

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD -402 103
Semester Examination – December - 2018

Branch: Computer Science and Engineering

Sem.:- I

Subject with Subject Code:- Computer Architecture & Organization(BTCOC304)

Marks: 60

Date:-7/12/2018

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 appropriately assume it and should mention it clearly
-

(Marks)

- Q.1. a) Describe the structural overview of computer. (5)
b) Define stored program concept and Explain Von Neumann's Architecture with diagram. (7)
- Q.2. a) List assembler directives? Assuming any assembler, give the necessary directives required for any program. (5)
b) Explain in detail different types of addressing modes. (7)
- Q.3. a) Convert $(100.125)_{10}$ in IEEE-754 single precision floating point representation. (5)
b) Sketch and explain flowchart for multiplication of floating point numbers. (7)
- Q.4. a) Encode the data 1101 in even parity by using Hamming Code. (5)
b) Elaborate various types of ROM: Magnetic as well as optical (7)
- Q.5. a) Discuss Micro operations to execute an instruction MOV R1,R2. (5)
b) Explain Wilki's design of Micro programmed Control Unit. (7)
- Q.6. a) Explain Instruction Pipelining. (5)
b) Discuss Interrupt Driven I/O. Compare it with Programmed I/O and explain types of Interrupts (7)
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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: 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
Q.1 Solve Any Four of the following.		12
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	
Q.2 Solve Any Four of the following.		12
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

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

Winter Semester Examination – Dec - 2019

Branch: B.Tech. (Computer Engineering)		Sem: III
Subject with Subject Code: Computer Architecture & Organization[BTCOC304]		Marks:60
Date:- 17-12-2019		Time: 3 Hrs
Instructions to the Students:		
<p>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 appropriately assume it and should mention it clearly.</p>		
Q.1	Solve any following questions.	
(A)	What, in general terms, is the distinction between computer organization and computer architecture?	06
(B)	Explain the computer: the top level structure with structural component with neat sketch diagram.	06
Q. 2	Attempt the following questions.	
(A)	<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"> • Word 20 contains 40. • Word 30 contains 50. • Word 40 contains 60. • Word 50 contains 70. <p>a. LOAD IMMEDIATE 20 b. LOAD DIRECT 20 c. LOAD INDIRECT 20 d. LOAD IMMEDIATE 30</p>	06
(B)		
I.	Convert the following instruction into Accumulator based CPU, Register based CPU. Instruction:(A*B)-(R+Z)/T	03
II.	Is RISC better than CISC? Illustrate your answer with example of processor.	03
Q.3	Attempt the following questions.	
(A)	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.	06
(B)	Show how the following floating-point additions are performed (where significant are	06

	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. $6.21 \times 10^5 \div 8.877 \times 10^1$	
Q.4	Attempt the following questions.	
(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.	06
(B)	Elaborate the concept of SRAM and DRAM memory with typical memory cell structure.	06
Q.5	Attempt the following questions.	
(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	06
(B)	What is the difference between a hardwired implementation and a microprogrammed implementation of a control unit?	06
Q.6	Attempt any two questions.	
(A)	In virtually all systems that include DMA modules, DMA access to main memory is given priority than CPU access to main memory. Why?	06
(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.	06
(c)	How does instruction pipelining enhance system performance? Elaborate your answer using RISC instruction stages.	06

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

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

B)	Draw and explain in detail Memory Hierarchy. Difference between main memory and cache memory.		06
C)	What is DMA? Draw typical DMA module diagram.		06
	*** End ***		

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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular & Supplementary Winter Examination – 2023

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

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

Max. Marks: 60

Date:09/01/2024

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

Q.1) Solve Any Two of the following.		12
A) Explain top level view of computer components with neat labelled diagram?	Understand	6
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
C) Discuss the role of buses in computer organization. Explain the different types of buses and their functions?	Understand	6
Q.2) Solve Any Two of the following.		12
A) Discuss the assembly language programming. How does it differ from a high-level programming language?	Remember	6
B) Describe the concept of Addressing Modes. Give the list of addressing modes and explain- a) Register Indirect Addressing Mode b) Direct Addressing Mode	Understand	6
C) Write a short note on- 1) RISC 2) CISC	Understand	6
Q.3) Solve Any Two of the following.		12
A) Explain Integer representation in detail?	Understand	6
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
C) Subtract $(11011)_2 - (10011)_2$ using 1's complement & 2's complement method.	Analyze	6

Q.4) Solve Any Two of the following. 12

- | | | |
|--------------------------------------------------------------------------------------------------------------------|------------|---|
| A) Write a short note on- | Remember | 6 |
| 1) RAM | | |
| 2) ROM | | |
| B) Explain RAID memory in detail? | Understand | 6 |
| C) Explain the magnetic Disk. Discuss the advantages and disadvantages of magnetic disk using as a storage medium? | Understand | 6 |

Q.5) Solve Any Two of the following. 12

- | | | |
|--------------------------------------------------------------------------------------------|------------|---|
| A) What is instruction pipelining, and what advantages does it offer in modern processors? | Understand | 6 |
| B) Explain the Microprogrammed Control Unit? | Remember | 6 |
| C) Differentiate between Interrupt driven I/O & Programmed I/O? | Understand | 6 |

***** End *****

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular & Supplementary Winter Examination – 2023

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

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

Max. Marks: 60

Date:09/01/2024

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

Q.1) Solve Any Two of the following.		12
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A) Discuss the assembly language programming. How does it differ from a high-level programming language?	Remember	6
B) Describe the concept of Addressing Modes. Give the list of addressing modes and explain- a) Register Indirect Addressing Mode b) Direct Addressing Mode	Understand	6
C) Write a short note on- 1) RISC 2) CISC	Understand	6
Q.3) Solve Any Two of the following.		12
A) Explain Integer representation in detail?	Understand	6
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
C) Subtract $(11011)_2 - (10011)_2$ using 1's complement & 2's complement method.	Analyze	6

Q.4) Solve Any Two of the following. 12

- | | | |
|--------------------------------------------------------------------------------------------------------------------|------------|---|
| A) Write a short note on- | Remember | 6 |
| 1) RAM | | |
| 2) ROM | | |
| B) Explain RAID memory in detail? | Understand | 6 |
| C) Explain the magnetic Disk. Discuss the advantages and disadvantages of magnetic disk using as a storage medium? | Understand | 6 |

Q.5) Solve Any Two of the following. 12

- | | | |
|--------------------------------------------------------------------------------------------|------------|---|
| A) What is instruction pipelining, and what advantages does it offer in modern processors? | Understand | 6 |
| B) Explain the Microprogrammed Control Unit? | Remember | 6 |
| C) Differentiate between Interrupt driven I/O & Programmed I/O? | Understand | 6 |

***** End *****

Dr. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Winter Examinations 2022

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

Subject Code & Name: BTCOC302 _ Discrete Mathematics

Max Marks: 60

Date: 11/03/2023

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

	(BTLevel)	Marks
Q.1 Solve Any Two of the following.		12
A) Among the integers 1 to 1000:	Apply	6
1) How many of them are not divisible by 3, or by 5, or by 7?		
2) How many are not divisible by 5 and 7 but divisible by 3.		
B) Prove that $1 + 2 + 2^2 + \dots + 2^n = 2^{n+1} - 1$, where n is a nonnegative integer by using mathematical induction	Understand	6
C) Let $S(x)$ be the predicate "x is a student," $F(x)$ the predicate "x is a faculty member," and $A(x, y)$ the predicate "x has asked y a question," where the domain consists of all people associated with your school. Use quantifiers to express each of these statements.	Understand	6
I. Lois has asked Professor Michaels a question.		
II. Every student has asked Professor Gross a question.		
III. Every faculty member has either asked Professor Miller a question or been asked a question by Professor Miller.		
IV. Some student has not asked any faculty member a question.		
V. There is a faculty member who has never been asked a question by a student		
VI. There is a faculty member who has asked every other faculty member a question		
Q.2 Solve Any Two of the following.		12
A) Let $A = \{p, q, r\}$. Show $(P(A), \text{subset})$ is a poset and draw its Hasse diagram.	Apply	6
B) How many permutations of the letters a, b, c, d, e, f, g contain neither the pattern <i>bge</i> nor <i>eaf</i> ?	Apply	6
C) Determine whether each of these functions is one-to-one, onto, both or not a function. Justify your answer	Apply	6

1) from $\{a, b, c, d\}$ to itself

i. $f(a) = b, f(b) = a, f(c) = c, f(d) = d$

ii. $f(a) = b, f(b) = b, f(c) = d, f(d) = c$

2) from \mathbb{Z} to \mathbb{Z}

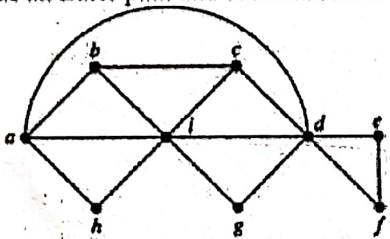
i. $f(n) = n + 1$

ii. $f(n) = n^3$

Q.3 Solve Any two of the following.

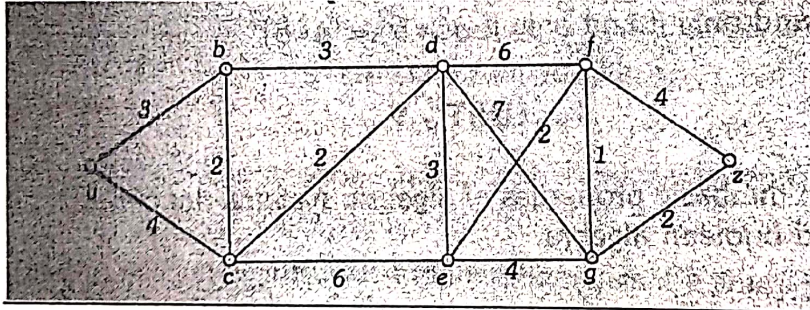
A) Determine whether the given graph has an Euler circuit. Construct such a circuit when one exists. If no Euler circuit exists, determine whether the graph has an Euler path and construct such a path if one exists.

Apply 12
6



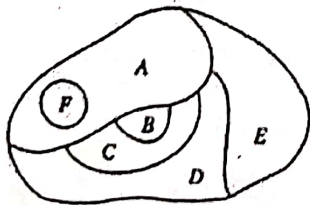
B) Find shortest path between a to z by Dijkstra's Method.

Understand 6



C) For the following maps
1) Draw the planar graph
2) Color the vertices of graph.
3) Find the chromatic number

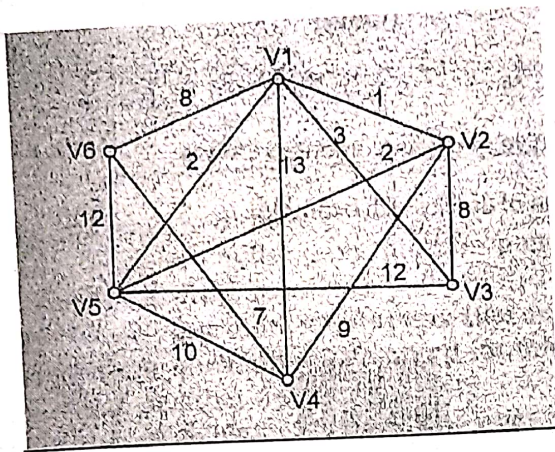
Apply 6



Q.4 Solve Any Two of the following.

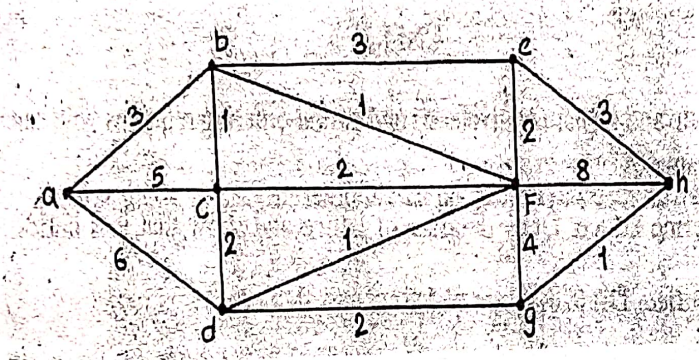
A) Find Minimum spanning tree for following graph by using Kruskal's algorithm.

Apply 12
6



B) Find Minimum spanning tree for following graph by Prim's Algorithm.

Apply 6



C) Define Rooted tree, Balanced Tree and Binary search tree. Explain with example

Understand 6

Q.5 Solve Any two of the following.

A) Define Semigroup, Monoid and Group. Explain with example

Remember 6

B) Let (G, \oplus) is an algebraic system where $G = \{1101, 0000, 1001, 0100\}$ prove that (G, \oplus) is a group.

Apply 6

C) Define Ring. Prove that An algebraic system $(\mathbb{Z}; +, \cdot)$ is a ring, where $+$ is addition and \cdot means multiplication operation. i.e. $a + b$ as the sum of a and b in \mathbb{Z} , and $a \cdot b$ as the product of a and b in \mathbb{Z} .

Apply 6

*** End ***

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/ Marks
CO)

Q. 1 Attempt the following questions.

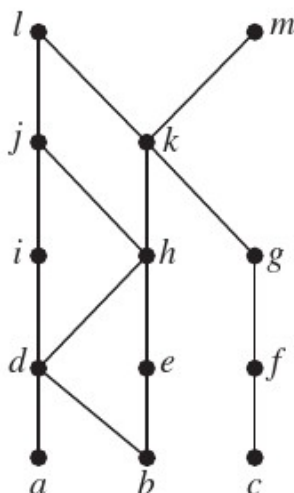
[12]

- 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.

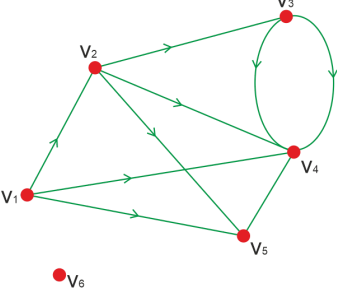
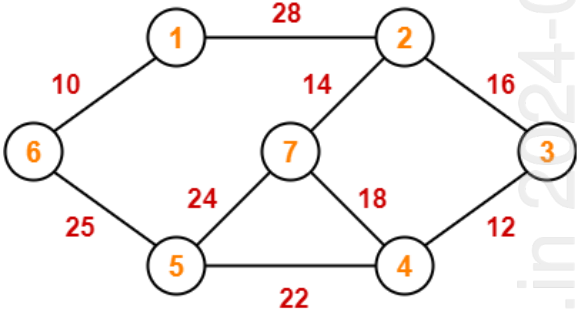
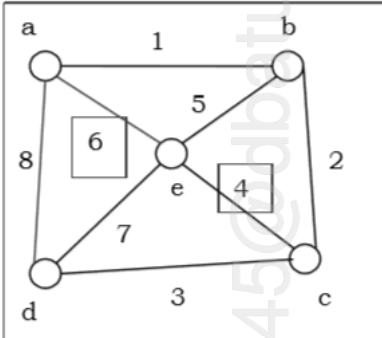
[12]

- 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 $\{f, g, h\}$.

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE Supplementary Examination Summer 2024 Course: B. Tech. Branch : ComputerEngg. and Allied branches Semester : III Subject Code & Name: Discrete Mathematics BTCOC302/ BTCOC302_Y18 Max Marks: 60 Date: 02/07/2024 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
Q. 1	Solve Any Two of the following.		12
A)	Consider the sets $U = \{1,2,3,\dots,8,9\}$ and $A = \{1,2,5,6\}$, $B = \{2,5,7\}$, $C = \{1,3,5,7,9\}$ i) Find a) $A \cap B$ and $A \cap C$ b) $A \cup B$ and $B \cup C$	Apply	6
B)	Prove by mathematical induction for all positive integers. $\frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + \dots + \frac{1}{(2n-1)(2n+1)} = \frac{n}{2n+1}$	Apply	6
C)	Prove that $p \rightarrow q$ and $\neg q \rightarrow \neg p$ are logically equivalent using truth table.	Apply	6
Q.2	Solve Any Two of the following.		12
A)	Determine whether the following functions are one-one, onto or both. Justify your answer i) $X = Y = \{a,b,c,d\}$ and $A = \{(a,a),(b,c),(c,d),(d,b)\}$ ii) $X = \{1,2,3\}$ and $Y = \{a,b,c,d\}$ $B = \{(1,a),(2,a),(3,c)\}$	Apply	6
B)	Let set $A = \{1, 2, 3\}$, $B = \{a, b, c\}$ & $C = \{x,y,z\}$. Consider the 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 MR, MS & $MR \circ S$ of relations R, S & $R \circ S$.	Apply	6
C)	Solve $a_r = a_{r-1} - 6a_{r-2} = -30$ given $a_0 = 20$, and $a_1 = 5$.	Understand	6
Q. 3	Solve Any Two of the following.		12
A)	Define the following terms i) Planar Graph ii) Bipartite graph iii) Complete Graph	Remember	6
B)	Find the sum of in-degree and Out degree of each vertex from the given graph	Apply	6

			
C)	Let G be a planar graph with 10 vertices, 3 components and 9 edges. Find the number of regions in G .	Apply	6
Q.4	Solve Any Two of the following.		12
A)	Construct the minimum spanning tree (MST) for the given graph using Prim's Algorithm. 	Apply	6
B)	Explain Binary search tree with an example in detail.	Remember	6
C)	Prove that following graph is Hamiltonian or not by Ore's Theorem . 	Apply	6
Q. 5	Solve Any Two of the following.		12
A)	Define the following terminology i) Monoid ii) Abelian group iii) Ring	Remember	6
B)	Explain the Disjunctive and Conjunctive Normal Form	Remember	6
C)	Write a short note on Algebraic Structures with two Binary Operation.	Remember	6
*** End ***			

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/ Marks
CO)

Q. 1 Attempt the following questions.

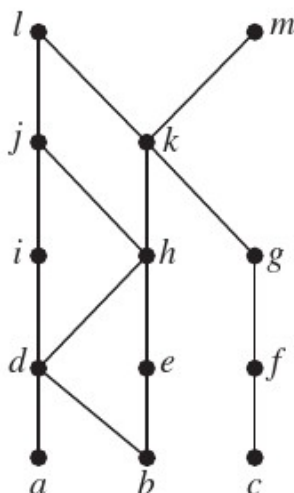
[12]

- 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]

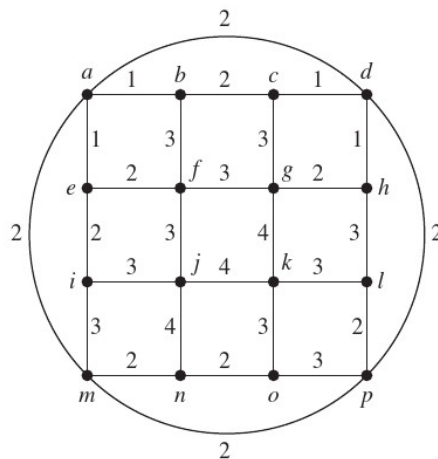
- A)** Answer these questions for the partial order represented by this Hasse diagram. **CO2**



- 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 $\{f, g, h\}$.

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 ***

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

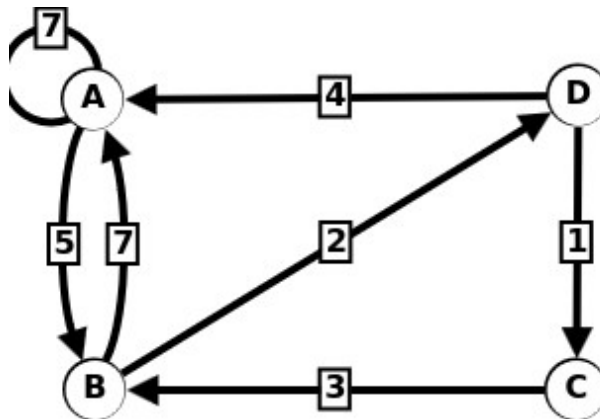
C) Write a pseudo code for the performing following operations in the Circular Link List: Understand

- 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 ***

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular & Supplementary Winter Examination-2023

Course: B. Tech. Branch : Computer Engineering / Computer Science Engineering / Computer Science & Engineering (Artificial Intelligence) / Computer Science & Design / Computer Science & Engineering (Artificial Intelligence & Machine Learning) Semester : III

Subject Code & Name: Data Structure (BTCOC303)

Max Marks: 60

Date:06-01-24

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
Q. 1 Solve Any Two of the following.		12
A) What is Data Structure? Explain the various characteristics of an algorithm.	Understand	6
B) What is sparse matrix? Explain the representation of it.	Understand	6
C) What is primitive data structure? Enlist the differences between primitive and non-primitive data structures.	Analyze	6
Q.2 Solve Any Two of the following.		12
A) Explain various stack operations with example.	Understand	6
B) Write Algorithms for enqueue and dequeue operations on queue with example.	Evaluate	6
C) Convert the following infix expression to postfix expression. $A / B \wedge C + D * E - A * C$	Create	6
Q. 3 Solve Any Two of the following.		12
A) What are advantages and disadvantages of linked list?	Understand	6
B) Write differences between array and linked list.	Analyze	6
C) Describe doubly link list (DLL) operations.	Evaluate	6
Q.4 Solve Any Two of the following.		12
A) What are the properties of binary search tree?	Knowledge	6
B) Illustrate the binary tree traversal with example.	Analyze	6
C) Explain Heap in binary tree with basic operations on binary heap.	Understand	6

Q. 5 Solve Any Two of the following.

12

A) What is skip list? Explain the representation of it in detail.

Understand

6

B) What is radix sort? Explain in detail with example.

Analyze

6

C) Apply the insertion sort on following list.

Create

6

25	79	41	9	34	60
----	----	----	---	----	----

***** End *****

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

Q.1 Solve Any Two of the following.

- A) What is Data Structure? Explain the various characteristics of an algorithm 6
- B) What is time complexity? Compute the frequency count for : 6
- ```

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;

```
- C) What is an algorithm? Write an algorithm to find Greatest common divisor (GCD). 6

**Q.2 Solve the following.**

- 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. 6
- Elements are 28, 55,71,67,11,10,90,44.

**Q.3 Solve the following.**

- 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 \*\*\*



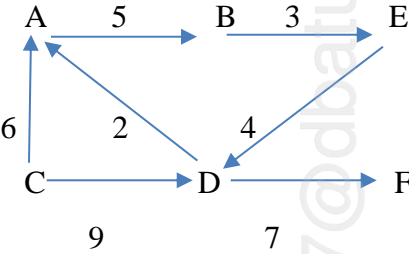
|                    |                                                                                                                                             |  |    |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--|----|
| B)                 | Write an algorithm for binary search tree . Construct binary search tree for the following list of numbers: 18,17,3,5,9,21,26,15,61,6,8,11. |  | 06 |
| C)                 | What is Hashing and explain construction of a hash table.                                                                                   |  | 06 |
|                    |                                                                                                                                             |  |    |
| Q. 5               | Solve Any One of the following. <i>(This is just a sample instruction)</i>                                                                  |  |    |
| A)                 | Explain different file operations.                                                                                                          |  | 06 |
| B)                 | Explain Indexed sequential file in detail.                                                                                                  |  | 06 |
| C)                 | What is graph ? Explain matrix and linked list representation of a graph.                                                                   |  | 06 |
| <b>*** End ***</b> |                                                                                                                                             |  |    |

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**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE****Supplementary Summer Examination – 2024****Course: B. Tech    Branch: Computer Engineering/Computer Science and Engineering    Sem: III****Subject Name: Data Structures****Subject Code: BTCOC303****Max Marks: 60****Date: - 04/07/2024****Duration: - 3 Hrs.****Instructions to the Students:**

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

|            |                                                                                                                                                                                                                                                                                                                               | (Level / CO) | Marks    |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|
| <b>Q.1</b> | <b>Solve any Two of the following</b>                                                                                                                                                                                                                                                                                         |              |          |
| 1.         | What is primitive data structure? Differentiate between primitive and non-primitive data structures.                                                                                                                                                                                                                          | Understand   | <b>6</b> |
| 2.         | Define space complexity of an algorithm. Determine the space complexity of the following program segment:<br><pre>int sum(int a[ ], int n) {   int x = 0;   for (int i=0; i&lt;n; i++)   {     x = x + a[i];   }   return x; }</pre> Note: Assume integer variable takes 4 bytes of memory space.                             | Analyze      | <b>6</b> |
| 3.         | Define collision. Consider a hash table of size 13 and the hash function given is $h(x) = x \text{ mod } 13$ . Demonstrate how Linear probing handles collision while inserting keys 18, 41, 22, 44, 59, 32, 31, 73, in this order.                                                                                           | Apply        | <b>6</b> |
| <b>Q.2</b> | <b>Solve any Two of the following</b>                                                                                                                                                                                                                                                                                         |              |          |
| 1.         | Consider the stack of size 5 memory cells. Suppose initially stack contains A, B, C, D (Top of stack). Then the following operations are executed in order. Show the stack top and any other situation raised while doing each of the operations.<br>i) Push(E) ii) Pop(top) iii) Push(F) iv) Push(G) v) Pop(top) vi) Push(H) | Apply        | <b>6</b> |

|            |                                                                                                                                                                                                                                     |            |   |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---|
| 2.         | Write algorithms for enqueue and dequeue operations on circular queue with example.                                                                                                                                                 | Evaluate   | 6 |
| 3.         | Explain with suitable example concept of binary recursion.                                                                                                                                                                          | Apply      | 6 |
| <b>Q.3</b> | <b>Solve any Two of the following</b>                                                                                                                                                                                               |            |   |
| 1.         | Describe circular linked list operations in detail.                                                                                                                                                                                 | Evaluate   | 6 |
| 2.         | What is garbage collection? Who will run garbage collection program?                                                                                                                                                                | Remember   | 6 |
| 3.         | Justify a linked list is a data structure that is based on dynamic memory allocation. List the advantages of linked list dynamic memory allocation.                                                                                 | Understand | 6 |
| <b>Q.4</b> | <b>Solve any Two of the following</b>                                                                                                                                                                                               |            |   |
| 1.         | Explain different binary search tree traversal methods.                                                                                                                                                                             | Understand | 6 |
| 2.         | How does graph can be represented using adjacency matrix? What will be the adjacency matrix for the below given directed weighted graph?<br><br> | Apply      | 6 |
| 3.         | Write short note on balanced trees.                                                                                                                                                                                                 | Understand | 6 |
| <b>Q.5</b> | <b>Solve any Two of the following</b>                                                                                                                                                                                               |            |   |
| 1.         | Describe how dictionaries can be implemented using skip lists.                                                                                                                                                                      | Evaluate   | 6 |
| 2.         | What is selection sort? Explain in detail with suitable example.                                                                                                                                                                    | Apply      | 6 |
| 3.         | Write short note on file handling.                                                                                                                                                                                                  | Understand | 6 |



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

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

- |    |                                                                                                                                                                            |            |   |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---|
| 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 |

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

- |    |                                                                                                                                                                                                                                                                                                                                                       |          |   |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---|
| 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.<br>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 |

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

- |    |                                                                                                                                                           |            |   |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---|
| 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.

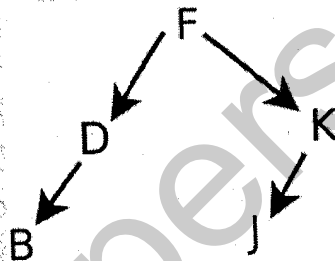
Apply

6

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

Apply

6

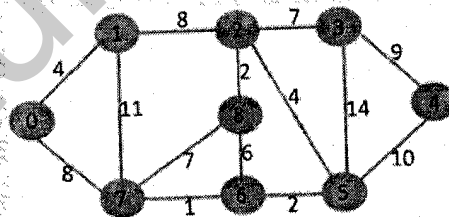


**Q.5 Solve the following.**

- 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

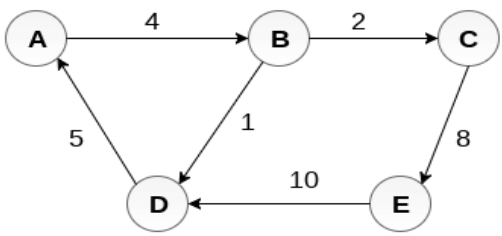
Understand

6

- i) red black tree ii) m-way search tree iii) b tree iv) b+ tree  
v) sparse matrix vi) AVL tree

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

| <b>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE</b>                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                          |                                     |                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------|
| <b>Winter Examination – 2022</b>                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                          |                                     |                        |
| <b>Course: B. Tech.</b>                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                          | <b>Branch :Computer Engineering</b> | <b>Semester :III</b>   |
| <b>Subject Code &amp; Name: BTCOC303 Data Structures</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)                                                                                                                                                                                                                                                                                                                                                                                                               | 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.<br>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

Regular & Supplementary Winter Examination-2023

Course: B. Tech. Branch : Artificial Intelligence & Allied Semester :III

Subject Code & Name: BTAIC303 & Data Structure and Algorithm using Python

Max Marks: 60

Date:06-01-24

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) Write a program to reverse the given string                                                                           | (BT3/CO1)  | 6         |
| B) What is mean by operators? List all operators and explain any two.                                                    | (BT2/CO1)  | 6         |
| C) Explain the use of break and continue statement with suitable example                                                 | (BT2/CO1)  | 6         |
| <b>Q.2 Solve Any Two of the following.</b>                                                                               |            | <b>12</b> |
| A) What are functions? Explain different functions types with example.                                                   | (BT2/CO2)  | 6         |
| B) What is class and object? Write a program to initialize and display details of two student using classes and objects? | (BT3/CO2)  | 6         |
| C) What is Exception Handling? Explain how to handle exceptions?                                                         | (BT3/CO2)  | 6         |
| <b>Q.3 Solve Any Two of the following.</b>                                                                               |            | <b>12</b> |
| A) Write algorithms for detecting node from Doubly linked list                                                           | (BT3/CO3)  | 6         |
| B) What is mean by array? Explain with suitable example                                                                  | (BT2/CO3)  | 6         |
| C) Explain the concept of Stack with its operations.                                                                     | (BT2/CO3)  | 6         |
| <b>Q.4 Solve Any Two of the following.</b>                                                                               |            | <b>12</b> |
| A) Write python program for Binary Search algorithm.                                                                     | (BT3/CO4)  | 6         |
| B) Define tree data structure? Explain Left and Right Rotation.                                                          | (BT2/CO4)  | 6         |
| C) Define hashing Techniques with its factions and application                                                           | (BT2/CO4)  | 6         |
| <b>Q.5 Solve Any Two of the following.</b>                                                                               |            | <b>12</b> |
| A) Explain Insertion and Quick sort with algorithm.                                                                      | (BT3/CO5)  | 6         |
| B) What is an algorithm? Explain time complexity and space complexity                                                    | (BT2/CO5)  | 6         |
| C) Write algorithm for insertion sort? Sort following element using insertion sort 40,30,20,50,45,60,10.                 | (BT3/CO5)  | 6         |

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

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

**Supplementary Examination Winter Dec-2019**

*Sf*

**Branch: B. Tech. In Computer Engineering**  
**Subject: Object Oriented Programming in Java (BTCOE404A)**  
**Date: 02/ 11 /2019**

**Sem.:- IV**  
**Marks: 60**  
**Time: 3 Hours.**

**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 appropriately assume it and should mention it clearly .

| Q. No  |                                                                                                                         | (Marks) |
|--------|-------------------------------------------------------------------------------------------------------------------------|---------|
| Q.1.A] | How Java differs from C and C++?                                                                                        | (6M)    |
| Q.1.B] | Explain the general structure of the Java Program.                                                                      | (6M)    |
| Q.2.A] | What is readLine( ). Write a simple Java Program which reads an integer, character and float value from the keyboard.   | (6M)    |
| Q.2.B] | What is a class? What is an object? How does class is declared? How instance of a class is generated?                   | (6M)    |
| Q.3.A] | What are switch statements? Write a simple Java Program which performs Arithmetic Operations using switch statement.    | (6M)    |
| Q.3.B] | Explain:<br>a) Conditional operators.<br>b) Logical Operators.<br>c) Bitwise Operators.                                 | (6M)    |
| Q.4.A] | How arrays are declared and created in computer memory? Write a simple Java program performing [2 X 2] matrix addition. | (6M)    |
| Q.4.B] | Write a Java Program to perform [3 X 3] Matrix Multiplication.                                                          | (6M)    |
| Q.5.A] | What are constructors? What are methods? How methods are declared in Java.                                              | (6M)    |
| Q.5.B] | Explain the Get and Set Methods using a Java Program.                                                                   | (6M)    |
| Q.6.A] | Explain the different types of inheritance implemented in Java.                                                         | (6M)    |
| Q.6.B] | Write a short note on:<br>a) Polymorphism.<br>b) Strings.<br>c) Packages.                                               | (6M)    |

\*\*\*\*\*END OF QUESTION PAPER\*\*\*\*\*

| <b>DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE</b><br><b>Regular &amp; Supplementary Winter Re-Examination-2023</b><br><b>Course: B. Tech. Branch : Computer &amp; Allied Engineering Semester :III</b><br><b>Subject Code &amp; Name: BTCOC305B Object Oriented Programming in Java</b><br><b>Max Marks: 60 Date:09-02-24 Duration: 3 Hr.</b>                         |                                                                                                                                                                                       |            |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|
| <b>Instructions to the Students:</b><br>1. All the questions are compulsory.<br>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.<br>3. Use of non-programmable scientific calculators is allowed.<br>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)                                                                                                                                                                                                                                                                                                                                                                                 | Explain the data types available in Java. Describe variable declaration by using different data types.                                                                                | CO1        | 6         |
| B)                                                                                                                                                                                                                                                                                                                                                                                 | What is method? How to define method & pass parameters to it?                                                                                                                         | CO1        | 6         |
| C)                                                                                                                                                                                                                                                                                                                                                                                 | Design a class Bank with data members as Account Holder Name, Account Balance with Methods as Deposit Amount, Withdraw Amount & Display. Write appropriate program for above details. | CO1        | 6         |
| <b>Q.2</b>                                                                                                                                                                                                                                                                                                                                                                         | <b>Solve Any Two of the following.</b>                                                                                                                                                |            | <b>12</b> |
| A)                                                                                                                                                                                                                                                                                                                                                                                 | Explain the control structures available in Java.                                                                                                                                     | CO2        | 6         |
| B)                                                                                                                                                                                                                                                                                                                                                                                 | What is method overloading & overriding? Explain with examples                                                                                                                        | CO2        | 6         |
| C)                                                                                                                                                                                                                                                                                                                                                                                 | Write a program to find smallest number from 3 given numbers. Use control statements & avoid direct java in built methods/functions.                                                  | CO2        | 6         |
| <b>Q. 3</b>                                                                                                                                                                                                                                                                                                                                                                        | <b>Solve Any Two of the following.</b>                                                                                                                                                |            | <b>12</b> |
| A)                                                                                                                                                                                                                                                                                                                                                                                 | What is array? Explain array declaration with programming example.                                                                                                                    | CO3        | 6         |
| B)                                                                                                                                                                                                                                                                                                                                                                                 | What is command line argument? Explain with program.                                                                                                                                  | CO3        | 6         |
| C)                                                                                                                                                                                                                                                                                                                                                                                 | Write a program for matrix multiplication. Add comments at appropriate places in a program.                                                                                           | CO3        | 6         |
| <b>Q.4</b>                                                                                                                                                                                                                                                                                                                                                                         | <b>Solve Any Two of the following.</b>                                                                                                                                                |            | <b>12</b> |
| A)                                                                                                                                                                                                                                                                                                                                                                                 | What is constructor? Explain default & parameterized constructors with examples.                                                                                                      | CO4        | 6         |
| B)                                                                                                                                                                                                                                                                                                                                                                                 | What are the types of inheritances available in Java? Explain the concept of inheritance with programming examples.                                                                   | CO4        | 6         |
| C)                                                                                                                                                                                                                                                                                                                                                                                 | What is abstract class? What is interface? Write a program by using abstract                                                                                                          | CO4        | 6         |

|             |                                                                                              |            |           |
|-------------|----------------------------------------------------------------------------------------------|------------|-----------|
|             | class & interface.                                                                           |            |           |
|             |                                                                                              |            |           |
| <b>Q. 5</b> | <b>Solve Any Two of the following.</b>                                                       |            | <b>12</b> |
| <b>A)</b>   | What is exception handling? Explain how to write our own exception with programming example. | <b>CO5</b> | <b>6</b>  |
| <b>B)</b>   | Differentiate between applet & application. Explain how to write an applet program.          | <b>CO5</b> | <b>6</b>  |
| <b>C)</b>   | Differentiate between C/C++ and Java.                                                        | <b>CO1</b> | <b>6</b>  |
|             | <b>*** End ***</b>                                                                           |            |           |

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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

End Semester Examination – Winter 2018

Course: B. Tech in Information Technology

Sem: III

Subject Name: Programming in Java

Subject Code: BTITE305B

Max Marks:60

Date: 10-12-2018

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 |
|-----------------------------------------------------------------------------------------------------------------------------|---------------|-------|
| Q. 1 Solve the following.                                                                                                   |               |       |
| A) Write any two methods of array list class with their syntax.                                                             | Application   | 04    |
| B) Why java became platform independent language? Explain.                                                                  | Analysis      | 04    |
| C) State & explain scope of variable with an example.                                                                       | Remember      | 04    |
| Q.2 Solve the following.                                                                                                    |               |       |
| A) Explain inheritance and polymorphism features of Java.                                                                   | Comprehension | 04    |
| Explain how interface is used to achieve multiple Inheritance in Java.                                                      | Application   | 04    |
| B)                                                                                                                          |               |       |
| C) Define a class and object. Write syntax to create class and object with an example.                                      | Remember      | 04    |
| Q. 3 Solve the following.                                                                                                   |               |       |
| A) Define applet. Write a program to create an applet to display message "Welcome to java applet".                          | Remember      | 04    |
|                                                                                                                             | Application   |       |
| B) Which are the ways to access package from another package? Explain with example.                                         | Comprehension | 04    |
| C) Explain applet life cycle with suitable diagram.                                                                         | Comprehension | 04    |
| Q.4 Solve the following.                                                                                                    |               |       |
| A) Write a program to create two thread one to print odd number only and other to print even numbers.                       | Application   | 04    |
| B) With proper syntax and example explain following thread methods:<br>(1) wait( ) (2) sleep( ) (3) resume( ) (4) notify( ) | Remember      | 04    |
|                                                                                                                             | Comprehension |       |
| C) With syntax and example explain try & catch statement.                                                                   | Comprehension | 04    |

Q. 5 Solve the following.

- A) Give the syntax of following methods of graphics class. Explain their use with suitable program: Comprehension 08
- (i) drawRoundRect( ) (ii) drawPolygon( ) (iii) drawOval( ) (iv) drawString( )
- B) Write a applet program to set background with red colour and foreground with blue colour. Application 04

Q.6 Solve the following.

- A) Write a java program to copy the content of the file "file1.txt" into new file "file2.txt". Application 08
- B) Explain byte stream class in detail. Comprehension 04

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

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

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Branch: Information Technology

Sem.: - V

Subject with Subject Code: - Programming in Java (BTITE305B)

Marks: 60

Date: -19/12/2019

Time: - 3 Hr.

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**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 appropriately assume it and should mention it clearly

- 
- |                                                                                                                                                                                             | <b>(Marks)</b> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>Q.1 Solve any two</b>                                                                                                                                                                    | <b>6*2=12</b>  |
| a) With neat diagram and example explain Java program structure.                                                                                                                            |                |
| b) Explain different data types supported by Java.                                                                                                                                          |                |
| c) Design the program in java that uses different methods of Vector class.                                                                                                                  |                |
| <b>Q.2 Solve the following</b>                                                                                                                                                              | <b>(12)</b>    |
| a) What is constructor? Tell how it is used to initialize the object.                                                                                                                       |                |
| b) Define Interface. Design the program that uses interface to achieve multiple inheritance.                                                                                                |                |
| <b>Q.3 Solve the following</b>                                                                                                                                                              | <b>(12)</b>    |
| a) Define package. Develop the program that consist of two packages, one package is used to calculate factorial of given number and other will display Fibonacci Series up to given number. |                |
| b) What is applet? How it is differ from application program? Also design small applet.                                                                                                     |                |
| <b>Q.4 Solve any two</b>                                                                                                                                                                    | <b>6*2=12</b>  |
| a) With neat sketch explain the life cycle of thread.                                                                                                                                       |                |
| b) What is Exception? Design the program that uses try, catch and finally block to handle the exception.                                                                                    |                |
| c) Write a program in Java to demonstrate the use of multiple catch.                                                                                                                        |                |
| <b>Q.5 Solve the following</b>                                                                                                                                                              | <b>(12)</b>    |
| a) What is the use of Graphics class? Enlist and explain different methods and its use provided in Graphics class.                                                                          |                |
| b) Design an applet to display the front view of bus.                                                                                                                                       |                |
| <b>Q.6 Solve the following</b>                                                                                                                                                              | <b>(12)</b>    |
| a) Draw and explain hierarchy of writer stream classes.                                                                                                                                     |                |
| b) Design the Java program to display the content of input file in terminal using byte stream classes.                                                                                      |                |
-



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

**Winter Examination – 2022**

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

**Subject Code & Name: BTCOC305(B) Object Oriented Programming in Java**

**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. 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)         | 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?<br>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>                                                                                             |                      | 12 |
| <b>A)</b>          | What is exceptions handling and state benefits of exception handling in java? Explain Java Exception Handling Keywords.            | <b>Remember</b>      | 6  |
| <b>B)</b>          | What is package? Write a program to create user defined package in java.                                                           | <b>Analysis</b>      | 6  |
| <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> | 6  |
| <b>*** End ***</b> |                                                                                                                                    |                      |    |

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ENGG SOLUTION



DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular & Supplementary Winter Examination-2023

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

Subject Code & Name:BTCOC305B & (Elective) Object Oriented Programming in Java

Max Marks: 60

Date:11/01/2024

Duration: 3.00 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

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

- A) Explain different parts of a Java program with an appropriate example (Application) 6
- B) What are the advantages of the object-oriented programming language? (Understand) 6
- C) List the primitive data types available in Java and explain. (Understand) 6

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

- A) What are the benefits of break and continue statements explain with example? (Analysis) 6
- B) Discuss default constructor and parameterized constructor with the help of an example in Java? (Application) 6
- C) How do we implement polymorphism in JAVA? Explain briefly (Understand) 6

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

- A) a) Write a program to find the smallest and largest number from given input array? (Application)) 6  
For example : **Input:** arr[]={13,4,2,5,9}  
**Output :** Maximum is 13 and Minimum is 2
- B) Write a program to check whether enter number is palindrome or not? (Application) 6
- C) Write the differences between interface and abstract class (Understand) 6

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

- A) Define inheritance. What are the benefits of inheritance? How to prevent a class from inheritance? (Understand) 6
- B) Write a program to demonstrate hierarchical and multiple inheritance using interfaces (Understand) 6
- C) Define polymorphism. Explain run time polymorphism with the help of example. (Application) 6

**Q.5 Solve Any two of the following.**

- A) What is the difference between error and an exception? Explain with help of example (Understand) 6
- B) How to create a user defined exception? (Application) 6

- C) Write an html page and also provide a JavaScript for accepting a user ID and password from the user to ensure that the input is not empty (Application) 6

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

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**Subject Code & Name: BTCOC305A- Object-oriented Programming in C++**

**Max Marks: 60**

**Date:11-01-24**

**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. 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) Distinguish Between following terms<br>a) Objects & Classes b) Inheritance & Encapsulation                                                                                              | 4          | <b>6</b>  |
| B) What is constructor? Explain its two type with example?                                                                                                                                 | 2          | <b>6</b>  |
| C) Write a C++ program using object & class to accept roll number of student & his marks of five subject. Calculate total marks & percentage and display it?                               | 3          | <b>6</b>  |
| <b>Q.2 Solve Any Two of the following.</b>                                                                                                                                                 |            | <b>12</b> |
| A) Describe the syntax of Multilevel inheritance in C++ with Example?                                                                                                                      | 2          | <b>6</b>  |
| B) Describe operator function with its appropriate syntax?                                                                                                                                 | 2          | <b>6</b>  |
| C) Write a program to overload binary + operator?                                                                                                                                          | 3          | <b>6</b>  |
| <b>Q. 3 Solve Any Two of the following.</b>                                                                                                                                                |            | <b>12</b> |
| A) Write short notes on Abstract class and pure virtual function?                                                                                                                          | 2          | <b>6</b>  |
| B) Explain Function Overriding with suitable example?                                                                                                                                      | 2          | <b>6</b>  |
| C) Differentiate between object pointer & this pointer?                                                                                                                                    | 4          | <b>6</b>  |
| <b>Q.4 Solve Any Two of the following.</b>                                                                                                                                                 |            | <b>12</b> |
| A) Explain in Brief: Seekg(),seekp(),tellg() tellp() ?                                                                                                                                     | 2          | <b>6</b>  |
| B) Describe file mode in details?                                                                                                                                                          | 2          | <b>6</b>  |
| C) Implement function seekg () to achieve the following:<br>1.To move the pointer by 15 positions backward from current position?<br>2.To go to the beginning after an operation is over.? | 3          | <b>6</b>  |

|             |                                                                            |   |           |
|-------------|----------------------------------------------------------------------------|---|-----------|
| <b>Q. 5</b> | <b>Solve Any Two of the following.</b>                                     |   | <b>12</b> |
| A)          | Explain, how to handle all type of exception in C++ with suitable example? | 2 | <b>6</b>  |
| B)          | Write a short note on Standard Template Library?                           | 2 | <b>6</b>  |
| C)          | Differentiate between function overloading and templates in C++?           | 4 | <b>6</b>  |

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



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) Find the Laplace transform of $e^{-2t} \int_0^t \frac{\cos 2t}{t} dt$ .                                                                                                                             | Understand  | 6     |
| B) Find the Laplace transform of the periodic function, $f(t) = \frac{t}{T}$ for $0 < t < T$ , & $f(t+T) = f(t)$ .                                                                                     | Understand  | 6     |
| C) By using Laplace transform, evaluate $\int_0^\infty e^{-2t} t^2 \sin 3t dt$                                                                                                                         | Evaluation  | 6     |
| Q.2 Solve Any Two of the following.                                                                                                                                                                    |             | 12    |
| A) By using convolution theorem, find inverse Laplace transform of $\frac{s}{(s^2+1)(s^2+4)}$                                                                                                          | Application | 6     |
| B) Find inverse Laplace transform of $\cot^{-1}\left(\frac{s+3}{2}\right)$                                                                                                                             | Application | 6     |
| C) Using Laplace Transform, solve $\frac{d^2y}{dt^2} - 4\frac{dy}{dt} + 3y = e^{-t}$ , given $y(0) = 1$ & $y'(0) = 0$                                                                                  | Application | 6     |
| Q.3 Solve Any Two of the following.                                                                                                                                                                    |             | 12    |
| Using the Fourier integral representation, show that                                                                                                                                                   |             |       |
| A) i) $\int_0^\infty \frac{\omega \sin x \omega}{1+\omega^2} d\omega = \frac{\pi}{2} e^{-x} (x > 0)$<br>ii) $\int_0^\infty \frac{\cos x \omega}{1+\omega^2} d\omega = \frac{\pi}{2} e^{-x} (x \geq 0)$ | Understand  | 6     |



|                                            |                                                                                                                                                                                                                      |             |    |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----|
| Find the Fourier transform of the function |                                                                                                                                                                                                                      |             |    |
| b)                                         | $f(x) = \begin{cases} 1 - x^2 &  x  \leq 1 \\ 0 &  x  > 1 \end{cases}$ <p>Hence evaluate <math>\int_0^{\infty} \frac{x \cos x - \sin x}{x^3} \cos \frac{x}{2} dx</math></p>                                          | Evaluation  | 6  |
| c)                                         | <p>Using Parseval's identity, show that</p> $\int_0^{\infty} \frac{t^2}{(4+t^2)(9+t^2)} dt = \frac{\pi}{10}$                                                                                                         | Application | 6  |
| Q.4                                        | Solve Any Two of the following.                                                                                                                                                                                      |             | 12 |
| A)                                         | Form the partial differential equation by eliminating arbitrary function from $f(x + y + z, x^2 + y^2 + z^2) = 0$                                                                                                    | Understand  | 6  |
| B)                                         | Solve the partial differential equation<br>$(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$                                                                                                                                    | Application | 6  |
| C)                                         | Find the temperature in a bar of length 2 units whose ends are kept at zero temperature & lateral surface insulated if the initial temperature is $\sin \frac{\pi x}{2} + 3 \sin \frac{5\pi x}{2}$                   | Application | 6  |
| Q.5                                        | Solve Any Two of the following. <a href="https://www.batuonline.com">https://www.batuonline.com</a>                                                                                                                  |             | 12 |
| A)                                         | Prove that the function $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$ is a harmonic function & hence determine the corresponding analytic function, $f(z) = u + iv$ .                                                          | Understand  | 6  |
| B)                                         | Evaluate, by using Cauchy's integral formula:<br>i) $\oint_C \frac{e^{-z}}{z+1} dz$ , where C is the circle $ z  = 2$ .<br>ii) $\oint_C \frac{\sin^2 z}{(z-\frac{\pi}{6})^3} dz$ , where C is the circle $ z  = 1$ . | Evaluation  | 6  |
| C)                                         | Evaluate $\int_C \frac{2z-1}{z(z+1)(z-3)} dz$ , where C is the circle $ z  = 2$                                                                                                                                      | Evaluation  | 6  |
| *** End ***                                |                                                                                                                                                                                                                      |             |    |



## Supplementary Examination – Summer 2022

Course: B. Tech.

Branch:

Semester: III

Subject Code &amp; Name: BTBS301(Engineering Mathematics III)

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

**Q.1 Solve Any Two of the following.**A) Find the Laplace Transform of  $e^{4t} \sin^3 t$ 

CO1

6

B) Evaluate  $\int_0^{\infty} \frac{\cos at - \cos bt}{t} dt$  by using Laplace transform.

CO1

6

C) Express in terms of Heaviside unit step function and find its Laplace transform.

$$f(t) = \sin t, \text{ for } 0 < t < \pi$$

$$= \sin 2t, \text{ for } \pi < t < 2\pi$$

$$= \sin 3t, \text{ for } t > 2\pi$$

CO1

6

**Q.2 Solve Any Two of the following.**A) Find the inverse Laplace transform of  $\log\left(\frac{s+a}{s+b}\right)$ 

CO2

6

B) Find the inverse Laplace transform of  $\frac{5s^2 - 15s - 11}{(s+1)(s-2)^2}$ 

CO2

6

C) Solve using Laplace transform

$$3 \frac{dy}{dt} + 2y = e^{3t}, y = 1 \text{ at } t = 0.$$

CO2

6

**Q.3 Solve Any Two of the following.**A) Find the Fourier Transform of  $f(x) = 1, \text{ for } |x| < 1$   
 $= 0, \text{ for } |x| > 1$ 

Hence evaluate that  $\int_0^{\infty} \frac{\sin x}{x} dx$ .

CO3

6

B) Find the Fourier cosine transform of  $e^{-x^2}$ 

CO3

6

C) Using Parseval's Identity, prove that  $\int_0^{\infty} \frac{t^2}{(t^2+1)^2} dt = \frac{\pi}{4}$ 

CO3

6

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



|                                             |                                                                                                                                                                                                                                      |     |   |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---|
| A)                                          | Form the partial differential equation by eliminating the arbitrary function from: $f(x + y + z, x^2 + y^2 + z^2)$                                                                                                                   | CO4 | 6 |
| B)                                          | Solve the partial differential equation: $(mz - ny)p + (nx - lz)q = ly - mx$ .                                                                                                                                                       | CO4 | 6 |
| C)                                          | If the initial displacement and velocity of a string stretched between $x = 0$ & $x = l$ are given by $y = f(x)$ & $\frac{dy}{dt} = g(x)$ , determine the displacement $y$ of any point at a distance $x$ from one end at time $t$ . | CO4 | 6 |
| <b>Q. 5 Solve Any Two of the following.</b> |                                                                                                                                                                                                                                      |     |   |
| A)                                          | If $f(z) = u + iv$ is an analytic function and $u - v = e^x(\cos y - \sin y)$ , find $f(z)$ in terms of $z$ .                                                                                                                        | CO5 | 6 |
| B)                                          | Find the bilinear transformation that maps the points $z=0, -1, i$ into the points $w=i, 0, \infty$ respectively.                                                                                                                    | CO5 | 6 |
| C)                                          | Use Cauchy's Integral formula to evaluate $\oint_C \frac{e^{2z}}{(z+1)^4} dz$ , Where $C$ is the circle $ z  = 2$                                                                                                                    | CO5 | 6 |
| *** End ***                                 |                                                                                                                                                                                                                                      |     |   |

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DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Examination – Summer 2024

Course: B. Tech.

Branch: Common to all Branches

Semester : III

Subject Name & Code: Engineering Mathematics – III (BTBS301/BTES301)

Max Marks: 60

Date: 29/06/2024

Duration: 3 Hrs.

Instructions to the Students:

1. All the questions are compulsory.
2. Use of non-programmable scientific calculators is allowed.
3. Assume suitable data wherever necessary and mention it clearly.

Marks

Q.1 Solve Any Two of the following.

12

A) Find the Laplace transform of  $\frac{\sin 2t}{t}$ .

6

B) Find the Laplace transform of  $\int_0^t \left( \frac{e^{-at} - e^{-bt}}{t} \right) dt$ .

6

C) Find the Laplace transform of  $\text{erf}(\sqrt{t})$ .

6

Q.2. Solve Any Two of the following:

12

A) Find the inverse Laplace transform of  $\log\left(1 + \frac{1}{s^2}\right)$ .

6

B) Using Partial Fraction method, find the inverse Laplace Transform  $\frac{s}{(s^2+1)(s^2+4)}$ .

6

C) Find the inverse Laplace transform of  $\frac{4s+15}{16s^2-25}$ .

6

Q.3 Solve any Two of the following:

12

A) Find the Fourier transform of  $f(x) = \begin{cases} 1, & \text{for } |x| < 1 \\ 0, & \text{for } |x| > 1 \end{cases}$ . Hence evaluate that  $\int_0^\infty \frac{\sin x}{x} dx$ .

6

B) Find the Fourier sine transform of  $e^{-|x|}$ , and hence show that  $\int_0^\infty \frac{x \sin mx}{1+x^2} dx = \frac{\pi e^{-m}}{2}$ ,  $m > 0$ .

6

C) Evaluate the integral  $\int_0^\infty \frac{dx}{(a^2+x^2)(b^2+x^2)}$ .

6

Q.4 Solve any Two of the following:

12

A) Form the partial differential equation by eliminating the arbitrary function from

6

$$z = f(x^2 - y^2).$$

B) The partial differential equations by eliminating the arbitrary constant  $z = (x^2 + a)(y^2 + b)$

6

C) Solve the following partial differential equations  $p + 3q = 5z + \tan(y - 3x)$  where the symbols have got their usual meanings.

6

Q.5 Solve any Two of the following:

12

A) Show that  $u = x^3 - 3xy^2 + 3x^2 - 3y^2 + 1$  is a harmonic function and hence determine the corre-

6



|    |                                                                                                                     |   |
|----|---------------------------------------------------------------------------------------------------------------------|---|
|    | spending analytic function                                                                                          |   |
| B) | Evaluate $\oint_C \frac{e^{-z}}{z+1} dz$ where $C$ is the circle $ z  = 2$ and $ z  = \frac{1}{2}$                  | 6 |
| C) | Use Cauchy's integral formula to evaluate $\oint_C \frac{e^{2z}}{(z+1)^4} dz$ , where $C$ the circle is $ z  = 2$ . | 6 |
|    | ***END***                                                                                                           |   |



**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE**  
**Regular & Supplementary Winter Examination-2023**

Course: B. Tech. Branch: ALL Semester: III  
Subject Code & Name: BTBS301/ BTES 301 Engineering Mathematics-III  
Max Marks: 60 Date: 02.01.2024 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>                                                                                                                     |                    | 12    |
| A) Find the Laplace transform of $f(t) = t^2 \sin 2t$                                                                                                          | Understand/<br>CO1 | 6     |
| B) Find Laplace transform of $F(t) = \int_0^t \frac{e^{-at} - e^{-bt}}{t} dt$                                                                                  | Understand<br>/CO1 | 6     |
| C) Find the Laplace transforms of $f(t) = \frac{t}{T}$ , for $0 < t < T$<br>(saw - tooth wave function of period T)                                            | Apply/CO1          | 6     |
| <b>Q.2 Solve Any Two of the following.</b>                                                                                                                     |                    | 12    |
| A) Find inverse Laplace transform of $\cot^{-1}\left(\frac{s+3}{2}\right)$                                                                                     | Understand<br>/CO2 | 6     |
| B) By using Partial fraction expansion to find inverse Laplace transform of<br>$F(s) = \frac{s}{(s^2+1)(s^2+4)}$                                               | Understand<br>/CO2 | 6     |
| C) Using the Laplace transform, solve the differential equation<br>$\frac{d^2x}{dt^2} + 9x = \cos 2t$ ; if $x(0) = 1$ , $x\left(\frac{\pi}{2}\right) = -1$ .   | Apply/CO2          | 6     |
| <b>Q.3 Solve Any Two of the following.</b>                                                                                                                     |                    | 12    |
| A) Express the function $f(x) = \begin{cases} 1 & \text{for }  x  \leq 1 \\ 0 & \text{for }  x  > 1 \end{cases}$ as a Fourier integral.                        | Understand<br>/CO3 | 6     |
| B) Find the Fourier sine transform of $f(x) = e^{- x }$ , and hence show that<br>$\int_0^\infty \frac{x \sin mx}{1+x^2} dx = \frac{\pi e^{-m}}{2}$ , $m > 0$ . | Understand<br>/CO3 | 6     |
| C) Using Parseval's identity, show that $\int_0^\infty \frac{t^2}{(4+t^2)(9+t^2)} dt = \frac{\pi}{10}$                                                         | Apply/CO3          | 6     |
| <b>Q.4 Solve Any Two of the following.</b>                                                                                                                     |                    | 12    |
| A) Solve the following partial differential equations<br>$(mx - ny)p + (nx - lz)q = ly - mx$                                                                   | Understand<br>/CO4 | 6     |



- B) A string is stretched and fastened to two points  $l$  apart. Motion is started by replacing the string in the form  $y = A \sin \frac{\pi x}{l}$  from which it is released at time  $t = 0$ . Show that the displacement of a point at a distance  $x$  from one end at time  $t$  is given by  $y(x, t) = A \sin \frac{\pi x}{l} \cos \frac{\pi ct}{l}$ . Apply/CO4 6
- 
- C) Solve the following equation by the method of separation of variables: Apply /CO4 6  
 $\frac{\partial^2 u}{\partial x \partial t} = e^{-t} \cos x$ , given that  $u = 0$  when  $t = 0$  and  $\frac{\partial u}{\partial t} = 0$  when  $x = 0$ .
- 
- Q.5 Solve Any Two of the following. 12
- A) If  $f(z)$  is analytic, show that  $\left[ \frac{\partial |f(z)|}{\partial x} \right]^2 + \left[ \frac{\partial |f(z)|}{\partial y} \right]^2 = |f'(z)|^2$ . Understand /CO5 6
- 
- B) Apply Cauchy's integral Formula to evaluate  $\oint_C \frac{e^{-z}}{z+1} dz$ , where  $C$  is the circle (a)  $|z| = 2$  and (b)  $|z| = \frac{1}{2}$ . Apply/CO5 6
- 
- C) State Cauchy's residue theorem and evaluate  $\oint_C \tan z dz$ , where  $C$  is the circle  $|z| = 2$ . Apply /CO5 6

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



DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY  
LONERE

End Semester Examination – Winter 2019

Course: B. Tech in

Subject Name: Engineering Mathematics-III (BTBSC301)

Date: 10/12/2019

Sem: III

Marks: 60

Duration: 3 H

**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/C  |
| Q. 1 | Attempt the following.                                                                                                                                |           |
| A)   | Find $L\left\{\cosht \int_0^t e^u \coshu du\right\}$ .                                                                                                | Analysi   |
| B)   | If $f(t) = \begin{cases} t, & 0 < t < \pi \\ \pi - t, & \pi < t < 2\pi \end{cases}$ is a periodic function with period $2\pi$ .<br>Find $L\{f(t)\}$ . | Analysi   |
| C)   | Using Laplace transform evaluate $\int_0^\infty e^{-at} \frac{\sin^2 t}{t} dt$                                                                        | Evaluati  |
| Q. 2 | Attempt any three of the following.                                                                                                                   |           |
| A)   | Using convolution theorem find $L^{-1}\left\{\frac{1}{s(s+1)(s+2)}\right\}$                                                                           | Applicati |
| B)   | Find $L^{-1}\{\bar{f}(s)\}$ , where $\bar{f}(s) = \log\left(\frac{s^2+1}{s(s+1)}\right)$                                                              | Analysi   |
| C)   | Using Laplace transform solve $y'' + 2y' + 5y = e^{-t} \sin t$ ; $y(0) = 0$ ,<br>$y'(0) = 1$                                                          | Applicati |
| D)   | Find $L^{-1}\left\{\frac{s^2+2s-4}{(s-5)(s^2+9)}\right\}$                                                                                             | Analysi   |
| Q. 3 | Attempt any three of the following.                                                                                                                   |           |

5



Step

Step

|      |                                                                                                                                                                                                                                                                              |             |    |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----|
| A)   | Express the function $f(x) = \begin{cases} \sin x, & 0 \leq x \leq \pi \\ 0, & x > \pi \end{cases}$ as a Fourier sine integral and hence evaluate that $\int_0^{\infty} \frac{\sin \lambda x \sin \lambda \pi}{1-\lambda^2} d\lambda$ .                                      | Evaluation  | 4  |
| B)   | Using Parseval's identity for cosine transform, evaluate $\int_0^{\infty} \frac{dx}{(x^2+a^2)(x^2+b^2)}$ .                                                                                                                                                                   | Application | 4  |
| C)   | Find the Fourier sine transform of $f(x) = \begin{cases} x, & 0 \leq x \leq 1 \\ 2-x, & 1 \leq x \leq 2 \\ 0, & x > 2 \end{cases}$ .                                                                                                                                         | Analysis    | 4  |
| D)   | If $F_s\{f(x)\} = \frac{e^{-ax}}{x}$ , then find $f(x)$ . Hence obtain the inverse Fourier sine transform of $\frac{1}{x}$ .                                                                                                                                                 | Analysis    | 4  |
| Q. 4 | Attempt any three of the following.                                                                                                                                                                                                                                          |             | 12 |
| A)   | Form the partial differential equation by eliminating arbitrary function $f$ from $f(x^2 + y^2 + z^2, 3x + 5y + 7z) = 0$                                                                                                                                                     | Synthesis   | 4  |
| B)   | Solve $pz - qz = z^2 + (x + y)^2$                                                                                                                                                                                                                                            | Application | 4  |
| C)   | Determine the solution of one dimensional heat equation $\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$ where the boundary conditions are $u(0, t) = 0, u(l, t) = 0 (t > 0)$ and the initial condition $u(x, 0) = x, l$ being the length of the bar. | Analysis    | 4  |
| D)   | Use the method of separation of variables to solve the equation $\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u$ , given that $u(x, 0) = 6e^{-3x}$                                                                                                      | Application | 4  |
| Q. 5 | Attempt the following.                                                                                                                                                                                                                                                       |             | 12 |
| A)   | Determine the analytic function $f(z)$ in terms of $z$ whose real part is $\frac{\sin 2x}{\cosh 2y - \cos 2x}$                                                                                                                                                               | Analysis    | 4  |
| B)   | Prove that $u = x^2 - y^2 - 2xy - 2x + 3y$ is harmonic. Find a function $v$ such that $f(z) = u + iv$ is analytic.                                                                                                                                                           | Analysis    | 4  |
| C)   | Find the bilinear transformation which maps the points $z = 0, -1, -i$ onto the points $w = i, 0, \infty$ . Also, find the image of the unit circle $ z  = 1$ .                                                                                                              | Analysis    | 4  |
| Q. 6 | Attempt the following.                                                                                                                                                                                                                                                       |             | 12 |

|    |                                                                                                                                             |            |
|----|---------------------------------------------------------------------------------------------------------------------------------------------|------------|
| A) | Use Cauchy's integral formula to evaluate $\oint_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$ , where $C$ is the circle $ z  = 3$ . | Evaluation |
| B) | Find the poles of function $\frac{z^2-2z}{(z+1)^2(z^2+4)}$ . Also find the residue at each pole.                                            | Analysis   |
| C) | Evaluate $\oint_C \frac{e^z}{\cos \pi z} dz$ , where $C$ is the unit circle $ z  = 1$ .                                                     | Evaluation |

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

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JONERA UNIVERSITY, JONERA



Winter Examination – 2022

Course: - B. Tech.

Branch: - Common for All branches

Semester:- III

Subject Code & Name: BTBS301

Engineering Mathematics-III

Max. Marks: - 60

Date: - 09/03/2023

Duration: - 3-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 Three of the following.                                                          |            | 12    |
| A) Find Laplace Transform of $e^{-3t} \sin^2 t$                                                | L3/CO1     | 4     |
| B) Find Laplace Transform of $f(t) = \begin{cases} 1 & 0 < t < 1 \\ 0 & 1 < t < 2 \end{cases}$ | L3/CO1     | 4     |
| where $f(t)$ is periodic function of period 2.                                                 |            |       |
| C) Evaluate using Laplace Transform.: $\int_0^{\infty} \frac{\cos 4t - \cos 3t}{t} dt$         | L3/CO1     | 4     |
| D) Find Laplace Transform of $(1 + 2t - 3t^2 + 4t^3)H(t - 2)$                                  | L3/CO1     | 4     |

Q2 Solve Any Three of the following.

12

|                                                                                                         |        |   |
|---------------------------------------------------------------------------------------------------------|--------|---|
| A) Find the inverse Laplace transformation of the function. $\log\left(1 + \frac{a^2}{s^2}\right)$      | L3/CO2 | 4 |
| B) By using convolution theorem find $L^{-1}\left[\frac{s}{(s^2+4)(s^2+9)}\right]$                      | L3/CO2 | 4 |
| C) Find the inverse Laplace transformation of the function. $\frac{5s^2 - 15s - 11}{(s+1)(s-2)^2}$      | L3/CO2 | 4 |
| D) Solve using Laplace transformation<br>$y'' + 3y' + 2y = t\delta(t - 1)$ for which $y(0) = y'(0) = 0$ | L3/CO2 | 4 |



Q.3 Solve Any Three of the following.

A) Using Parseval's identity prove that  $\int_0^{\infty} \frac{x^2}{(x^2+1)^2} dx = \frac{\pi}{4}$

L3/CO3

B) Find the Fourier transform of

$$f(x) = \begin{cases} 1-x^2, & |x| \leq 1 \\ 0, & |x| > 1 \end{cases}$$

L3/CO3

C) Find the Fourier Sine transform  $e^{-ax}$ ,  $a > 0$

L3/CO3

D) Find the Fourier cosine transform of the function  $f(y) = \begin{cases} \cos y, & 0 < y < a \\ 0, & y > a \end{cases}$

L3/CO3

Q.4 Solve Any Three of the following.

A) Form the partial differential equation by eliminating arbitrary constants from

L3/CO4

$$(x-a)^2 + (y-b)^2 = z^2 \cot^2 \alpha$$

B) Solve the Partial differential equation  $x(y-z)p + y(z-x)q = z(x-y)$

L3/CO4

C) Use the method of separation of variables to solve

$$\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u \quad \text{given that } u(x,0) = 6e^{-3x}$$

L3/CO4

D) A bar with insulated at its ends is initially at temperature  $0^\circ\text{C}$  throughout. The end  $x=0$  is at  $0^\circ\text{C}$  for all times and the heat is suddenly applied so that  $\frac{\partial u}{\partial x} = 10$  at  $x=t$  for all time. Find temperature function  $u(x,t)$

L3/CO4

Q.5. Solve Any Three of the following.

A) Determine  $k$  such that the function  $f(z) = e^x \cos y + ie^x \sin ky$  is analytic.

(12)

L3/CO5

B) Show that  $u = x^2 - y^2 - 2xy - 2x + 3y$  is a harmonic function and hence determine the analytic function  $f(z)$  in terms of  $z$ .

L3/CO5

C) Determine the pole of the function  $f(z) = \frac{2z-1}{z(z+1)(z-3)}$  and also find the residue at each pole & sum of all residues.

L3/CO5

D) Evaluate

$$\oint_C \frac{\sin \pi z^2 + 2z}{(z-1)^2(z-2)} dz, \text{ Where } C \text{ is the circle } |z| = 4$$

L3/CO5

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



DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Summer Examination – 2023

Branch : B. Tech ( Common to all)

Semester : III

Subject with code: Engineering Mathematics – III (BTBS 301)

Max Marks: 60

Date: 08/08/2023

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 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------|
| Q.1 Solve Any Two of the following.                                                                                                                                                         |                      | 12    |
| A) Find the Laplace transform of $f(t) = \frac{e^t - \cos t}{t}$                                                                                                                            | Understand/<br>(CO1) | 6     |
| B) Using Laplace transform prove That $\int_0^\infty t e^{-3t} \sin t dt = \frac{3}{50}$                                                                                                    | Understand/<br>(CO1) | 6     |
| C) Find the Laplace transform of the triangular wave function of period $2c$ given by $f(t) = \begin{cases} t, & 0 \leq t \leq c \\ 2c - t, & c < t < 2c \end{cases}$                       | Remember/<br>(CO1)   | 6     |
| Q.2 Solve Any Two of the following.                                                                                                                                                         |                      | 12    |
| A) Find the inverse Laplace transforms of $\bar{f}(s) = \frac{s e^{-4s}}{s^2+9}$                                                                                                            | Understand/<br>(CO2) | 6     |
| B) By convolution theorem, find the inverse Laplace Transforms of $\bar{f}(s) = \frac{1}{s(s^2-a^2)}$                                                                                       | Understand/<br>(CO2) | 6     |
| C) Solve the equation $\frac{d^3y}{dt^3} + 2\frac{d^2y}{dt^2} - \frac{dy}{dt} - 2y = 0$ , where $y = 1, \frac{dy}{dt} = 2, \frac{d^2y}{dt^2} = 2$ at $t = 0$ , by Laplace transform method. | Remember/<br>(CO2)   | 6     |
| Q.3 Solve Any Two of the following.                                                                                                                                                         |                      | 12    |
| A) Using the Fourier integral representations, show that $\int_0^\infty \frac{\cos x\omega}{1+\omega^2} d\omega = \frac{\pi}{2} e^{-x} \quad (x \geq 0)$                                    | Understand/<br>(CO3) | 6     |
| B) Find the Fourier sine transform of $\frac{e^{-ax}}{x}$ .                                                                                                                                 | Understand/<br>(CO3) | 6     |
| C) Using Parseval's identity Evaluate $\int_0^\infty \frac{\sin^2 x}{x^2} dx$                                                                                                               | Remember/            | 6     |



Q:4 Solve Any Two of the following.

- A) Form the partial differential equation by eliminating the arbitrary functions from  $z = f(x + it) + g(x - it)$
- B) Solve the partial differential equation  $x(y^2 + z)p - y(x^2 + z)q = z(x^2 - y^2)$
- C) Use the method of separation of variables to solve the equation

$$\frac{\partial^2 u}{\partial x^2} - 2 \frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = 0.$$

Q.5 Solve Any Two of the following.

- A) Find a function  $w = u + iv$  which is analytic if  $u = x^2 - y^2$ .

- B) Evaluate  $\int_C \frac{\cos \pi z^2}{(z-1)(z-2)} dz$ , where  $C$  is  $|z| = \frac{3}{2}$ .

- C) By Residue theorem evaluate  $\int_C \frac{dz}{(z^2+4)^2}$ , where  $C$  is the circle  $|z - i| = 2$ .

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

Understand/  
(CO4)

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Course: - B. T

Subject Code

Max. Marks

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B) By us



Winter Examination – 2022

Course: - B. Tech.

Branch: - Common for All branches

Semester:- III

Subject Code & Name: BTBS301

Engineering Mathematics-III

Max. Marks: - 60

Date: - 09/03/2023

Duration: - 3-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 Three of the following.                                                          |            | 12    |
| A) Find Laplace Transform of $e^{-3t} \sin^2 t$                                                | L3/CO1     | 4     |
| B) Find Laplace Transform of $f(t) = \begin{cases} 1 & 0 < t < 1 \\ 0 & 1 < t < 2 \end{cases}$ | L3/CO1     | 4     |
| where $f(t)$ is periodic function of period 2.                                                 |            |       |
| C) Evaluate using Laplace Transform.: $\int_0^{\infty} \frac{\cos 4t - \cos 3t}{t} dt$         | L3/CO1     | 4     |
| D) Find Laplace Transform of $(1 + 2t - 3t^2 + 4t^3)H(t - 2)$                                  | L3/CO1     | 4     |

Q2 Solve Any Three of the following.

12

- |                                                                                                         |        |   |
|---------------------------------------------------------------------------------------------------------|--------|---|
| A) Find the inverse Laplace transformation of the function. $\log\left(1 + \frac{a^2}{s^2}\right)$      | L3/CO2 | 4 |
| B) By using convolution theorem find $L^{-1}\left[\frac{s}{(s^2+4)(s^2+9)}\right]$                      | L3/CO2 | 4 |
| C) Find the inverse Laplace transformation of the function. $\frac{5s^2 - 15s - 11}{(s+1)(s-2)^2}$      | L3/CO2 | 4 |
| D) Solve using Laplace transformation<br>$y'' + 3y' + 2y = t\delta(t - 1)$ for which $y(0) = y'(0) = 0$ | L3/CO2 | 4 |



Q.3 Solve Any Three of the following. (12)

A) Using Parseval's identity prove that  $\int_0^{\infty} \frac{x^2}{(x^2+1)^2} dx = \frac{\pi}{4}$  L3/CO3

B) Find the Fourier transform of L3/CO3

$$f(x) = \begin{cases} 1-x^2, & |x| \leq 1 \\ 0, & |x| > 1 \end{cases}$$

C) Find the Fourier Sine transform  $e^{-ax}$ ,  $a > 0$  L3/CO3

D) Find the Fourier cosine transform of the function  $f(y) = \begin{cases} \cos y, & 0 < y < a \\ 0, & y > a \end{cases}$  L3/CO3 (12)

Q.4 Solve Any Three of the following.

A) Form the partial differential equation by eliminating arbitrary constants from L3/CO4

$$(x-a)^2 + (y-b)^2 = z^2 \cot^2 \alpha$$

B) Solve the Partial differential equation  $x(y-z)p + y(z-x)q = z(x-y)$  L3/CO4

C) Use the method of separation of variables to solve

$$\frac{\partial u}{\partial x} = 2 \frac{\partial u}{\partial t} + u \quad \text{given that } u(x,0) = 6e^{-3x}$$

D) A bar with insulated at its ends is initially at temperature  $0^\circ\text{C}$  throughout. The end  $x=0$  is kept at  $0^\circ\text{C}$  for all times and the heat is suddenly applied so that  $\frac{\partial u}{\partial x} = 10$  at  $x=t$  for all time. Find the temperature function  $u(x,t)$  L3/CO4 (12)

Q.5 Solve Any Three of the following.

A) Determine  $k$  such that the function  $f(z) = e^x \cos y + ie^x \sin ky$  is analytic. L3/CO5

B) Show that  $u = x^2 - y^2 - 2xy - 2x + 3y$  is a harmonic function and L3/CO5 hence determine the analytic function  $f(z)$  in terms of  $z$ .

C) Determine the pole of the function  $f(z) = \frac{z-1}{z(z+1)(z-3)}$  and also find the residue at each pole & sum of all residues.

D) Evaluate L3/CO5

$$\oint_C \frac{\sin \pi z^2 + 2z}{(z-1)^2(z-2)} dz, \text{ Where } C \text{ is the circle } |z| = 4$$

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

Solve any five of  
Q. Obtain Lapla

1)  $f(t) = \begin{cases} \dots \\ \dots \end{cases}$

2) a)  
b)

3) a)  
b)  $\left[ \dots \right]$

4)  $(-)$

5)  $e^{-2t} (3)$

6)  $e^{At} (t)$

7)  $-at$





|                    |                                                                                                                                                                                                                                                                                                                                                    |                        |           |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------|
| <b>B)</b>          | A string is stretched and fastened to two points $l$ apart. Motion is started by replacing the string in the form $y = A \sin \frac{\pi x}{l}$ from which it is released at time $t = 0$ . Show that the displacement of a point at a distance $x$ from one end at time $t$ is given by $y(x, t) = A \sin \frac{\pi x}{l} \cos \frac{\pi ct}{l}$ . | <b>Apply/CO4</b>       | <b>6</b>  |
| <b>C)</b>          | Solve the following equation by the method of separation of variables:<br>$\frac{\partial^2 u}{\partial x \partial t} = e^{-t} \cos x$ , given that $u = 0$ when $t = 0$ and $\frac{\partial u}{\partial t} = 0$ when $x = 0$ .                                                                                                                    | <b>Apply /CO4</b>      | <b>6</b>  |
| <b>Q. 5</b>        | <b>Solve Any Two of the following.</b>                                                                                                                                                                                                                                                                                                             |                        | <b>12</b> |
| <b>A)</b>          | If $f(z)$ is analytic, show that $\left[ \frac{\partial  f(z) }{\partial x} \right]^2 + \left[ \frac{\partial  f(z) }{\partial y} \right]^2 =  f'(z) ^2$ .                                                                                                                                                                                         | <b>Understand /CO5</b> | <b>6</b>  |
| <b>B)</b>          | Apply Cauchy's integral Formula to evaluate $\oint_C \frac{e^{-z}}{z+1} dz$ , where $C$ is the circle (a) $ z  = 2$ and (b) $ z  = \frac{1}{2}$ .                                                                                                                                                                                                  | <b>Apply/CO5</b>       | <b>6</b>  |
| <b>C)</b>          | State Cauchy's residue theorem and evaluate $\oint_C \tan z dz$ , where $C$ is the circle $ z  = 2$ .                                                                                                                                                                                                                                              | <b>Apply /CO5</b>      | <b>6</b>  |
| <b>*** End ***</b> |                                                                                                                                                                                                                                                                                                                                                    |                        |           |