C2	1	10
Q. 03		What are logical gates? Define and explain basic types of logic gates by giving their logical operation, truth tables, Boolean expressions and logical symbols. In which type of logic gate, an output is equal to 1 when any input is equal to 0? What is the only combination in OR gate that produces an output equal to 0?	1	C2	1	10

The End

QUAID-E-AWAM UNIVERSITY OF ENGINEERING, SCIENCE & TECHNOLOGY, NAWABSHAH

MID-SEMESTER EXAMINATION OF FIRST SEMESTER – SECOND YEAR (3RD SEMESTER) 2023, 21-BATCH, B.E (CS)

SUBJECT: DATA STRUCTURES & ALGORITHMS

Dated: 06.03.2023   Maximum Marks: 20   Time Allowed: 01 Hour.

NOTE: ATTEMPT ANY TWO (02) QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

	Question	CLO	PLO	Marks
Q. 01(a)	Define an object in C++? Differentiate class and struct in C++.	CLO-1 (C1)	PLO-1	(05)
Q. 01(b)	Describe an array in C++. Write C++ program to create a class which has Array as a data member. Enter marks for five subjects in array. Calculate the total marks obtained and percentage.	CLO-2 (C2)	PLO-2	(05)
Q. 02 (a)	Recall and discuss two different organizational tools that can help us to solve problems. Create a IPO chart for calculating the Gross pay, given the formula GrossPay = Hours * PayRate	CLO-1 (C1)	PLO-1	(05)
Q. 02 (b)	Describe string storing structure. P and T are strings with length R and S, respectively, and are stored as array with one character per element. Write the Brute Force Algorithm to replace every occurrence of P in T by Q.	CLO-2 (C2)	PLO-2	(05)
Q. 03 (a)	Define abstract data type? We have a DATA array [4:40]. Find the location of DATA [28].	CLO-1 (C1)	PLO-1	(05)
Q. 03 (b)	Explain linear array data structure. Given DATA is linear Array with lower bound LB and upper bound UB. Write an algorithm and draw flowchart to insert an ITEM at k^{th} in the DATA array.	CLO-2 (C2)	PLO-2	(05)

--- THE END ---

SUBJECT: DATABASE MANAGEMENT SYSTEMS

Dated: 09.03.2023   Maximum Marks: 20   Time Allowed: 01 Hour.

NOTE: ATTEMPT ANY TWO (02) QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

Q. No.		Question	CLO	Taxonomy Level	PLO	Marks
Q. 01	(a)	Explain Data, Information and Knowledge. How they are important in database?	1	C1	1	05
	(b)	What is DBMS? What are different uses of DBMS?	1	C2	1	05
Q. 02		Explain the following: 1. DML 2. SQL 3. WHERE clause 4. FROM clause 5. DDL	2	C4	5	10
Q. 03	(a)	Compare and explain different database architectures.	1	C2	1	05
	(b)	Draw database architecture with different components. Explain following components: 1. QUERY Processor 2. Storage Manager 3. Storage	1	C2	1	05

The End

QUAID-E-AWAM UNIVERSITY OF ENGINEERING, SCIENCE & TECHNOLOGY, NAWABSHAH

MID-SEMESTER EXAMINATION OF FIRST SEMESTER – SECOND YEAR (3ʳᵈ SEMESTER) 2023, 21-BATCH B.E (CS)

SUBJECT: COMPLEX VARIABLES AND TRANSFORMS

Dated: 08.03.2023   **Maximum Marks: 20**   **Time Allowed: 01 Hour.**

NOTE: ATTEMPT ANY TWO (02) QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

Q. No.		Question	CLO	PLO	Marks
Q. 01	(a)	State and prove De Moivre's theorem. If $2\cos\theta = x + \dfrac{1}{x}$, prove that $$\frac{x^{2n}+1}{x^{2n-1}+x} = \frac{\cos n\theta}{\cos(n-1)\theta}$$	1	2	05
	(b)	Use De Moivre's theorem to solve the equation $x^4 - x^3 + x^2 - x + 1 = 0$,	1	2	05
Q. 02	(a)	Define complex function and if $\tan(\theta + i\phi) = e^{i\alpha}$, show that $$\theta = \left(n + \frac{1}{2}\right)\frac{\pi}{2} \text{ and } \phi = \frac{1}{2}\log\tan\left(\frac{\pi}{4} + \frac{\alpha}{2}\right)$$	1	2	05
	(b)	Find the sum to infinity of the series $$1 - \frac{1}{2}\cos\theta + \frac{1.3}{2.4}\cos 2\theta - \frac{1.3.5}{2.4.6}\cos 3\theta + \dots (-\pi < \theta < \pi)$$	1	2	05
Q. 03	(a)	Define the continuity and differentiability of the complex function $f(z)$, consider the function $f(z) = 4x + y + i(-x + 4y)$ and discuss $\dfrac{df}{dz}$.	1	2	05
	(b)	Derive the Cauchy-Riemann equations as necessary conditions for the function $f(z) = u(x,y) + iv(x,y)$, $(z = x + iy)$ to be differential able as a function of a complex variable z. State sufficient conditions involving the Cauchy-Riemann equations for f to be differentiable.	1	2	05

The End

SUBJECT: COMPLEX VARIABLES AND TRANSFORMS

Dated: 01.06.2023   Maximum Marks: 60   Time Allowed: 3 Hours.

NOTE: ATTEMPT ALL QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

Q. No.	QUESTION	CLO	Taxonomy Level	PLO	Marks
Q. 01 (a)	Define analytic function. Show that polar form of Cauchy-Riemann equations are $$\frac{\partial u}{\partial r}=\frac{1}{r}\frac{\partial v}{\partial \theta},\ \frac{\partial v}{\partial r}=-\frac{1}{r}\frac{\partial u}{\partial \theta}$$ and deduce that $$\frac{\partial^2 u}{\partial r^2}+\frac{1}{r}\frac{\partial u}{\partial r}+\frac{1}{r^2}\frac{\partial^2 u}{\partial \theta^2}=0$$	2	C2	2	06
(b)	Could you provide a simple explanation of what a harmonic function is and how it is connected to its conjugate harmonic function? Prove that $u = x^2 - y^2$ and $v = \dfrac{y}{x^2+y^2}$ are harmonic functions of (x, y) but are not harmonic conjugates.	2	C2	2	06
Q. 02 (a)	What are the definitions of simply connected and multiply connected regions in complex analysis? Use Cauchy Integral formula to evaluate $$\int_c \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)}dz$$ where C is the circle $|z| = 3$.	2	C2	2	06
(b)	What is the definition and principle behind Cauchy's residue theorem? Evaluate $$\int_c \frac{z^2 dz}{(z-1)^3(z+2)},$$ where $c:|z|=3$.	2	C2	2	06
Q. 03 (a)	What is Heaviside's expansion formula for finding the inverse Laplace transform? Find $$L^{-1}\left\{\frac{2s^2-4}{(s+1)(s-2)(s-3)}\right\}$$	2	C2	2	06
(b)	How does the convolution theorem apply to finding the inverse Laplace transform of a product of two Laplace-transformed functions? Using the convolution theorem, find $$L^{-1}\left\{\frac{s^2}{(s^2+a^2)(s^2+b^2)}\right\},\ a\neq b$$	2	C2	2	06
Q. 04 (a)	A particle P of mass 2 grams moves on the X axis and is attracted toward origin O with a force numerically equal to 8X. If it is initially at rest at $X = 10$, by using Laplace transform, find its position at any subsequent time by using (a) no other forces act, (b) a damping force numerically equal to 8 times the instantaneous velocity acts.	3	C3	3	06
(b)	Solve the following differential equation by using Laplace transform: $tY'' + Y' + 4tY = 0,\ Y(0)=3,\ Y'(0)=0$	3	C3	3	06
Q. 05 (a)	Define Fourier series with its advantages and determine its Fourier coefficients.	3	C3	3	06
(b)	Find the Fourier series for the following: For $f(x)$, if $f(x)=\begin{cases}-\pi, & -\pi<x<0 \\ x, & 0<x<\pi\end{cases}$ deduce that $\dfrac{1}{1^2}+\dfrac{1}{3^2}+\dfrac{1}{5^2}+\cdots = \dfrac{\pi^2}{8}$	3	C3	3	06

Good Luck

Dated: 05.06.2023   Maximum Marks: 60   Time Allowed: 3 Hours.

NOTE: ATTEMPT ALL QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

Q. No.	Questions	CLO	Taxonomy Level	PLO	Marks
01(a)	What is Relational Model? Write main objectives of that.	1	C1	1	06
01(b)	Explain Following in terms of Data Base: 1. Attribute 2. Domain 3. Relation 4. Tuple	1	C2	1	06
02(a)	Explain SET operation in SQL. Write an example of UNION, INTERSECT & EXCEPT operations.	2	C2	5	06
02(b)	Write Importance of SQL in making DBMS. What are different parts of it?	2	C1	5	06
03(a)	Why String operations are important in DB? Write pattern matching example with concatenation.	2	C1	5	06
03(b)	(see table below) Using aggregate function, find average salary of different departments showed in above table.	2	C3	5	06
04	Analyze Normalization with an example of 1 NF, 2NF & 3NF.	1	C4	1	12
05 (a)	What are Database roles? Create different views in SQL.	2	C3	5	06
05 (b)	Explain Following: 1. View In Database 2. Granting of Privileges 3. Revoke Authorization In SQL 4. Audit Trails	2	C2	5	06

Table for 03(b):

ID	name	dept_name	salary
76766	Crick	Biology	72000
45565	Katz	Comp. Sci.	75000
10101	Srinivasan	Comp. Sci.	65000
83821	Brandt	Comp. Sci.	92000
98345	Kim	Elec. Eng.	80000
12121	Wu	Finance	90000
76543	Singh	Finance	80000
32343	El Said	History	60000
58583	Califieri	History	62000
15151	Mozart	Music	40000
33456	Gold	Physics	87000
22222	Einstein	Physics	95000

Good Luck

Dated: 08.06.2023   Maximum Marks: 60   Time Allowed: 3 Hours.

NOTE: ATTEMPT ALL QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

Q. No.	QUESTION	CLO	Tax: Level	PLO	Marks
Q.01	Distinguish between combinational and sequential logic circuits. Design Half and Full Adder logic circuits using AND, OR & NOT gates. How a Full adder can be constructed by using two Half adders and one OR gate.	2	C3	2	12
Q. 02	Briefly discuss multiplexer and de-multiplexer logic circuits. What is the role of selection lines in multiplexer and de-multiplexer logic circuits? Design any TWO of the following combinational logic circuits. i) 4-input multiplexer logic circuit ii) Binary to Octal decoder logic circuit. iii) 2-bit comparator logic circuit.	2	C3	2	12
Q. 03 (a)	What are sequential logic circuits? Distinguish between asynchronous and synchronous sequential logic circuits. How an asynchronous counter differs from a synchronous counter? Design 3-bit asynchronous/synchronous counter using JK flip flops.	3	C5	3	08
(b)	Design a synchronous sequential logic circuit using T or D flip flops that detects parity in the binary input string. The circuit detects odd parity if binary input string contains odd number of 1's or even parity if binary input string contains even number of 1's.	3	C5	3	04
Q. 04 (a)	What are shift registers? Explain four basic types of shift registers. How a shift left register differs from a shift right register? Design 6-bit SISO shift right register.	3	C5	3	08
(b)	The content of a 6-bit shift right register is initially cleared. The register is shifted eight times to the right with the serial input being 1100011. What is the content of the register after each shift?	3	C5	3	04
Q. 05 (a)	What are multiviberator circuits? Discuss various types of multiviberator circuits and their usage in digital circuits with examples.	3	C5	3	06
(b)	Design a combinational circuit with three inputs, X, Y, Z, and three outputs, A, B, C. When the binary input is 0, 1, 2, or 3, the binary output is one greater than the input. When the binary input is 4, 5, 6, or 7, the binary output is two less than the input.	2	C3	2	06

Good Luck
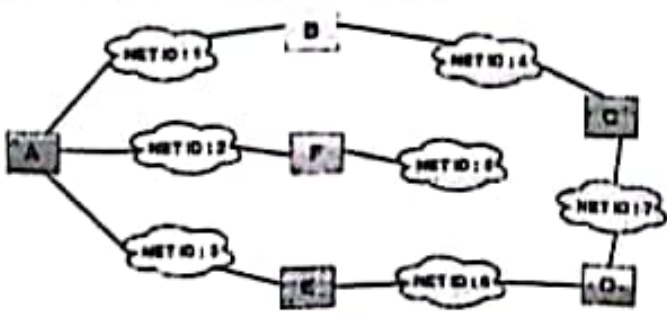
NOTE: ATTEMPT ALL QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.

Q. No.	QUESTION	CLOs	Taxonomy Level	PLOs	Marks
Q. 01	Define an algorithm. **List** out and discuss the sequence of steps needed to design and analyze an algorithm. Explain operations of a stack with an example.	CLO1	C1	1	12
Q. 02(a)	Explain how an infix expression can be converted to a post fix expression with an example. Write an algorithm to find an equivalent postfix expression for given infix expressions.	CLO2	C2	2	06
Q. 02(b)	What are Asymptotic Notations? **Solve** function $f(n) = 5n^2 + 4n + 2$ to calculate Big O.	CLO3	C3	3	06
Q. 03	**Explain** variations of linked list. Write an algorithm and draw flowchart to traverse circular linked list.	CLO2	C2	2	12
Q. 04	Design algorithm and draw flowchart for arranging data in ascending order using Quick sort. Analyze the worst-case behavior of Quick sort and demonstrate possible ways of improving it. Discuss the advantages and disadvantages of choosing the pivot from a random location in the input array.	CLO3	C3	3	12
Q. 05(a)	Determine the order in which vertices of the following binary trees will be visited using (1) Preorde (2) Inorder (3) Postorder	CLO3	C3	3	06
Q. 05(b)	Define graph? Write breadth-first search algorithm and explain breadth-first search with example problem.	CLO1	C1	1	06

Good Luck

NOTE: ATTEMPT ALL QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS.
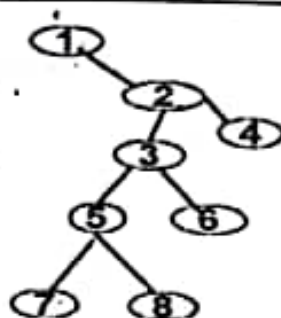
Q. No.		QUESTION	CLOs	Taxonomy Level	PLOs	Marks
Q. 01	(a)	Consider the initial data "1010" intended for transmission. Apply Hamming Code. If the 4th bit changes from 0 to 1 upon reception, recompute the parity bits.	02	C3	1	06
	(b)	Compare the fundamental principles of secret key encryption and public key encryption technique.	02	C4	1	06
Q. 02	(a)	Discuss the functionalities and operation of the following network layer protocols: 1. Address Resolution Protocol (ARP) 2. Internet Control Message Protocol (ICMP) 3. Open Shortest Path First (OSPF)	02	C2	1	06
	(b)	Explain the significance of IP addressing and subnetting in the network layer and how they facilitate efficient data routing.	02	C2	1	06
Q. 03	(a)	Explain the working of distance vector routing (DVR) algorithm. Construct a table illustrating the routing information for routers A using DVR.	03	C2	3	06

	(b)	Discuss the importance and functions of the transport layer in computer networking, focusing on how TCP and UDP protocols enhance an efficient and reliable communication. Provide examples of scenarios where each protocol is best suited and highlight key differences between TCP and UDP.	03	C2	3	

Q. 04	(a)	Discuss following Application Layer protocols and explain how these protocols contribute to effective communication and network management at the Application Layer.
		    1. DNS (Domain Name System)
		    2. SMTP (Simple Mail Transfer Protocol)
		    3. HTTP (Hypertext Transfer Protocol)
			03	C2	3	

	(b)	Describe how VPNs operate, including the concept of tunneling. Highlight the primary advantages of VPNs over dedicated networks employing frame relay, leased lines, and traditional dial-up connections.	03	C2	3	

Q. 05		Explain any 04 of the following terms
		    1. Cloud computing and cloud security
		    2. Wireless Network
		    3. Mobile ahdoc Network
		    4. IPV4 and IPV6
		    5. Client server architecture and P2P network
			03	C2	3	1

The End