B.Tech. (CSE/CSAI/CSDS/MAC) 3rd Semester
END-SEMESTER EXAMINATION, DECEMBER 2021

Course Code: COCSC07/CACSC07/CDCSC07/CMCSC07
Course Title: Computer Architecture and Organization

Time: 3 Hrs. Max. Marks: 50

Note: Attempt ALL FIVE questions. Missing data/information, if any, may be suitably assumed and mentioned in the answer.

Q. No.	Question	Marks	CO
Q 1	*Attempt ANY 2 of the following parts.*		
1a	A digital system has four registers each of which is of 4 bits. Design a data bus for the system using three-state buffers. Provide the function table for the bus.	5	CO2
1b	Design a 4-bit arithmetic circuit that can perform the following microoperations: add, add with carry, increment, transfer. Provide the function table for the circuit.	5	CO2
1c	Design a 4-bit logic circuit that can perform the following microoperations: arithmetic left shift, arithmetic right shift, circular left shift, circular right shift. Provide the function table for the circuit.	5	CO2
Q 2	*Attempt ANY 2 of the following parts.*		
2a	What addressing modes should be used for the following operations: • To initialize a register. • To perform arithmetic and logic calculations. • To copy a list from one part of the memory to another. • To jump to an instruction that is 21 bytes ahead. • To call a subroutine whose address is to be provided by the user. Justify your answers.	5	CO1
2b	Explain the working of the first pass of an assembler. Describe the data structures used by an assembler.	5	CO1
2c	What is an interrupt? What are the different types of interrupt? How a computer handles an interrupt?	5	CO1
Q 3	*Attempt ANY 2 of the following parts.*		
3a	What are the important features of a CISC processor? Explain with an example.	5	CO3
3b	Derive the formula for speedup of a pipeline. Use the formula to calculate the speedup of a floating-point adder-subtractor pipeline.	5	CO3
3c	What is a SIMD computer according to Flynn's classification? Explain the working of a SIMD array processor.	5	CO5

Q 4	*Attempt ANY 2 of the following parts.*		
4a	Multiply the numbers 11000111 and 01100011 using Booth's algorithm.	5	CO4
4b	Design a 3-bit by 3-bit array multiplier. Compare the performance of Booth's algorithm and array multiplier.	5	CO4
4c	Explain the process of asynchronous data transfer with handshaking using suitable timing diagrams.	5	CO3
Q 5	*Attempt ANY 2 of the following parts.*		
5a	Compare the performance of: • Hardwired control and microprogrammed control • Machine language, assembly language and high-level programming language • FIFO and LRU page replacement algorithms Differentiate between: • Write back and write through protocols • Locality of references in code and locality of reference in data	5	CO4
5b	Write a technical note on supercomputer.	5	CO5
5c	Write a technical note on the applications of GPU.	5	CO5

UG 3rd & 5th Semester END SEMESTER EXAMS, DEC 2021

Course codes: COCSC05/CACSC05/CMCSC05/CDCSC05
Course name: Database Management system
Time: 3 Hrs. **Max Marks**:40

Note: Attempt all the five questions. Missing data/ information if any, may be suitably assumed.

Q no.	Question	Marks	CO
Q.1.	a. Explain the difference between logical and physical data independence. b. Draw block diagram of database architecture and explain its functionality. c. Explain the characteristics of DBMS and file system.	4 4 4	CO1
Q.2.	a. Explain aggregation in ER model. Give any real life example where it is required. b. Explain what is mapping cardinality of relationships. Show there transformation into schema definition with the help of suitable example. c. What are weak and strong entities and how they are represented in ER model. Give suitable example.	4 4 4	CO2
Q.3.	a. Consider the following database employee (employee-name, street, city) works (employee-name, company-name, salary) company (company-name, city) manages (employee-name, manager-name) i) Write a SQL query to create an assertion to implement that the minimum wage should not be less than 5000. ii) Write the relational algebra expressions for the following for finding all employees who earn more than the average salary of all employees of their company. b. Compute the closure of the following set F of functional dependencies for relation schema $R = (A, B, C, D, E)$. $A \rightarrow BC$ $CD \rightarrow E$ $B \rightarrow D$ $E \rightarrow A$ List the candidate keys for R. Normalize the above relation R upto third normal form. c. Explain the various types of keys used in relational model. Give suitable examples.	2 + 2 4 4	CO3
Q.4.	Consider the following schedule S with two transactions T1 and T2. R(x) and W(x) indicate read and write respectively on		CO4

	data item x. a. i) Is the above schedule conflict serializable? Justify your answer. ii) What is strict 2PL protocol? Show how strict 2PL generates conflict serializable schedule for the above mentioned transactions. b. i) Is the schedule S shown above is cascadeless and recoverable, if T2 fails after R(y)? Justify your answer. ii) Define 'C' and 'D' in ACID properties of transaction. c. Explain any one concurrency control protocol in detail which can prevent deadlocks. How does that protocol ensure deadlock free schedules?	2 + 2 2 + 2 4	
Q.5.	a. Explain various kinds of failures. b. Explain deferred and immediate log based recovery mechanisms. Also give example. c. Discuss various types of log records.	4 4 4	CO5

T1	T2	T3
R(x)		
x = x+24		
W(x)		R(z)
		W(z)
		Commit
	R(x)	
	R(y)	
R(y)		
y = x+y		
W(y)		
Commit		
	Commit	

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* Attempt any two parts in each Question.

END SEMESTER EXAMINATION - DEC 2021

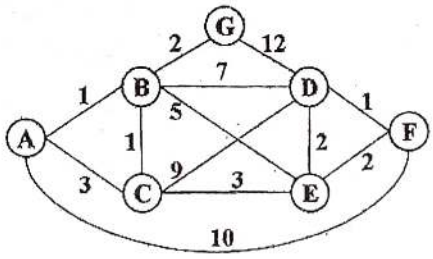
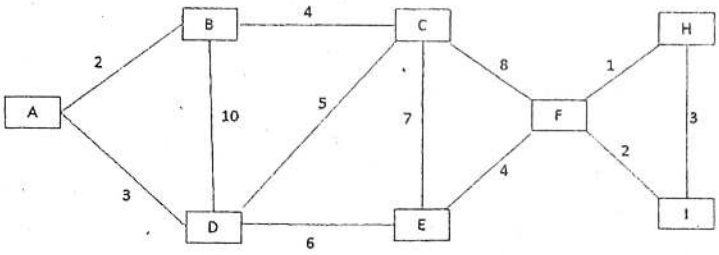
Course Code: **COCSC06, CACSC06, CDCSC06, CMCSC06**
Course Title: **Design and Analysis of Algorithms**

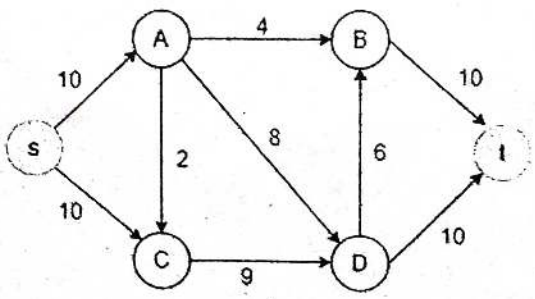
Time: 3 Hours | Max. Marks: 40

Note: Attempt all the five questions. Missing data / information if any, may be suitably assumed & mentioned in the answer. All questions are of equal marks.

Q. No.	Question	Marks	CO
Q1	**Attempt any 2 parts of the following.**		
1a	Sort the following functions in the decreasing order of their growth. Justify your answer. $f1=2^n$ $f2=n^{10} \times 2^{n/2}$ $f3=(1.00000001)^n$ $f4=n(\log n)3$ $f5=2^{\sqrt{\log n}}$	4	1
1b	Say, we want to build a B-Tree of order 4. Insert the keys 5, 3, 21, 9, 1, 13, 2, 7, 10, 12, 4, 8 in the B-Tree in the given order. Now, delete the keys 2, 21, 10, 3, 4 in the given order. Show the structure of B-Tree at each step.	4	3
1c	Perform the build-max heap operation on the given input array. What is the time complexity of this operation? 12 | 19 | 16 | 58 | 1 | 17 | 88 | 13 | 59 | 24 | 45 | 68	4	3
Q2	**Attempt any 2 parts of the following.**		
2a	You are given a problem of computing min-max in an unsorted array where min and max are minimum and maximum elements of the array. Algorithm P1 can compute min-max in p1 comparisons without divide and conquer. Algorithm P2 can compute min-max in p2 comparisons by scanning the array linearly. Derive the relation between p1 and p2 considering the worst case scenarios. Explain with examples.	4	2
2b	Consider a directed graph G whose vertex ranges numbers from 1 to 100. There is an edge from a vertex i to a vertex j iff either $j = i + 1$ or $j = 3i$. Find the minimum number of edges in a path in G from vertex 1 to vertex 100. Justify your answer.	4	2
2c	Create a Red Black Tree by inserting following sequence of number : 8, 18, 5, 15, 17, 25, 40, and 80	4	3
Q3	**Attempt any 2 parts of the following.**		
3a	Compute the **prefix function** (KMP Preprocessing) for following patterns when the alphabet set is $\Sigma = \{a,b,c\}$. (i) ababbabbabbababbab (ii) bacbababaabcbab	4	4
3b	Given two sequences S1 = ABCDABCDABAB and S2 = MABCPABCDA, Find the longest common subsequence using the dynamic programming paradigm, show the complete table.	4	4

3c	Given a Knapsack with maximum capacity 4 and 4 items with their (weight, value) as given below: I1= (1, 6); I2= (2, 12); I3= (3, 16); I4= (4, 21). We are required to pack the knapsack to achieve the maximum total value of packed items. For solving this 0-1 Knapsack problem in an efficient manner, a table is constructed in the program. Show the final state of the table to find out the items to be packed and total value of items packed.	4	4

Q4	**Attempt any 2 parts of the following.**		
4a	Construct a Huffman Tree by using these nodes. Value: A, B, C, D, E, F Frequency: 5, 25, 7, 15, 4, 12	4	4
4b	Step through Dijkstra's algorithm to calculate the single-source shortest paths from A to every other vertex. Finally, indicate the lowest-cost path from node A to node F. 	4	4
4c	Find the minimum spanning tree for the following graph using Prim's algorithm. 	4	4

Q5	**Attempt any 2 parts of the following.**		
5a	Define NP-Hard and NP-Complete problems with examples.	4	5
5b	We have a sequence of 4 matrices A1, A2, A3, A4 with the dimensions set as 5, 4, 6, 2, 7. Determine the multiplication sequence that minimizes the number of multiplication operations. Show the final state of the table constructed for solving the problem.	4	5
5c	Given below a flow network G=(V,E) with source S and sink t, apply Ford Fulkerson Method and find the maximum flow in the network. Show steps. 	4	3

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III SEMESTER B.Tech
END-SEMESTER EXAMINATION, DECEMBER 2021

Course Code- COECC08/CAECC08/CDECC08
Course Title- Microprocessors and Microcontrollers
Time: 3:00 Hrs

Max Marks: 40

Note : Attempt all the five questions Missing data/information (If any), may be suitably assumed & mentioned in the answer.

Q. No.	Questions	Marks	CO
Q 1	**Attempt any 2 parts of the following**		
1 a	i) Write a program for 8085 microprocessor to perform division of two 8 bit numbers.	02	CO1
	ii) Write a program to convert BCD number into a Binary Number (Use 8085 ALP)	02	CO1
1 b	Explain the SIM and RIM with examples.	04	CO1
1 c	Explain the following instructions of 8085 a) PCHL b) DAA c) LHLD 8000H d) RST 7 e) XRA A	04	CO1
Q 2	**Attempt any 2 parts of the following**		
2 a	Draw the timing diagram for maximum mode memory read cycle of 8086 microprocessor.	04	CO2
2 b	Write an ALP program to sort the given numbers 08H, 02H, 07H,03H,06H,04H and 05H in ascending order with flow chart	04	CO2
2 c	i) Explain the feature of pipelining and queue in 8086 architecture.	02	CO1
	ii) Give the state of all the status flag bits after the addition of 30A2H with F01CH in 8086 microprocessor.	02	CO2
Q 3	**Attempt any 2 parts of the following**		
3 a	With a suitable diagram describe how 8259 can be used for handling multiple Interrupts?	04	CO3
3 b	Design a Diagram to show interfacing of ADC 0808 with 8086 microprocessor using 8255 ports. Use port A of 8255 for transferring digital data output of ADC to the CPU and port C for control signal. Assume that Analog input is present at I/P_2 of the ADC and a clock input of suitable frequency is available. Also write 8086 ALP for the same.	04	CO3
3 c	Generate a square wave with a frequency of 1 KHz using 8254. Assume that the clock frequency of 8254 is 1.5 MHz	04	CO3
Q 4	**Attempt any 2 parts of the following**		
4 a	Draw the block diagram of 8051 microcontroller and explain the operation of each block briefly.	04	CO4
4 b	Explain memory organization of the 8051 microcontroller in detail with suitable diagram.	04	CO4
4 c	Explain the various timer modes of the 8051 microcontroller. What is the auto reloaded mode?	04	CO4
Q 5	**Attempt any 2 parts of the following**		
5 a	Explain architecture of Arduino with suitable diagram. Why Arduino is preferred over other microcontrollers?	04	CO5
5 b	Explain implementation of memory segmentation and paging.	04	CO5
5 c	Explain in detail virtual memory at the hardware level.	04	CO5

Semester – 3

END SEMESTER EXAMINATION December 2021

Course Code: COCSC04, CACSC04, CDCSC04
Course Title: Web Technologies

Time: 3 Hours | Max. Marks: 40

Note: - **Attempt all the five questions. Missing data/ information if any, maybe suitably assumed & mentioned in the answer.**

Q. No.	Question	Marks	CO
Q1	**Attempt any 2 parts of the following.**		
1a	Write a HTMLCode which uses CSS that gives all H1 and H2 elements a padding of 0.5 ems; a grooved border style and a margin of 0.5 ems.	4	CO2
1b	Using suitable pseudo-codes, explain how the following tags are used in HTML: • AttributeTag • Image Tag • Font Color • Meta Tag	4	CO3
1c	Design a HTML page for adding following style to the HTML elements: • H1 tag has to be green color and underlined. • Paragraph has to be enclosed in a border with groove and text font style italics, font family Helvetica, font size 15pt, font color red. • Unordered list color Blue and text bold.	4	CO2
Q2	**Attempt any 2 parts of the following.**		
2a	What are scripting languages and why java script is used? Write a JavaScript function for validating form data such as Email field?	4	CO1
2b	What is the difference between == and === operators in javascript?Create a button that is destroyed by clicking on it, but two new buttons are created in its place.	4	CO3
2c	What do you understand by DOM? How are DOM utilized in JavaScript?	4	CO4
Q3	**Attempt any 2 parts of the following.**		
3a	Differentiate between XML and HTML. Mention the properties, syntax rules of XML documents and how it is differentiated as "well-formed" and "valid" XML document.	4	CO CO4

3b	Explain the element naming and attribute rules of XML with example.	4	CO3
3c	Create an XML document of 10 students of final CSE. Add their roll numbers, marks obtained in 5 subjects, total marks, and percentage. Save this XML document at the server, write a program that accepts student's roll number as input and returns the students marks, total percentage by taking student information for XML document.	4	CO2
Q4	**Attempt any 2 parts of the following.**		
4a	What are the rules for naming a PHP variable? Explain the difference between $message and $$message. Write a script to create a multidatatype array in php and print the data with foreach loop, also use php embedding to apply h1 tag during printing.	4	CO2
4b	Write the connection string for connecting PHP code with MYSQL. What are the steps to create and delete a database in MySQL using PHP? Explain with the help of an example.	4	CO4
4c	Write a PHP script to open a file in read mode and store the contents of the file in three different variables.	4	CO3
Q5	**Attempt any 2 parts of the following.**		
5a	What is the difference between synchronous and asynchronous requests? Also state the role of the callback function in AJAX?	4	CO4
5b	Create a Web application for registering the "customers" with their ID and PASSWORD and taking their orderlist. The orderlist will consist of the orderID, orderDecription and orderDate(yymmdd). Suitable tables must be created at the backend. In frontend, the application asks the user for his credentials and proper validation must be performed.	4	CO5
5c	Explain the benefits of regular expression (regex) in Php. Write a regex that matches dollar amounts of at max $100.00?	4	CO3