

<p align="center"><b>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE</b></p> <p align="center"><b>Supplementary Summer Examination – 2023</b></p> <p><b>Course: B. Tech.    Branch: Computer Engineering and Allied    Semester: III</b></p> <p align="center"><b>Subject Name &amp; Code: Computer Architecture &amp; Organization (BTCOC304)</b></p> <p><b>Max. Marks: 60                                  Date: 18/08/2023                                  Duration: 3 Hr.</b></p>			
<p><b>Instructions to the Students:</b></p> <ol style="list-style-type: none"> <li>1 All the questions are compulsory.</li> <li>2 The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.</li> <li>3 Use of non-programmable scientific calculators is allowed.</li> <li>4 Assume suitable data wherever necessary and mention it clearly.</li> </ol>			
		(Level/CO)	Marks
<b>Q.1)</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
<b>A)</b>	Describe the Fetch-Decode-Execute cycle in the CPU. Explain the role of each stage in the execution of the instructions cycle.	Understand	6
<b>B)</b>	Discuss the role of buses in computer organization. Explain the different types of buses and their functions.	Understand	6
<b>C)</b>	Discuss the concept of interrupts in computer organization.	Understand	6
<b>Q.2)</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
<b>A)</b>	Differentiate between RISC & CISC Architecture.	Remember	6
<b>B)</b>	Describe the concept of Addressing Modes. Give the list of addressing modes and explain- a) Immediate Addressing Mode b) Indirect Addressing Mode	Understand	6
<b>C)</b>	Discuss the assembly language programming. How does it differ from a high-level programming language.	Understand	6
<b>Q.3)</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
<b>A)</b>	Explain the floating-point representation in detail.	Understand	6
<b>B)</b>	Represent the decimal values 12, -10 and 15 assigned eight-bit numbers in the following binary formats- a) Signed magnitude b) 1's Complement c) 2's Complement	Analyze	6
<b>C)</b>	Subtract $(11011)_2 - (10011)_2$ using 1's complement & 2's complement method.	Analyze	6
<b>Q.4)</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
<b>A)</b>	Write a short note on- 1) ROM 2) RAID	Remember	6

<b>B)</b>	Explain the role and function of a cache memory system. Discuss the different levels of cache memory including L1, L2 and L3 caches.	Understand	6
<b>C)</b>	Explain the magnetic tape. Discuss the advantages and disadvantages of magnetic tape using as a storage medium.	Understand	6
<b>Q.5)</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
<b>A)</b>	Explain the Microprogrammed Control Unit.	Understand	6
<b>B)</b>	Differentiate between Interrupt driven I/O & Direct Memory Access.	Remember	6
<b>C)</b>	Explain the Instruction pipelining & what are the benefits of it in modern processors.	Understand	6
	<b>*** End ***</b>		

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE**

**Winter Examination – 2022**

**Course: B. Tech.      Branch :Computer Science & Engineering      Semester :III**

**Subject Code & Name: (BTCOC304)Computer Architecture & Organization**

**Max Marks: 60**

**Date:**

**Duration: 3 Hr.**

**Instructions to the Students:**

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

	(Level/CO)	Marks
<b>Q. 1 Solve Any Two of the following.</b>		<b>12</b>
A) Explain the different components of Central Processing Unit?	Understand	<b>6</b>
B) Explain different types of memories with examples?	Remember	<b>6</b>
C) Explain with neat diagram computer components top- level view?	Analysis	<b>6</b>
<b>Q.2 Solve Any Two of the following.</b>		<b>12</b>
A) Explain different types of instructions sets.	Remember	<b>6</b>
B) Explain different addressing modes.	Analysis	<b>6</b>
C) Explain the architecture of RISC and CISC processor.	Understand	<b>6</b>
<b>Q. 3 Solve Any One of the following.</b>		<b>12</b>
A) Explain the function of ALU.	Understand	<b>6</b>
B) Briefly explain the following representations: sign magnitude, twos complement.	Synthesis	<b>6</b>
C) What are the four essential elements of a number in floating-point notation?	Analysis	<b>6</b>
<b>Q.4 Solve Any Two of the following.</b>		<b>12</b>
A) Explain types of semiconductor memories technologies.	Understand	<b>6</b>
B) Explain memory hierarchy in computer system.	Remember	<b>6</b>
C) Explain the working of optical memory.	Understand	<b>6</b>
<b>Q. 5 Solve Any One of the following.</b>		<b>12</b>
A) Explain Programmed I/O module and Interrupt driven I/O.	Understand	<b>6</b>
B) Explain Input/output organization of computer system.	Remember	<b>6</b>
C) Explain the Flynn's classification.	Analysis	<b>6</b>

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD -402 103**

**Winter Semester Examination – Dec - 2019**

<b>Branch: B.Tech. ( Computer Engineering )</b>		<b>Sem: III</b>
<b>Subject with Subject Code: Computer Architecture &amp; Organization[BTCOC304]</b>		<b>Marks:60</b>
<b>Date:- 17-12-2019</b>		<b>Time: 3 Hrs</b>
<b>Instructions to the Students:</b>		
<p>1.Each question carries 12 marks.                  2. Attempt <b>any five</b> questions of the following.                  3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.                  4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.</p>		
<b>Q.1</b>	<b>Solve any following questions.</b>	
<b>(A)</b>	What, in general terms, is the distinction between computer organization and computer architecture?	<b>06</b>
<b>(B)</b>	Explain the computer: the top level structure with structural component with neat sketch diagram.	<b>06</b>
<b>Q. 2</b>	<b>Attempt the following questions.</b>	
<b>(A)</b>	<p>Enlist and explain any two addressing modes. Given the following memory values and a one-address machine with an accumulator, what values do the following instructions load into the accumulator?</p> <ul style="list-style-type: none"> <li>• Word 20 contains 40.</li> <li>• Word 30 contains 50.</li> <li>• Word 40 contains 60.</li> <li>• Word 50 contains 70.</li> </ul> <p>a. LOAD IMMEDIATE 20                      b. LOAD DIRECT 20                      c. LOAD INDIRECT 20                      d. LOAD IMMEDIATE 30</p>	<b>06</b>
<b>(B)</b>		
<b>I.</b>	Convert the following instruction into Accumulator based CPU, Register based CPU. Instruction:(A*B)-(R+Z)/T	<b>03</b>
<b>II.</b>	Is RISC better than CISC? Illustrate your answer with example of processor.	<b>03</b>
<b>Q.3</b>	<b>Attempt the following questions.</b>	
<b>(A)</b>	Given $x = 1011$ and $y = 1001$ in twos complement notation (i.e., $x = -5$ , $y = -7$ ), draw and compute the product $p = x * y$ with Booth's algorithm flowchart.	<b>06</b>
<b>(B)</b>	Show how the following floating-point additions are performed (where significant are	<b>06</b>

	truncated to 4 decimal digits). Show the results in normalized form. a. $5.566 \times 10^2 \times 7.777 \times 10^3$ b. $3.344 \times 10^1 + 8.877 \times 10^{-2}$ c. $6.21 \times 10^5 \div 8.877 \times 10^1$	
<b>Q.4</b>	<b>Attempt the following questions.</b>	
(A)	What are the differences among direct mapping, associative mapping, and set-associative mapping? A set-associative cache consists of 64 lines, or slots, divided into four-line sets. Main memory contains 4K blocks of 128 words each. Show the format of main memory addresses.	<b>06</b>
(B)	Elaborate the concept of SRAM and DRAM memory with typical memory cell structure.	<b>06</b>
<b>Q.5</b>	<b>Attempt the following questions.</b>	
(A)	What is the overall function of a processor's control unit? A stack is implemented. show the sequence of micro-operations for a. popping b. pushing the stack PUSH 10 PUSH 70 PUSH 8 ADD PUSH 20 SUB MUL	<b>06</b>
(B)	What is the difference between a hardwired implementation and a microprogrammed implementation of a control unit?	<b>06</b>
<b>Q.6</b>	<b>Attempt any two questions.</b>	
(A)	In virtually all systems that include DMA modules, DMA access to main memory is given priority than CPU access to main memory. Why?	<b>06</b>
(B)	What is the meaning of each of the four states in the MESI protocol? Can you foresee any problem with the write-once cache approach on bus-based multiprocessors? If so, suggest a solution.	<b>06</b>
(c)	How does instruction pipelining enhance system performance? Elaborate your answer using RISC instruction stages.	<b>06</b>

\*\*\*\*\*End of Paper\*\*\*\*\*

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE****End Semester Examination – Summer 2019****Course: B. Tech in Computer Engineering****Sem: III****Subject Name: Computer Architecture and Organization****Subject Code: BTCOC304****Max Marks: 60****Date: 31/05/19****Duration: 3 Hr.****Instructions to the Students:**

1. Solve **ANY FIVE** questions out of the following.
2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

	(Level/CO)	Marks
<b>Q.1 Solve Any Four of the following.</b>		<b>12</b>
A) Differentiate between Big and Little endian. Why are transfer of control instructions needed?	Informative/Easy	
B) A digital computer has a common bus system for 16 registers of 32 bits each. The bus is constructed with multiplexers. (i) How many selection inputs are there in each multiplier? (ii) What sizes of multiplexers are needed? (iii) How many multiplexers are there in the bus?	Synthesis/Logical	
C) Enlist the design issues of computer organisation with explanation. For move and add instructions, the format is load location1,location 2 and add R1, R0. Is it possible to use fewer instructions to accomplish the task? If yes, then elaborate your answer and give the proper sequence.	Application/ Average Level	
D) Why a format that allows multiple words to be use for a single instruction would be needed to represent an instruction set? Why there is need of computer organization?	Understanding /Easy	
E) Represent the decimal values 5,-2,14,-10 as signed seven bit numbers in the following binary formats. a) Signed and Magnitude b) 1's complement c) 2's complement.	Informative/ Average	
<b>Q.2 Solve Any Four of the following.</b>		<b>12</b>
A) Why is RISC architecture better suited for pipeline processing than CISC? Which architecture is more common in mobile phones RISC or CISC?	Info/Average	
B) What is the purpose of integer arithmetic and describe the role of overflow in addition and subtraction operations of integer arithmetic? Calculate (72530-48960) using tens complement arithmetic. Assume rules similar to those for twos complement arithmetic.	Understanding	
C) A memory byte location contains the pattern 00101100. What does this pattern represents when interpreted as a binary number? What does it represent as ASCII code? How two's complement relates with subtraction	Understanding/	

rule? Write proper reason and example.

Hard

D) Discuss the need of variable length instruction format. How many bits wide memory address have to be if the computer had 16 MB of memory?

Tough Level/  
Synthesis

E) How do you improve the cache performance? How many check-bits are needed if the hamming error correction code is used to detect single bit errors in a 2048 bit data word?

Application

**Q. 3 Solve the following.**

12

A) Discuss difference between dynamic and static RAM in terms of characteristics such as speed, size and cost. What is the basic advantage of using interrupt initiated data transfer over transfer under program control without an interrupt?

Understanding

B) How is the syndrome for the Hamming code interpreted? Suppose that the processor has access to two levels of memory. Level 1 contains 1000 words and has an access time of 0.01 microseconds; level 2 contains 1,00,000 words and has an access time of 0.1 microseconds. Assume that if a word to be accessed in level 1, then the processor accesses it directly. If it is in level 2, then the word is first transferred to level 1 and then accessed by the processor. Suppose 95% of the memory accesses are found in the cache. Then, what should be the average time to access a word?

Info/Average

**Q.4 Solve Any four of the following.**

12

A) Differentiate virtual with main memory?

Info

B) Consider a cache with a line size of 32 bytes and a main memory that requires 30 ns to transfer a 4 byte word. For any line that is written at least ones before being swapped out of the cache, what is the average number of times that the line must be written before being swapped out for a write-back cache to be more efficient than a write-through cache?

Understanding

C) Give the difference between sequential, random and direct access.

Info

D) A set associative cache consists of 64 lines or slots divided into four line sets. Main memory contains 8K blocks of 64 words each. Show the format of main memory addresses.

Application

E) How the memory is organized?

Info

**Q. 5 Attempt any four of the following.**

12

A) When a DMA module takes control of a bus and while it retains control of the bus, what does the processor do?

Understanding

B) What is the difference between isolated I/O and memory mapped I/O? Why does DMA have priority over the CPU when both request a memory transfer?

Info

C) When a device interrupt occurs, how does the processor determine which device issued the interrupt?

Average/  
Understanding

D) How three techniques have defined and differentiated for performing Input/Output?

Info

E) What is parity bit? How does SDRAM differ from ordinary DRAM?

Info/Synthesis

Q. 6 Attempt the following.

A) Explain the difference between hardwired control and micro-programmed control. What are different stages of a pipe?

Informative/

Logical/

Reasoning based

B) Why does an assembly line in a manufacturing plant refer to as pipe-lining? Discuss the need of instruction pipe-lining.

Reasoning/Info

C) Many pipelined processors use four to six stages. Others divide instruction execution into smaller steps and use more pipeline stages and a faster clock.

Application/

Understanding

Considering the above scenario, for fast operations what would you suggest in terms of pipeline stages? How we relate instructions and micro-operations? What is the overall function of a processor's control unit?

END



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(Level/ Marks  
CO)

**Q. 1 Attempt the following questions.**

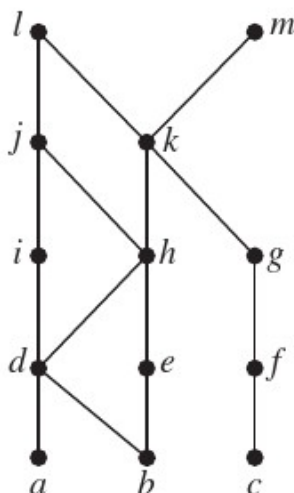
[12]

- A)** Let  $P(x)$ ,  $Q(x)$ , and  $R(x)$  be the statements “ $x$  is a professor,” “ $x$  is ignorant,” and “ $x$  is vain,” respectively. Express each of these statements using quantifiers; logical connectives; and  $P(x)$ ,  $Q(x)$ , and  $R(x)$ , where the domain consists of all people. **CO1**
- (a) No professors are ignorant. (b) All ignorant people are vain.  
(c) No professors are vain. (d) Does (c) follows (a) and (b)?
- B)** Show that if  $n$  is a positive integer, then  $1+2+3+\dots+n = \frac{n(n+1)}{2}$  by using mathematical induction. **CO1**
- C)** Use De Morgan’s laws to find the negation of each of the following statements. **CO1**
- (a) Kwame will take a job in industry or go to graduate school.  
(b) Yoshiko knows Java and calculus.  
(c) James is young and strong.  
(d) Rita will move to Oregon or Washington.

**Q.2 Solve Any Two of the following.**

[12]

- A)** Answer these questions for the partial order represented by this Hasse diagram. **CO2**



- a) Find the maximal elements.
- b) Find the minimal elements.
- c) Is there a greatest element?
- d) Is there a least element?
- e) Find all upper bounds of  $\{a, b, c\}$ .
- f) Find all lower bounds of  $\{f, g, h\}$ .

B) Let  $f(x) = x + 2$ ,  $g(x) = x - 2$ , and  $h(x) = 3x$  for  $x \in \mathbb{R}$  where  $\mathbb{R}$  = set of real numbers. Find **C02**

i)  $\text{gof}$

ii)  $\text{fohog}$

iii)  $\text{foh}$

C) Solve the following homogeneous recurrence relation: **C03**

$$t_n = 4t_{n-1} - 4t_{n-2}.$$

$$t_n = 1, n = 0 \text{ and } n = 1.$$

**Q. 3 Solve Any Two of the following.**

[12]

A) Draw the following graphs. **C04**

a)  $K_7$

b)  $K_{1,8}$

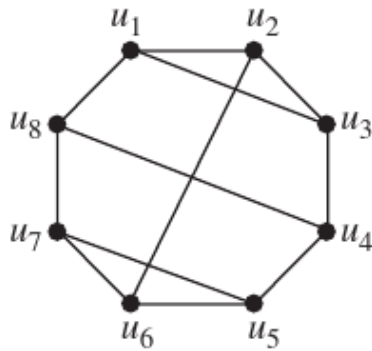
c)  $K_{4,4}$

d)  $C_7$

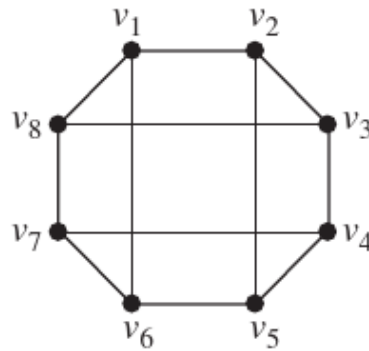
e)  $W_7$

f)  $Q_4$

B) Use paths either to show that these graphs are not isomorphic or to find an isomorphism between them. **C04**

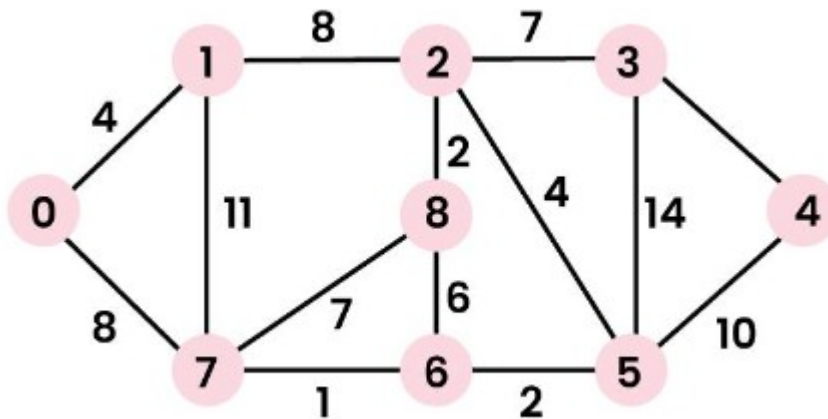


G



H

C) Use Dijkstra's algorithm to find the length of a shortest path between the vertices 1 and 4 in the weighted graph displayed in Figure below. **C04**



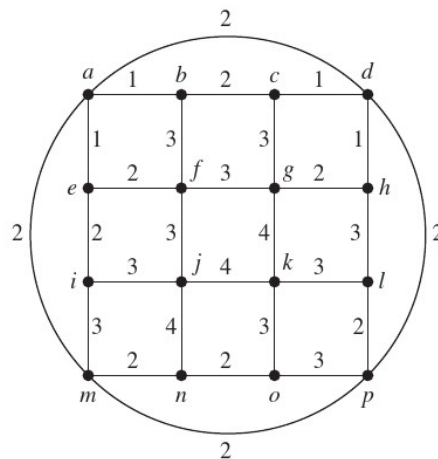
**Q.4 Attempt the following questions.**

[12]

A) Use Huffman's algorithm to provide an optimal average-bit-length code for the probability distribution a: 0.2, b: 0.2, c: 0.15, d: 0.15, e: 0.15, f: 0.1, and g: 0.05. Draw a binary tree to find the prefix code for for each probability distribution **C04**

and compute the average bit-length of a codeword.

- B)** Use Kruskal's algorithm to find a minimum spanning tree for the weighted graph in **C04** the Figure below.



- C)** (i) What is the value of each of the prefix expressions  $+ - \uparrow 3 2 \uparrow 2 3 / 6 - 4 2$ ? **C04**  
 (ii) What is the value of each of the postfix expressions  $3 2 * 2 \uparrow 5 3 - 8 4 / * -$ ?

**Q. 5 Attempt the following questions.**

[12]

- A)** Consider the binary operation defined on the set  $A = \{a, b, c, d\}$  by following table. **C05**  
 Find:

*	a	b	c	d
a	a	c	b	d
b	d	a	b	c
c	c	d	a	a
d	d	b	a	c

- (i)  $c * d$  and  $d * c$   
 (ii)  $b * d$  and  $d * b$   
 (iii)  $a * (b * c)$  and  $(a * b) * c$
- B)** Consider the group  $G = \{1, 2, 4, 7, 8, 11, 13, 14\}$  under multiplication modulo 15. **C05**  
 i) Find multiplication table of  $G$ .  
 ii) Find  $2^{-1}$ ,  $7^{-1}$ .  
 iii) Find the orders and subgroups generated by 7 and 11.

\*\*\* End \*\*\*

Course: B. Tech. Branch : Computer Engineering and Allied Semester : III

Subject Code & Name: Discrete Mathematics [BTCOC302]

Max Marks: 60

Date: 10/08/2023

Duration: 03:00 Hrs.

**Instructions to the Students:**

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.
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4. Assume suitable data wherever necessary and mention it clearly.

(Level/CO) Marks

**Q.1 Attempt the following questions.**

[12]

A) a) Use the following statements

Apply

p: Mohan is rich

q: Mohan is happy

write the following statement in symbolic form

i) Mohan is rich but unhappy.

ii) Mohan is poor but happy.

iii) Mohan is neither rich nor happy.

b) Construct the truth table for the  $p \vee \neg(p \wedge q)$  statement form.

B) a) Write the following statements using quantifier variables and predicate symbols **Understand**

i) All birds can fly.

ii) Some men are genius.

iii) Each integer is either even or odd.

b) In survey of 120 people, it was found that 65 read News read magazine, 45 read Times, 42 read Fortune; 20 read both Network and Times, 25 read both Network and Fortune, 15 read both Time and Fortune; and 8 read all the three magazine. Find the number of people who read exactly one magazine.

**Q.2 Solve Any Two of the following.**

[12]

A) Let  $A = \{1, 2\}$  and  $B = \{a, b, c\}$  Find

Understand

i)  $A \times B$

ii)  $B \times A$

iii)  $A \times A$ .

B) Solve  $a_r = a_{r-1} - 6a_{r-2} = -30$  given  $a_0 = 20$ , and  $a_1 = 5$ .

Apply

C) a) Let R be the relation on the set of real numbers such that  $xRy$  if and only if  $x$  and  $y$  are real numbers that differ by less than 1, that is  $|x - y| < 1$ . Show that R is not an equivalence relation.

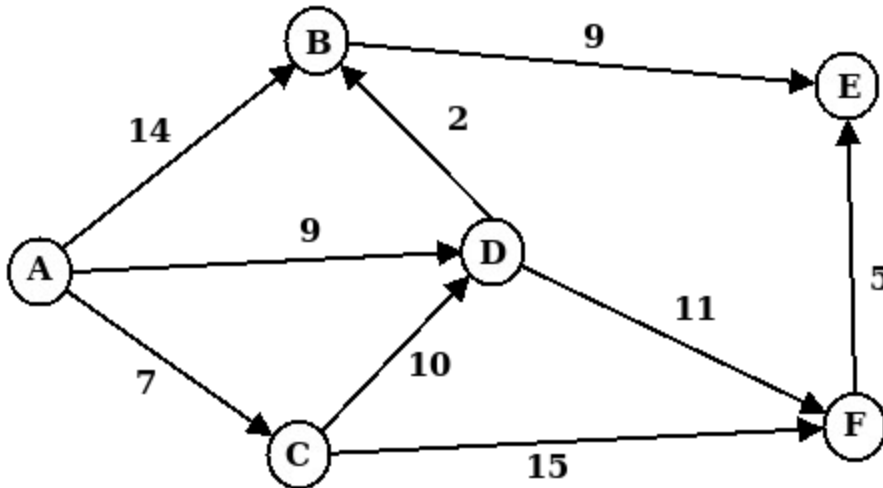
b) Define composite function. Let  $f$  and  $g$  be the functions from the set of

integers to the set of integers defined by  $f(x) = 2x + 3$  and  $g(x) = 3x + 2$ .  
 What is the composition of  $f$  and  $g$ ? What is the composition of  $g$  and  $f$ ?

**Q.3 Solve Any Two of the following.**

[12]

- A) Define the terms: Simple Path, Null Graph, Complete Graph, Planner Graph. Find the Hamiltonian path and Hamiltonian circuit in the complete graph  $K_{4,3}$ . **Understand**
- B) Compute the shortest distance between source A to destination E using Dijkstra's algorithm for the following graph. **Understand**

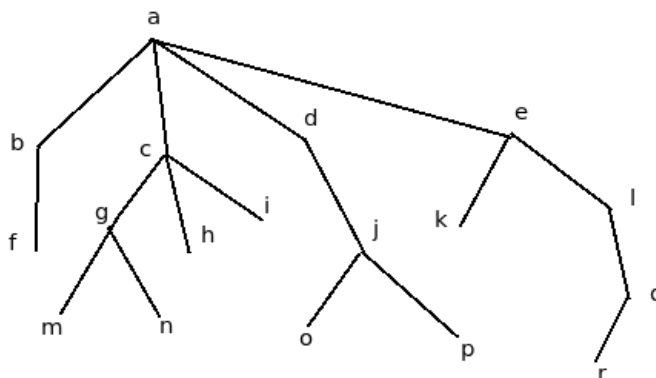


- C) i. Write a Handshaking Lemma for a graph having Vertices  $V = (G, E)$  and Edges  $E$ . **Understand**
- ii. How many edges are there in a graph with 10 vertices each of degree six?
- iii. Define Chromatic Number with suitable example.

**Q.4 Attempt the following questions.**

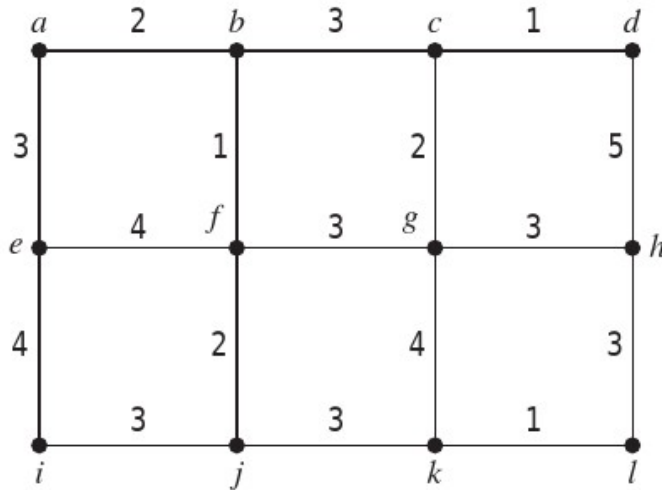
[12]

- A) Consider the following rooted tree and give the answer for following: **Understand**
- (i) Find the ancestor of  $f$ .
- (ii) Find the Descendant of  $j$ .
- (iii) How many terminal vertices are there?
- (iv) Draw the subtree rooted at  $e$ .
- (v) Find the siblings of  $g$ .
- (vi) Write the internal vertices of the tree.



**B)** Use Prim's algorithm and Kruskal's to find a minimum spanning tree in the graph shown in Figure.

**Apply**



**Q. 5 Attempt the following questions.**

**[12]**

**A)** Consider the binary operation defined on the set  $A = \{a, b, c, d\}$  by following table. **Understand**  
Find:

*	a	b	c	d
a	a	c	b	d
b	d	a	b	c
c	c	d	a	a
d	d	b	a	c

- (i)  $C * d$  and  $d * c$
- (ii)  $b * d$  and  $d * b$
- (iii)  $a * (b * c)$  and  $(a * b) * c$

**B)** Consider the group  $G = \{1, 2, 3, 4, 5, 6\}$  under multiplication modulo 7.

**Understand**

- i) Find multiplication table of  $G$ .
- ii) Find  $2^{-1}, 3^{-1}$ .
- iii) Find the orders and subgroups generated by 2 and 3.

**\*\*\* End \*\*\***

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,  
LONERE – RAIGAD -402 103  
Winter Semester Examination – Dec.- 2019**

**Branch: Computer Science**  
**Subject: - Discrete Mathematics (BTCOC302)**  
**Date: - 12/12/2019**

**Sem.:- III**  
**Marks: 60**  
**Time:- 3 Hr.**

**Instructions to the Students**

1. Each question carries 12 marks.
2. Attempt **any five** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriate assume it and should mention it clearly

**(Marks)**

- Q.1. a) Let  $A = \{4,5,7,8,10\}$ ,  $B = \{4,5,9\}$  and  $C = \{1,4,6,9\}$ . Then verify that,  
 $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$  (6)
- b) Show that  $(n^3 + 2n)$  is divisible by 3, for all  $n \geq 1$ , by method of induction. (6)

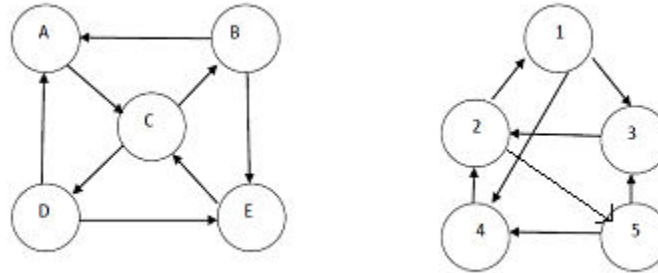
- Q.2. a) Find transitive closure of relation R defined on set  $A = \{1, 2, 3, 4\}$  defined as:  
 $R = \{(1,2), (1,3), (1,4), (2,1), (2,3), (3,4), (3,2), (4,2), (4,3)\}$  (6)
- b) Let set  $A = \{1, 2, 3\}$ ,  $B = \{a, b, c\}$  &  $C = \{x, y, z\}$ .  
Consider following relations R & S from A to B and B to C respectively.  
 $R = \{(1,b), (2,a), (2,c)\}$  &  $S = \{(a,y), (b,x), (c,y), (c,z)\}$   
(i) Find composition relation  $R \circ S$ .  
(ii) Write matrices  $M_R, M_S$  &  $M_{R \circ S}$  of relations R, S &  $R \circ S$ .  
(iii) Find product of  $M_R, M_S = M_P$   
Compare and comment on contents of  $M_{R \circ S}$  &  $M_P$ . (6)

- Q.3. a) Define discrete numeric function.  
Also state rules for product and sum of two numeric functions a and b.  
Find sum of two numeric functions defined as:
- $$a_r = \begin{cases} 0 & 0 \leq r \leq 2 \\ 2^{-r} + 5 & r \geq 3 \end{cases}$$
- and
- $$b_r = \begin{cases} 3 \cdot 2^r & 0 \leq r \leq 1 \\ r + 2 & r \geq 2 \end{cases}$$
- (6)

- b) (i) How many different strings of length six can be generated using either three uppercase alphabets followed by three digits or four uppercase alphabets followed by two digits. (6)

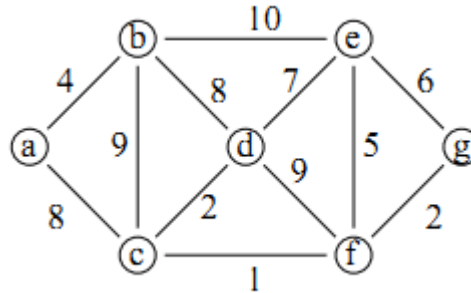
Q.4. a) (i) Show that the maximum number of edges in a simple graph having  $n$  vertices is  $n * (n-1) / 2$ . (6)

b) (i) Show that following graphs are isomorphic. Also give correspondence between edges and vertices of two graphs. (6)



Q.5. a) Show the steps of constructing a binary Search tree for following sequence of data items. Also write steps to search an element "25" in the resultant tree. 32, 56, 47, 28, 30, 45, 15, 72, 25 (6)

b) Find minimum spanning tree for the graph given below using Prim's algorithm



Q.6. a) Define following terms (1) Abelian Group (2) Monoid (3) Ring (6)

b) Let  $A = \{0, 1, 2, 3\}$  &  $\langle A, * \rangle$  be an algebraic system, where  $\forall a, b \in A$  and  $a * b = (a + b) \pmod 4$ . Find  $\forall a \in A, a^2, a^3, a^4$ . (6)

----- \*\*\*Paper End\*\*\* -----



**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE**

**End Semester Examination – Summer 2019**

**Course: B. Tech in CE/ CS / CS&E**

**Semester: III**

**Subject Name: Discrete Mathematics**

**Subject Code: BTCOC302**

**Max. Marks: 60**

**Date: 29 / 05 / 2019**

**Duration: 3 Hrs.**

**Instructions to the Students:**

1. Solve ANY FIVE questions out of the following.
2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

	(Level/ CO)	Marks
<b>Q.1 Solve Any Three of the following.</b>		
<b>A)</b> Among integers 1 to 1000,	<b>Application</b>	<b>4</b>
i. How many of them are not divisible by 3 nor by 5 nor by 7?		
ii. How many are not divisible by 5 or 7 but divisible by 3?		
<b>B)</b> Among integers 1 to 300,	<b>Application</b>	<b>4</b>
i. How many of them are not divisible by 3 nor by 5 nor by 7?		
ii. How many of them are divisible by 3 but not by 5, nor by 7?		
<b>C)</b> i. Obtain the Conjunctive Normal Form of $(p \wedge q) \vee (\sim p \wedge q \wedge r)$	<b>understand</b>	<b>4</b>
ii. Obtain the Disjunctive Normal Form of $\sim (p \rightarrow (q \wedge r))$		
<b>D)</b> Transcribe the following into logical notation. Let the universe of discourse be the real numbers.	<b>understand</b>	<b>4</b>
i. For any value of $x$ , $x^2$ is non-negative.		
ii. For every value of $x$ , there is some value of $y$ such that $x \cdot y = 1$ .		
iii. There are positive values of $x$ and $y$ such that $x \cdot y > 0$ .		
iv. There is a value of $x$ such that if $y$ is positive, then $x + y$ is negative.		
<b>Q.2 Solve Any Two of the following.</b>		
<b>A)</b> $X = \{2, 3, 6, 12, 24, 36\}$ $R$ on $X = \{(x, y) \in R, x \text{ divides } y\}$	<b>Synthesis</b>	<b>6</b>
(a) Construct Hasse diagram.		
(b) Find maximal and minimal element?		
(c) Is poset a lattice? Justify.		
<b>B)</b> Given $A = \{1, 2, 3, 4\}$ and $B = \{x, y, z\}$ . Let $R$ be the following relation from $A$ to $B$ :	<b>understand</b>	<b>6</b>

$$R = \{(1, y), (1, z), (3, y), (4, x), (4, z)\}$$

- (a) Determine the matrix of the relation.
- (b) Find the inverse relation  $R^{-1}$  of  $R$ .
- (c) Determine the domain and range of  $R$ .

C) Given:  $A = \{1, 2, 3, 4\}$ . Consider the following relation in  $A$ :

$$R = \{(1, 1), (2, 2), (2, 3), (3, 2), (4, 2), (4, 4)\}$$

- (a) Draw its directed graph.
- (b) Is  $R$  (i) reflexive, (ii) symmetric, (iii) transitive, or (iv) antisymmetric?
- (c) Find  $R^2 = R \circ R$ .

understand 6

**Q.3 Solve the following.**

A) Consider the second-order homogeneous recurrence relation  $a_n = a_{n-1} + 2a_{n-2}$  with the initial conditions  $a_0 = 2$ , and  $a_1 = 7$ ,

Application 6

- (a) Find the next three terms of the sequence.
- (b) Find the general solution.
- (c) Find the unique solution with the given initial conditions.

B) Solve the following recurrence

Understand 6

$$t_n = 6t_{n-1} - 11t_{n-2} + 6t_{n-3}$$

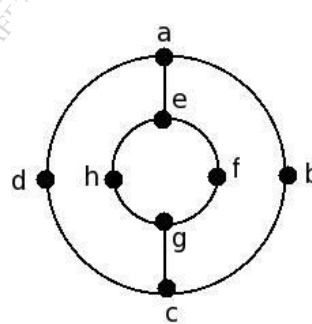
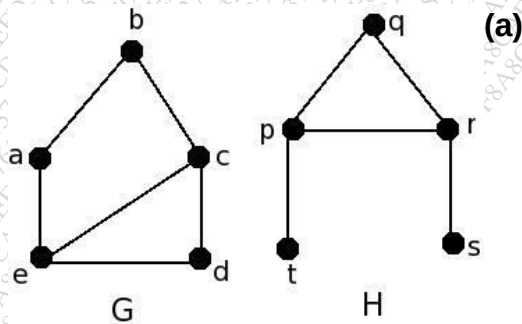
with initial conditions

$$t_0 = 1, t_1 = 5, \text{ and } t_2 = 15$$

**Q.4 Solve Any Two of the following.**

A) Define the isomorphic graph. Are the following graphs shown in fig. (a) and (b) isomorphic?

Understand 6



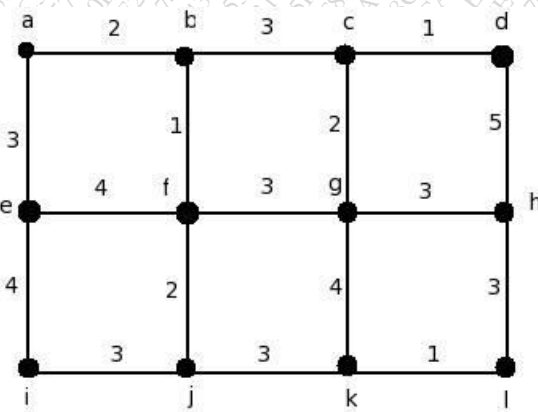
B) (a) Draw the graph  $K_{2,5}$ .

Understand 6

- (b) Define the following terms:  
 (i) Planar Graph      (ii) Bipartite Graph      (iii) Complete graph
- (c) Draw the 2-regular graph with 5 vertices.
- C) Write the Euler's Formula. Prove that in planar graph G with p vertices and q edges, where  $p \geq 3$  then  $q \geq 3p - 6$ . **Knowledge 6**

**Q.5 Solve the following.**

- A) Use Prim's algorithm to find a minimum spanning tree in the graph shown in Figure given below. **Understand 6**



- B) Construct a Binary Search Tree by inserting the following sequence of numbers:  
 10, 12, 5, 4, 20, 8, 7, 15, 13. **Application 6**
- Also Find Preorder, Inorder and Postorder traversal of Binary Search Tree.

**Q.6 Solve the following.**

- A) Define the following terminology: **Knowledge 6**  
 (i) Identity Element      (ii) Monoid      (iii) Group      (iv) Algebraic System  
 (v) Ring      (vi) Inverse Element
- B) Consider the group  $G = \{1, 2, 3, 4, 5, 6\}$  under multiplication modulo 7. **Understand 6**  
 (a) Find the multiplication table of G.  
 (b) Find the  $2^{-1}, 3^{-1}, 6^{-1}$ .  
 (c) Find the orders and subgroups generated by 2 and 3.

\*\*\* End \*\*\*

**Course:** B. Tech in Computer Science and Engg

**Sem:** III

**Subject Name:** Discrete Mathematics

**Subject Code:** BTCOC302

**Date:** 03/12/2018

**Max Marks:** 60

**Duration:** 3 Hrs.

**Instructions to the Students:**

1. Solve **ANY FIVE** questions out of the following.
2. Use of non-programmable scientific calculators is allowed.
3. Assume suitable data wherever necessary and mention it clearly.

Marks

**Q. 1 Solve Any Three of the following.**

- A) Let p and q be the propositions “Swimming at the New Jersey shore is allowed” and “Sharks have been spotted near the shore” respectively. Express each of these compound propositions as an English sentence. **4M**
- a)  $\neg q$                       b)  $p \rightarrow \neg q$                       c)  $p \leftrightarrow \neg q$                       d)  $\neg p \vee q$

- B) Explain with example, notations used and mathematical expression to describe the following terms. **4 M**

- i) Membership                      ii) Subset                      iii) Equality of two sets                      iv) Union

- C) Use mathematical induction to show that  $1+5+9+\dots+(4n-3) = n(2n-1)$ ,  $\forall n \geq 1, n \in \mathbb{Z}$  **4M**

- D) Explain Universal quantifiers and Existential quantifiers with example. What is De Morgan’s law for quantifiers? **4M**

**Q.2 Solve the following.**

- A) Check whether the relation R defined in the set  $\{1, 2, 3, 4, 5, 6\}$  is  $R = \{(a, b) : b = a+1\}$  is reflexive, symmetric or transitive. Justify your answer. Find the relation Matrix. **6 M**

- B) Explain surjective, injective, bijective and inverse function each with example. **6M**

**Q. 3 Solve Any three of the following.**

- A) Explain the pigeonhole principle with example. **4M**

- B) Find how many symbol codes can be formed if the first two symbols are letters and the next three are digits but no symbol is repeated? **4M**

- C) What is the expansion of  $(3x + y)^4$ ? **4M**

- D) Determine the sequence  $\{a_n\}$  where  $a_n = 3n$  for every non-negative integer, n is a solution of the recurrence relation  $a_n = 2a_{n-1} - a_{n-2}$  for  $n = 2, 3, 4, \dots$  **4M**

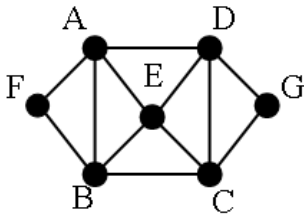
**Q.4 Solve the following.**

- A) Define Euler graph and Hamiltonian Graph. **6M**

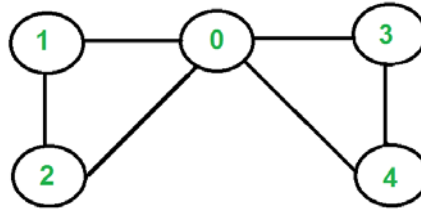
i) For a given graph G :

- (a) Find a Hamiltonian path that begins at A and ends at E.
- (b) Find a Hamiltonian circuit that starts at A and ends with the pair of vertices E, A.
- (c) Find a Hamiltonian path that begins at F and ends at G.

ii) For a given graph I find Eulerian path and Eulerian cycle.



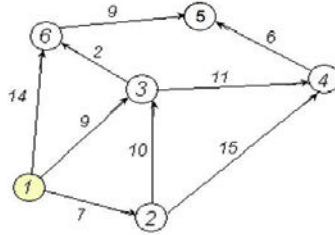
Graph: H



Graph: I

B) Find the shortest path in the given graph using Dijkstra shortest path algorithm.

6M



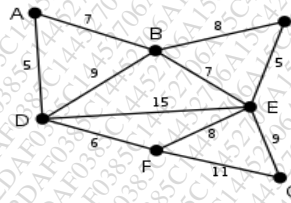
Q. 5 Solve Any three of the following.

A) Show that a tree with n vertices has n-1 edges.

4M

B) Find minimum spanning tree for the given graph using Prim's algorithm?

4M



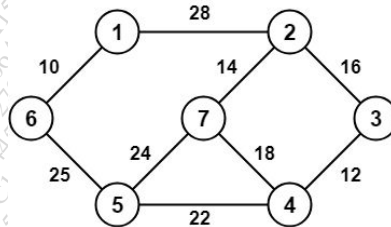
C) Define the following terms with reference to tree with example.

4M

- i) Level and Height of a tree      ii) M-ary Tree      iii) Eccentricity of a vertex

D) Construct the minimum spanning tree (MST) for the given graph using Kruskal's Algorithm.

4M



Q. 6 Solve the following.

A) Define the following terms.

6M

- i) Algebraic Structures      ii) Semi Groups      iii) Monoids      iv) Ring  
v) Field      vi) Group

B) For each of the following, determine whether the binary operation \* is commutative or associative?

6M

- i) N is the set of natural numbers and  $a * b = a + b + 2$  for  $a, b \in \mathbb{N}$   
ii) On N where  $a * b = \min(a, b+2)$   
iii) On R where  $a * b = a^b$

\*\*\* End \*\*\*

Supplementary Semester Examination – 2023

Course: B. Tech. Branch : Computer Engineering and Allied

Semester : III

Subject Code & Name: Data Structures [BTCOC303]

Max Marks: 60

Date: 14/08/2023

Duration: 03:00 Hrs.

**Instructions to the Students:**

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

(Level/CO) Marks

**Q. 1 Solve Any Two of the following.**

[12]

A) Define the following terms:

Remember

- i) Classification of Data Structure
- ii) Abstract Data Types
- iii) Transpose of Matrix

B) What is the Sparse Matrix. Write a C program to convert a sparse matrix, an input provided by a user into its triplet representation. Understand

C) Consider the following 4-digit employee numbers: 3205 and 7148. Find 2-digit hash address of each number using a) division method ( $m = 97$ ); b) mid-square method; c) folding method without reversing. Application

**Q.2 Attempt the following questions.**

[12]

A) Define Queue. Write an algorithm to perform an Enqueue and Dequeue operations on the Queue. Understand

B) Write an algorithm to convert Infix expression to Postfix expression. Consider the following Infix expression Q and translate Q into its equivalent Postfix expression P. Application

$$Q: A + ( B * C - ( D / E \uparrow F ) * G ) * H$$

**Q. 3 Solve Any Two of the following.**

[12]

A) Explain the following concepts:

Understand

- a) Garbage Collection
- b) Dynamic Memory Allocation

B) Write a pseudo code for the performing following operations in the Single Link List: Understand

- a) Insert the elements at the end
- b) Delete the element from the beginning

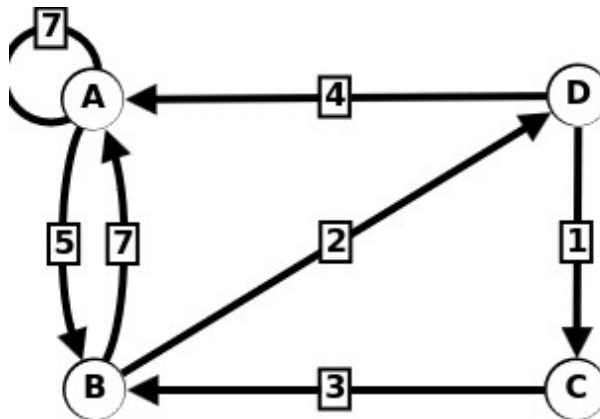
C) Write a pseudo code for the performing following operations in the Circular Link List: Understand

- a) Insert the elements at the beginning
- b) Delete the element from the end

**Q.4 Attempt the following questions.**

[12]

- A) Consider the following weighted graph G. Find the shortest path between the Application nodes using Warshall's Algorithm.



- B) Define the the following terms:

Application

- i) Siblings                  ii) Leaf Node                  iii) Ancestor of Node

Following numbers are inserted into an empty binary search tree. Find the final tree **T**.

25, 20, 10, 36, 22, 5, 1, 8, 30, 12, 15, 40, 28, 38, 48, 45, 50

**Q. 5 Attempt the following questions.**

[12]

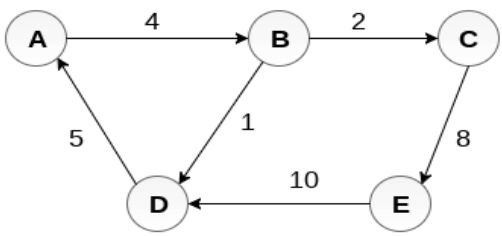
- A) Write a pseudo code for Linear Searching. Understand
- B) Consider the following array consisting of 8 elements. Use insertion sort to Application arrange the elements in the Ascending order.

77, 33, 44, 11, 88, 22, 66, 55

\*\*\* End \*\*\*

<b>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE</b> <b>Winter Examination – 2022</b> <b>Course: B. Tech.                      Branch :Computer Engineering                      Semester :III</b> <b>Subject Code &amp; Name: BTCOC303 Data Structures</b> <b>Max Marks: 60                                              Date:                                              Duration: 3 Hr.</b>			
<b>Instructions to the Students:</b> 1. All the questions are compulsory. 2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question. 3. Write proper Syntax, example and program wherever necessary. 4. Assume suitable data wherever necessary and mention it clearly.			
		(Level/CO)	Marks
<b>Q. 1</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
A)	What is a data structure? Why do we need data structures? Differentiate linear and non-linear data structure.	<b>Remember</b>	<b>6</b>
B)	Explain the concept of sparse matrices.	<b>Understanding</b>	<b>6</b>
C)	Explain double hashing in data structure with its advantages and disadvantages.	<b>Understanding</b>	<b>6</b>
<b>Q.2</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
A)	What is Queue ADT? Explain representation and implementation of queue using sequential operations.	<b>Synthesis</b>	<b>6</b>
B)	Explain applications of stack for Expression Evaluation.	<b>Understanding</b>	<b>6</b>
C)	What is priority queue ? Explain operations of priority queue.	<b>Analysis</b>	<b>6</b>
<b>Q. 3</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
A)	Explain circular linked list data structure with its insertion and deletion operations.	<b>Analysis</b>	<b>6</b>
B)	Write a C Program to implement following any two operations of doubly linked list. 1.insertion 2.deletion 3.display 4.search	<b>Apply</b>	<b>6</b>
C)	Justify a linked list is a data structure that is based on dynamic memory allocation. and List the application of Linked List Dynamic Memory Allocation.	<b>Understanding</b>	<b>6</b>
<b>Q.4</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
A)	What is Binary Search Tree? Write an algorithm to search an element in Binary search tree.	<b>Remember</b>	<b>6</b>



<p><b>B)</b></p>	<p>Explain Adjacency matrix for an undirected graph and what will be the adjacency matrix for the below directed weighted graph?</p>  <p style="text-align: center;">Fig. Directed weighted graph</p>	<p><b>Synthesis</b></p>	<p><b>6</b></p>
<p><b>C)</b></p>	<p>Explain Threaded Binary Tree and its types? State its advantages and disadvantages.</p>	<p><b>Understanding</b></p>	<p><b>6</b></p>
<p><b>Q. 5</b></p>	<p><b>Solve Any Two of the following.</b></p>		<p><b>12</b></p>
<p><b>A)</b></p>	<p>What is a skip list? Write algorithm for basic skip list operations.</p>	<p><b>Remember</b></p>	<p><b>6</b></p>
<p><b>B)</b></p>	<p>Explain binary search algorithm by suitable example. Discuss the complexity of Binary search algorithm.</p>	<p><b>Analysis</b></p>	<p><b>6</b></p>
<p><b>C)</b></p>	<p>Explain Insertion sort algorithm with suitable example. Discuss the complexity of insertion sort.</p>	<p><b>Understanding</b></p>	<p><b>6</b></p>
<p><b>*** End ***</b></p>			

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## DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

## End Semester Examination – Summer 2019

Course: B. Tech in Computer Engineering

Sem: III

Subject Name: Data Structures

Subject Code: BTCOC303

Max Marks:60

Date: 30/05/2019

Duration: 3 Hr.

**Instructions to the Students:**

1. Solve **ANY FIVE** questions out of the following.
2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

	(Level/CO)	Marks
<b>Q. 1 Solve Any Two of the following.</b>		
A) What is Data Structure? Explain the various characteristics of an algorithm		6
B) What is time complexity? Compute the frequency count for : for i : = 1 to n for j : = i + 1 to n for k : = j + 1 to n for l : = k + 1 to n x = x + 1;		6
C) What is an algorithm? Write an algorithm to find Greatest common divisor (GCD).		6
<b>Q.2 Solve the following.</b>		
A) Write a “C” code to find the transpose of a sparse matrix stored in this way.		6
B) Using linear probing insert the following values in hash table of size 10. Elements are 28, 55,71,67,11,10,90,44.		6
<b>Q. 3 Solve the following.</b>		
A) Explain sequential search. Write an algorithm for sequential search.		4
B) What is skip list? Give its representation .Write an algorithm to insert new item (k,e) in the skip list S.		8

**Q.4 Solve the following.**

- A) Write a program in C to create a singly linked list and perform the following operations I) Insert into list II) Search for data III) Delete from list **6**
  
- B) Construct algorithm for following operations on a Doubly Linked List 1) CREATE AT END 2) DELETE AT START 3) TRAVERSE **6**

**Q.5 Solve the following.**

- A) With the help of suitable example, explain following operation, Enqueue and Dequeue and traverse operation of circular queue **6**
  
- B) Convert the  $A*B+C/D$  expression into postfix using stack **6**

**Q.6 Solve the following.**

- A) Explain breadth first search technique for graph traversal. **6**
  
- B) What is a Binary Tree. Explain inorder and postorder traversals with example **6**

\*\*\* End \*\*\*

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

End Semester Examination – Winter 2018

Course: B. Tech in Computer Engineering

Sem: III

Subject Name: Data Structures

Subject Code: BTCOC303

Max Marks: 60

Date: 5/12/2018

Duration: 3 Hrs.

**Instructions to the Students:**

1. Solve **ALL** questions.
2. The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

	(Level/CO)	Marks
<b>Q. 1 Solve Any Three of the following.</b>		
A) What is data structure? Why to study data structure? Enlist the five areas of computer science in which data structure is used.	Understand	4
B) What is garbage collection? Who will run garbage collection program? When it will be run?	Understand	4
C) Suppose multidimensional arrays A and B are declared using A (0:5, -2:7) and B (0:5, -1:4). Find the length of each dimension and the number of elements in array A and B.	Apply	4
D) What is primitive data structure? Enlist the differences between primitive and non-primitive data structures.	Understand	4
<b>Q.2 Solve Any Two of the following.</b>		
A) What is circular queue? Let the following circular queue can accommodate maximum six elements with the following data, front = 2, rear = 4 and initial queue content is queue = ----, L, M, N, ----, --- Show the queue content with front and rear value after the following operations. i) Insert A    ii) Delete    iii) Insert B    iv) Delete	Apply	6
B) What is singly linked list? Write algorithm to find the number of times a given ITEM occurs in the singly linked list.	Creating	6
C) Let the keys: 46, 34, 42, 23, 52, 33 are inserted into an empty hash table using function $h(\text{key}) = \text{key} \bmod 10$ . Give hash table content after every insertion, if open addressing with linear probing is used to deal with collision.	Creating	6
<b>Q. 3 Solve Any Two of the following.</b>		
A) What is selection sort? Sort the number following numbers in ascending order and also show the worst case time complexity of selection sort is $O(n^2)$ .	Analyzing	6
B) Consider the stack of size 6 memory cells. Suppose initially stack contains a, b, c, d, e (Top of stack). Then the following operations are executed	Evaluating	6

in order. Show the stack top and any other situation raised while doing each of the operation.

- i) Push(f) ii) Pop(top) iii) Push(g) iv) Push(h) v) Pop(top) vi) Push(i)

Apply

- C) Explain how to implement two stacks in one array  $A[1 \dots N]$  in such a way that neither stack overflow unless the total number of elements in both the stacks together is  $N$ . Note that, Push() and Pop() operations should be run in  $O(1)$  time.

6

**Q.4 Solve Any Two of the following.**

- A) What are the different types of the linked list? Give advantages and disadvantages each of the linked list over another.

Remember

6

- B) Assume, the following letters are inserted into an empty binary search tree in given order. J, B, D, F, N, K, O. Construct binary search tree and also give height of the tree.

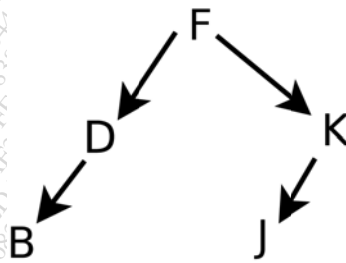
Apply

6

- C) What is threaded binary trees? Give the threaded binary tree of the following binary tree.

Apply

6

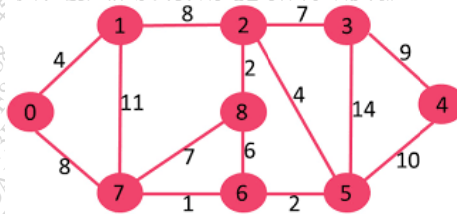


**Q. 5 Solve the following.**

- A) What is graph? Find the shortest path using Dijkstra algorithm. Assume starting node is 0.

Evaluating

6



- B) Explain the in brief the following  
 i) red black tree ii) m-way search tree iii) b tree iv) b+ tree  
 v) sparse matrix vi) AVL tree

Understand

6

\*\*\* End \*\*\*

**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE****Supplementary Summer - 2023****Course: B. Tech. Branch : Computer Science Engineering and Allied Second Year Semester :III****Subject Code & Name:BTCOC305B & (Elective) Object Oriented Programming in Java****Max Marks: 60****Date:21/08/2023****Duration: 3.00 Hr.**

<b>Instructions to the Students:</b>			
	<ol style="list-style-type: none"><li>1. All the questions are compulsory.</li><li>2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.</li><li>3. Use of non-programmable scientific calculators is allowed.</li><li>4. Assume suitable data wherever necessary and mention it clearly.</li></ol>		
		(Level/CO)	Marks
<b>Q. 1</b>	<b>Solve Any Two of the following.</b>		
A)	Write a Java Program to Check Whether a Number is Even or Odd	(Application)	<b>6</b>
B)	What are the advantages of the object-oriented programming language?	(Understand)	<b>6</b>
C)	List the primitive data types available in Java and explain.	(Understand)	<b>6</b>
<b>Q.2</b>	<b>Solve Any Two of the following.</b>		
A)	What are the benefits of break and continue statements explain with example?	(Analysis)	<b>6</b>
B)	Discuss default constructor and parameterized constructor with the help of an example in Java?	(Application)	<b>6</b>
C)	Difference between method overloading and method overriding	(Understand)	<b>6</b>
<b>Q. 3</b>	<b>Solve Any Two of the following.</b>		
A)	Write a program to sort the given input array in ascending and descending order? For example : <b>Input:</b> arr[]={13,41,2,21,9,25,3}	(Application))	<b>6</b>
B)	Write a program to check whether enter number is palindrome or not?	(Application)	<b>6</b>
C)	Write the differences between interface and abstract class	(Understand)	<b>6</b>
<b>Q.4</b>	<b>Solve Any Two of the following.</b>		
A)	Define inheritance. What are the benefits of inheritance? How to prevent a class from inheritance?	(Understand)	<b>6</b>
B)	Explain different types of inheritance with diagram.	(Understand)	<b>6</b>
C)	Define polymorphism. Explain run time polymorphism with the help of example.	(Application)	<b>6</b>
<b>Q. 5</b>	<b>Solve Any two of the following.</b>		
A)	What is the difference between error and an exception? Explain with help of example	(Understand)	<b>6</b>
B)	Write the difference between Final, finally and finalize.	(Application)	<b>6</b>

C)	Explain try, catch and finally block with the help of example	(Application)	<b>6</b>
	<b>*** End ***</b>		

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<b>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE</b>			
<b>Winter Examination – 2022</b>			
<b>Course: B. Tech.</b>		<b>Branch :Computer Science &amp; Engineering</b>	<b>Semester :III</b>
<b>Subject Code &amp; Name: BTCOC305(B) Object Oriented Programming in Java</b>			
<b>Max Marks: 60</b>	<b>Date:</b>	<b>Duration: 3 Hr.</b>	
<b>Instructions to the Students:</b>			
<ol style="list-style-type: none"> <li>1. All the questions are compulsory.</li> <li>2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in ( ) in front of the question.</li> <li>3. Write proper Syntax, example and program wherever necessary.</li> <li>4. Assume suitable data wherever necessary and mention it clearly.</li> </ol>			
		(Level/CO)	Marks
<b>Q. 1</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
A)	Define Class, Method and Object? Show the syntax to define these in java.	<b>Remember</b>	<b>6</b>
B)	Explain parameterized constructor with java program.	<b>Apply</b>	<b>6</b>
C)	What are get () and set () method in java? State advantages of get () and set () method.	<b>Understanding</b>	<b>6</b>
<b>Q.2</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
A)	Write a program in Java to display n terms of natural numbers and their sum.	<b>Apply</b>	<b>6</b>
B)	What is static variable and static function? State difference between static method and instance method.	<b>Understanding</b>	<b>6</b>
C)	Explain method overloading using java program.	<b>Apply</b>	<b>6</b>
<b>Q. 3</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
A)	What is an Array? How do you declare and initialize an Array in java? What are the disadvantages of Array?	<b>Analysis</b>	<b>6</b>
B)	How to pass Arrays to method and return from method in Java?	<b>Understanding</b>	<b>6</b>
C)	What is a Multidimensional array? Write a java program for addition of two dimensional arrays.	<b>Apply</b>	<b>6</b>
<b>Q.4</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
A)	Describe the uses of super keywords with respect to inheritance.	<b>Remember</b>	<b>6</b>
B)	Explain concept of multilevel inheritance using a simple java program.	<b>Apply</b>	<b>6</b>
C)	What is an abstract class in java? What is an interface? List the rules to create an interface in java with example.	<b>Understanding</b>	<b>6</b>



<b>Q. 5</b>	<b>Solve Any Two of the following.</b>		<b>12</b>
<b>A)</b>	What is exceptions handling and state benefits of exception handling in java? Explain Java Exception Handling Keywords.	<b>Remember</b>	<b>6</b>
<b>B)</b>	What is package? Write a program to create user defined package in java.	<b>Analysis</b>	<b>6</b>
<b>C)</b>	How to declare variables in JavaScript? Write a Java script Program to add two numbers by using on click event, form and text box.	<b>Understanding</b>	<b>6</b>
	<b>*** End ***</b>		

**The grid and the borders of the table will be hidden before final printing.**