K.S.INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE FILE

NAME OF THE STAFF	:	Dr. Vijayalaxmi Mekali/ Dr. Soubhagya M P / Mrs. Sheba Jebakani
SUBJECT CODE/NAME	:	BCS401/Analysis and Design of Algorithms
SEMESTER/YEAR	:	IV/II
ACADEMIC YEAR	:	2024-2025
BRANCH	:	CSE

FACULTY IN-CHARGE

HOD

Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K.S. INSTITUTE OF TECHNOLOGY

KSIT

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

Vision of the Institute

To impart quality technical education with ethical values, employable skills and research to achieve excellence

Mission of the Institute

- To attract and retain highly qualified, experienced & committed faculty.
- To create relevant infrastructure.
- Network with industry & premier institutions to encourage emergence of new ideas by providing research & development facilities to strive for academic excellence.
- To inculcate the professional & ethical values among young students with employable skills & knowledge acquired to transform the society.

Vision of the Department

To create competent professionals in Computer Science and Engineering with adequate skills to drive the IT industry

Mission of the Department

- Impart sound technical knowledge and quest for continuous learning.
- To equip students to furnish Computer Applications for the society through experiential learning and research with professional ethics.
- Encourage team work through inter-disciplinary project and evolve as leaders with social concerns.

Head of the Department
Dept. of Computer Science & Engg.
K.S. Institute of Technology
Bengaluru -560 109

K.S. INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

Program Educational Objectives

PEO1: Excel in professional career by acquiring knowledge in cutting edge technology and contribute to the society as an excellent employee or as an entrepreneur in the field of Computer Science & Engineering.

PEO2: Continuously enhance their knowledge on par with the development in IT industry and pursue higher studies in Computer Science & Engineering.

PEO3: Exhibit professionalism, cultural awareness, team work, ethics, and effective communication skills with their knowledge in solving social and environmental problems by applying computer technology.

Program Specific Outcomes (PSO)

PSO1: Ability to understand, analyze problems and implement solutions in programming languages, as well to apply concepts in core areas of Computer Science in association with professional bodies and clubs.

PSO2: Ability to use computational skills and apply software knowledge to develop effective solutions and data to address real world challenges.

Head of the Department
Dept. of Computer Science & Engg.
K.S. Institute of Technology
Bengaluru-560 109

K.S. INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

Program Outcomes

PO1: **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bangalore -560 109

K. S. INSTITUTE OF TECHNOLOGY

#14, Raghuvanahalli, Kanakapura Main Road, Bengaluru-5600109

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Course: Analysis and Design of Algorithms			
Type: Core		Course Code:BCS401	
No of Hours per week			
Theory (Lecture Class)	Practical/Field Work/Allied Activities	Total/Week	Total teaching hours
L+T+P+S:4+0+0+1 L –Lecture, T – Tutorial, P- Practical/ Drawing, S – Self Study Component	0	4	40+10
Marks			
Internal Assessment	Examination	Total	Credits
50	50	100	3

Aim/Objective of the Course:

- Explain various computational problem solving techniques.
- Describe various methods of algorithm analysis and understand time complexity.
- Explain appropriate algorithm techniques to solve a problem
- Ability to differentiate between Divide and Conquer, Dynamic programming, Greed approach and backtracking
- Illustrate concepts of deterministic and non-deterministic algorithms and understand NP0-Hard and NP-Complete problems.

Course Learning Outcomes:

After completing the course, the students will be able to,

BCS401.1	**Identify** the Performance Analysis of various Algorithms. Solve problems based on Brute Force approach	Apply (K3)
BCS401.2	**Experiment with** time complexity of different algorithms of divide and conquer and decrease and conquer algorithm techniques.	Apply (K3)
BCS401.3	**Construct** the solutions for different types of problems based Transform and Conquer and Space time trade off.	Apply (K3)
BCS401.4	**Develop** optimal solutions for different problems using Greedy method and dynamic programming techniques.	Apply (K3)
BCS401.5	**Interview** Limitations of Algorithmic Power and Coping with Limitations of Algorithmic Power	Apply (K3)

Syllabus Contents	
Module 1: Introduction: What is an Algorithm?, Fundamentals of Algorithmic Problem Solving. Fundamentals of The Analysis of Algorithm Efficiency: Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non recursive Algorithms, Mathematical Analysis of Recursive Algorithms. Brute Force Approaches: Selection Sort and Bubble Sort, Sequential Search and Brute Force String Matching. **LO: At the end of this module, student will be able to** • Understand the difference between an algorithm and program • Basic characteristics of an algorithm • How to compute Time complexity analysis of an algorithm • Use of recursion technique to solve simple problems that repeats at sublevel • Understand use of appropriate data structures for a given problem	**CO1** **10 hrs** PO1 - 3 PO2 - 3 PO3 – 3 PO4 – 2 PO5 – 2 PO12 - 2 PSO1 - 3 PSO2 - 2
Module 2 Brute Force Approaches (Contd..): Exhaustive Search (Travelling Salesman probem and Knapsack Problem). Decrease-And-Conquer: Insertion Sort, Topological Sorting. Divide And Conquer: Merge Sort, Quick Sort, Binary Tree Traversals, Multiplication of Large Integers and Strassen's Matrix Multiplication. **LO: At the end of this module, student will be able to** • Understand the basic concept of how to reduce a given problem to a same problem instance of smaller size • Applying the divide and conquer algorithm for some basic problems • Understand ther difference between Divide and Conquer and Decrease and conquer. • Analyze the given problem and apply recursion equation to compute the time complexity analysis.	**CO2** **10 hrs** PO1 - 3 PO2 - 3 PO3 – 3 PO4 – 2 PO5 – 2 PO12 - 2 PSO1 - 3 PSO2 - 2
Module 3 Transform-and-Conquer: Balanced Search Trees, Heaps and Heapsort. Space-Time Tradeoffs: Sorting by Counting: Comparison counting sort, Input Enhancement in String Matching: Horspool's Algorithm. **LO: At the end of this module, student will be able to** • Understand why greedy methods works and what kind of problems are suitable for Transform-and-Conquer • Apply Transform-and-Conquer to some well-known problems such as sorting of number and constructions of different types of trees • Apply heap and heapsort technique and analyze its time complexity	**CO3** **10 hrs** PO1 - 3 PO2 - 3 PO3 – 3 PO4 – 2 PO5 – 2 PO12 - 2 PSO1 - 3 PSO2 - 2
Module 4 Dynamic Programming: Three basic examples, The Knapsack Problem and Memory Functions, Warshall's and Floyd's	**CO4** **10 hrs**

Algorithms. The Greedy Method: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees and Codes. **LO: At the end of this module, student will be able to** • Analyze applications where The Greedy Method is applicable. • Apply The Greedy Method techniques to solve some well known problems such as knapsack problem, binary search tress, travelling salesman problem • Differentiate between all possible shortest path between all nodes of a graph • Understand the process that makes a program robust and reliable	PO1 - 3 PO2 - 3 PO3 – 3 PO4 – 2 PO5 – 2 PO12 - 2 PSO1 - 3 PSO2 - 2
Module 5 **Limitations of Algorithmic Power:** Decision Trees, P, NP, and NP-Complete Problems. **Coping with Limitations of Algorithmic Power**: Backtracking (n-Queens problem, Subset-sum problem), Branch-and-Bound (Knapsack problem), Approximation algorithms for NP-Hard problems (Knapsack problem). **LO: At the end of this module, student will be able to** • Differentiate between deterministic computing and non-deterministic computing • Analyze a given problem and if can be mapped to NP-complete problem • Understand applications where backtracking technique is most suitable one e.g. solving 8-queens problems, or tracking the full chessboard in 64 moves • Understand well known NP-Complete problem and how these can be mapped to each other.	**CO5** **10 hrs** PO1 - 3 PO2 - 3 PO3 – 3 PO4 – 2 PO5 – 2 PO12 - 2 PSO1 - 3 PSO2 - 2

Text Books:

1. Introduction to the Design and Analysis of Algorithms, By Anany Levitin, 3rd Edition (Indian),2017, Pearson.

Reference Books:

1. Computer Algorithms/C++, Ellis Horowitz, SatrajSahni and Rajasekaran, 2nd Edition, 2014, Universities Press.
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI.
3. Design and Analysis of Algorithms, S. Sridhar, Oxford (Higher Education)

Web Material:
https://nptel.ac.in/courses/106/106/106106131/

Teaching and Learning Methods:

1. Lecture class: 50 hrs.
2. Self-study:
3. Problem solving/Group Discussions/programming/Seminars:

Assessment:

Type of test/examination: Written examination

Continuous Internal Evaluation(CIE) : 50 marks (Average three of tests will be considered)

Semester End Exam(SEE) : 50 marks (students have to answer all main questions)

Test duration: 1 hr

Examination duration: 3 hrs

PO1: Science and engineering Knowledge	**PO7:**Environment and Sustainability
PO2: Problem Analysis	**PO8:**Ethics
PO3: Design & Development of Solutions	**PO9:**Individual & Team Work
PO4: Investigations of Complex Problems	**PO10:** Communication
PO5: Modern Tool Usage	**PO11:**Project Mngmt & Finance
PO6: Engineer & Society	**PO12:**Life long Learning

Program Specific Outcomes (PSOs)

PSO1: Ability to apply the fundamental concepts of Artificial Intelligence and Machine Learning to design and develop solutions to multidisciplinary problems of social concern.

PSO2: Ability to use the inculcated experiential learning for research and development activities in compliance with National Education Policy.

CO BCS401	Bloom's Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BCS401.1	K3	3	3	3	2	2	-	-	-	-	-	-	2	3	2
BCS401.2	K3	3	3	3	2	2	-	-	-	-	-	-	2	3	2
BCS401.3	K3	3	3	3	2	2	-	-	-	-	-	-	2	3	2
BCS401.4	K3	3	3	3	2	2	-	-	-	-	-	-	2	3	2
BCS401.5	K3	3	3	3	2	2	-	-	-	-	-	-	2	3	2
BCS401		3	3	3	2	2	-	-	-	-	-	-	2	3	2

CO	PSO1	PSO2
BCS401.1	3	2
BCS401.2	3	2
BCS401.3	3	2
BCS401.4	3	2
BCS401.5	3	2
BCS401.6	3	2

3	Substantial (High) Correlation
2	Moderate (Medium) Correlation
1	Slight (Low) Correlation
-	No correlation.

CO-PO MAPPING Justification Table

Sl. No.	CO	PO	Number of Key Elements of PO Mapped To CO	Justification
CO1: **Identify** the Performance Analysis of various Algorithms. Solve problems based on Brute Force approach				
1.	CO1	1	**The students will able to gain** • Knowledge of Mathematics • Knowledge in Specific Engineering Problem • To Find Solution	3
2.		2	**The students will able to** • Identify the time complexity of algorithm • Formulate time complexity of algorithm • Analyse time complexity of algorithm	3
3.		3	**The students will able to** • Design algorithm and its time complexity for different types of problem • Design Solutions using different algorithm • Design Solutions for various applications	3
4		4	**The students will able to** • Identify different algorithm for given problem • Analysis of algorithm and its time complexity	2
5		5	The **students will able to** • Make use of modern tools to solve different types algorithm and its time complexity • Build the application using modern tool	2
8		12	**The students will able to engage in knowledge upgradation through** • Independent learning • Lifelong learning	2
9		PSO1	**The students will able to understand the fundamentals of algorithm and its time complexity in** • Different programming languages • Modern tools for algorithm and its time complexity	3
10		PSO2	**The students will able to gain the ability to** • Design algorithm and its time complexity using different datastructures • Develop solutions for applications	2

CO2: Experiment with time complexity of different algorithms of divide and conquer and decrease and conquer algorithm techniques.				
11	**CO2**	1	**The students will able to gain the** • Knowledge of Mathematics • Knowledge of Science, • Knowledge In Specific Engg. Problem & To Find Solution	3
12		2	**The students will able to** • Identify • Formulate • Analyse algorithm and its time complexity for Complex Engineering Problems	3
13		3	**The students will able to** • **Design** solutions algorithms using different algorithm approaches • **Design** solutions for larger problems	3
14		4	**The students will able to** • Design of solution for complex problems by Analysis of problems • Synthesis of solution for complex problems	2
15		5	**The students will able to** • Make use of Modern tools to experiment with different algorithms using different algorithm approaches • Experiment with applications using different algorithms	
16		12	**The students will able to engage in knowledge up gradation through** • Independent learning • Lifelong learning	2
17		PSO1	**The students will able to gain the knowledge in the fundamentals of Computer science algorithm concepts**	3
18		PSO2	**The students will have the ability to** • Design basic Application for societal concern • Develop solutions for software tools	2
CO3: **Construct** the solutions for different types of problems based Transform and Conquer and Space time trade off.				
19	**CO3**	1	**The students will able to gain the** • Knowledge Of Mathematics • Knowledge Of Science, • Knowledge In Specific Engg. Problem & To Find Solution	3

20		2	**The students will able to** • Identify • Formulate • Analyse Complex Engineering Problems using	3
21		3	**The students will able to gain** • **Design** solutions array, dynamic array and linked lists to represent stacks, queues, polynomials sparse matrix and different types of trees. • **Design** solutions for Complex Engineering Problems based on Transform and Conquer and Space time trade off	3
22		4	**The students will able to** • Design of solution for complex problems using based on Transform and Conquer and Space time trade off • Analysis of problems designed using Transform and Conquer and Space time trade off • Synthesis of solution for complex problems based on Transform and Conquer and Space time trade off	2
23		5	**The students will able to** • Make use of Modern tools to experiment with different problems based on Transform and Conquer and Space time trade off • Experiment with applications based on Transform and Conquer and Space time trade off	2
24		12	**The students will able to engage in knowledge upgradation through** • Independent learning • Lifelong learning	2
25		PSO1	**The students will able to gain the fundamentals of algorithms**	3
26		PSO2	**The students will able to gain the ability to** • Design basic algorithms needed build various applications • Develop solutions for as software	2
CO4: Develop optimal solutions for different problems using Greedy method and dynamic programming techniques.				
27	**CO4**	1	**The students will able to gain the** • Knowledge Of Mathematics • Knowledge Of Science, • Knowledge In Specific Engg. Problem & To Find Solution using dynamic programming.	3

28		2	**The students will able to** • Identify • Formulate • Analyse Complex Engineering Problems using dynamic programming.	3
29		3	**The students will able to** • **Design** solutions using dynamic programming approach.	3
30		4	**The students will able to** • Design of solution for complex problems using dynamic programming approach. • Analysis of problems based on dynamic programming approach.	2
31		5	**The students will able to** • Make use of Modern tools to experiment with different algorithms to solve problems.	2
32		12	**The students will able to engage in knowledge up gradation through** • Independent learning • Lifelong learning	2
33		PSO1	**The students will able to gain the knowledge in the fundamentals of algorithm design approach** •	3
34		PSO2	**The students will able to gain the ability to** • Design basic applications using dynamic programming. • Develop solutions for software tools	2
CO5: **Interview** Limitations of Algorithmic Power and Coping with Limitations of Algorithmic Power				
35	CO5	1	**The students will able to gain** • Knowledge Of Mathematics • Knowledge In Specific Engg. Problem & To Find Solution	3
36		2	**The students will able to** • Identify • Formulate • Analyse Complex Engineering Problems using NP complete	3
37		3	**The students will able to** • **Design** solutions using NP complete • **Design** solutions for mathematical problems	3

38		4	**The students will able to** • Analysis and Design of solution for complex problems using NP complete • Synthesis of solution for complex problem using NP complete		2
39		5	**The students will able to** • Make use of Modern tools to experiment different NP complete based problems • Experiment with applications of NP complete		2
40		12	**The students will able to engage in knowledge upgradation through** • Independent learning • Lifelong learning		2
41		PSO1	**The students will able to gain the knowledge in the fundamentals of different algorithm approaches**		3
42		PSO2	**The students will able to gain the ability to** • Design basic applications using NP complete • Develop solutions for software tools		2

Sl. No.	Gap Identification	Activity Planned to fill the gap	CO	Relevant PO Mapping
1	PO5, PO6, PO8, PO9, PO10, PO12	Implementation of Programs using different algorithm design techniques, Online courses, Problem solving on the online platforms like Hacker Rank, Hacker Earth	CO1, CO2, CO3, CO4, CO5	PO5, PO6, PO8, PO9, PO10, PO12

Signature of Course In-charge

Signature of Module Coordinator

Signature of HOD

Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K. S. INSTITUTE OF TECHNOLOGY, BENGALURU-560109

CALENDAR OF EVENTS: IV SEM - B'TECH (2024-2025)

Department Of Computer Science and Engineering

SESSION: FEB TO MAY 2025

Week No.	Month	Day						Days	Activities	Department Activities
		Mon	Tue	Wed	Thu	Fri	Sat			
1	FEB	10*	11	12	13	14	15 DH	5	10* Commencement of IV	
2	FEB	17	18	19	20	21	22	6	22 - Monday Time Table	
3	FEB MAR	24	25	26H	27	28	1DH	4	26 - Mahasivratri	24-Hands on Workshop on IOT
4	MAR	3	4	5	6	7	8	6	8 - Wednesday Time Table	8- Technical Talk on UI/UX from Philips
5	MAR	10	11	12	13	14TA	15DH	5		11-CCM1
6	MAR	17T1	18T1	19T1	20	21	22	6	22 - Sports Day	
7	MAR	24* FFB1	25 BV	26 ASD	27	28	29	6	24- First Faculty Feed Back 29 - Monday Time Table	26-Performance Report Card1 to Parents 29-PTM
8	MAR/ APR	31H	1	2	3	4	5DH	4	31- Qutub-E-Ramzan	1- Technical Talk on Cloud Computing from Bhrighu
9	APR	7	8	9	10 H	11	12	5	10 - Mahaveer Jayanthi 12 - Ananya Fest	9-CCM2
10	APR	14 H	15	16	17TA	18H	19DH	3	14- Dr. B R Ambedkar Jayanthi 18- Good Friday	15- Technical Talk on Analysis & Design of Algorithm
11	APR	21T2	22T2	23T2	24	25	26	6	24 - GC Meeting 26- Wednesday Time Table	24 to 26 Workshop on Cyber Security & Ethical Hacking-CSL
12	APR/ MAY	28 BV	29 ASD	30H	1 H	2	3DH	3	30- Basava Jayanthi 1 - May Day (Labour Day)	2- Performance Report Card2 to Parents
13	MAY	5* FFB1	6	7	8	9	10	6	5- Second Faculty Feed Back 10 - Thursday Time Table	9- Industrial Visit
14	MAY	12	13	14	15	16	17DH	5		
15	MAY	19	20	21TA	22T3	23T3	24T3	6		
16	MAY 2025	26LT	27LT	28LT	29LT	30	31*	6	31- Thursday Time Table 31* - Last working Day	28- Performance Report Card3 to Parents 30- Project Exhibition

Total No of Working Days : 82

Total Number of working days (Excluding holidays and Tests)= 69

H	Holiday
BV	Blue Book Verification
T1,T2,T3	Tests 1,2,3
ASD	Attendance & Sessional Display
DH	Declared Holiday
LT	Lab Test
TA	Test attendance

Monday	13
Tuesday	13
Wednesday	13
Thursday	14
Friday	14
Sports Day	1
Ananya	1
Total	69

PRINCIPAL
K.S. INSTITUTE OF TECHNOLOGY
BENGALURU - 560 109.

Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU-560109

TENTATIVE CALENDAR OF EVENTS: IV SEM - EVEN (2024-2025)

SESSION: FEB TO MAY 2025

Week No.	Month	Day						Days	Activities
		Mon	Tue	Wed	Thu	Fri	Sat		
1	FEB	10*	11	12	13	14	15 DH	5	10* Commencement of IV
2	FEB	17	18	19	20	21	22	6	22 - Monday Time Table or NSS /Yoga/Sports 22 - Internal Hackathon
3	FEB MAR	24	25	26H	27	28	1DH	4	26 - Mahasivratri
4	MAR	3	4	5	6	7	8	6	6 - ASH Activity 8 - Wednesday Time Table or Dept Event, Women's Day
5	MAR	10	11	12	13	14TA	15DH	5	
6	MAR	17T1	18T1	19T1	20	21	22 £	6	22 £- Sports Day
7	MAR	24* FFB1	25 BV	26 ASD	27	28	29	6	24- First Faculty Feed Back 28,29 - Centinel, Hardware Hackathon 29 - Monday Time Table or NSS TEST /Class
8	MAR/ APR	31H	1	2	3	4	5DH	4	31- Qutub-E-Ramzan 5- Marathon
9	APR	7	8	9	10 H	11	12 µ	5	10 - Mahaveer Jayanthi 12 µ - Ananya Fest
10	APR	14 H	15	16	17TA	18H	19DH	3	14- Dr. B R Ambedkar Jayanthi 18- Good Friday
11	APR	21T2	22T2	23T2	24	25	26	6	22 - 2nd IQAC Meeting 24 - GC Meeting 26- Wednesday Time Table or Dept Event. 26April-2Oct - NSS Camp
12	APR/ MAY	28 BV	29 ASD	30H	1 H	2	3DH	3	30- Basava Jayanthi 1 - May Day (Labour Day)
13	MAY	5* FFB1	6	7	8	9	10	6	5- Second Faculty Feed Back 6 - ASH Activity 9,10 - International Conference 10 - Thursday Time Table or NSS TEST
14	MAY	12	13	14	15	16	17DH	5	
15	MAY	19	20	21TA	22T3	23T3	24T3	6	
16	MAY 2025	26LT	27LT	28LT	29LT	30	31*	6	31- Thursday Time Table 31* - Last working Day

Total No of Working Days : 82

Total Number of working days (Excluding holidays and Tests)= 69

H	Holiday
BV	Blue Book Verification
T1,T2,T3	Tests 1,2,3
ASD	Attendance & Sessional Display
DH	Declared Holiday
LT	Lab Test
TA	Test attendance

Monday	13
Tuesday	13
Wednesday	13
Thursday	14
Friday	14
Sports Day	1
Ananya	1
Total	**69**

6/2/25

PRINCIPAL
K.S. INSTITUTE OF TECHNOLOGY
BENGALURU - 560 109

K.S. INSTITUTE OF TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGG.
IV A SEC STUDENT LIST 2024-2025

SL. NO	USN	NAME OF THE STUDENT	HOSTEL/ DAY SCHOLAR	ARREARS	GENDER	STUDENT PHONE	FATHER PHONE NUMBER	MOTHER PHONE	EMAIL ID
1	1KS23CS001	ABHIMANYU N SHETTIGAR	Hostel	0	Male	7204585701	9482036913	9449292371	abhimanyushettigar59@gmail.com
2	1KS23CS002	ADITI S H	DAY SCHOLAR	0	Female	7892494802	9731648110	9980015048	aditishetty.1111@gmail.com
3	1KS23CS003	ADITYA A	DAY SCHOLAR	0	Male	8147242802	9449544488	7259669794	adityaanil40@gmail.com
4	1KS23CS004	AISHWARYA B C	DAY SCHOLAR	0	Female	9019247286	9538242096	9886044512	caishwarya242@gmail.com
5	1KS23CS005	AISHWARYA N	DAY SCHOLAR	0	Female	9353294489	9945532113	9980323619	aishwaryanarayana1@gmail.com
6	1KS23CS006	AKASH R	DAY SCHOLAR	0	Male	7676207059	9740293935	9740293935	akashr@gmail.com
7	1KS23CS007	AKASH S	DAY SCHOLAR	0	Male	8438839535	9845113771	9845939237	sanjayakash2005@gmail.com
8	1KS23CS008	AKSHAYA BALAKUMAR	DAY SCHOLAR	0	Female	8197375977	9880291964	9743791964	akshayab0502@gmail.com
9	1KS23CS009	AMEENA FATHIMA	DAY SCHOLAR	0	Female	6360923763	9986674631	7975933180	ameenafathima79759@gmail.com
10	1KS23CS010	AMRUTH C K	DAY SCHOLAR	0	Male	6361898463	9916657219	8296113604	amruthck41@gmail.com
11	1KS23CS011	AMRUTHA J	Hostel	0	Female	7090801558	9141945619	9845802056	amruthaj211@gmail.com
12	1KS23CS012	AMULYA V	DAY SCHOLAR	0	Female	9481202928	9945876824	9844197639	amulyav304@gmail.com
13	1KS23CS013	ANGELINA SHARON ROBERT	DAY SCHOLAR	0	Female	9844840969	7259162198	9632681324	angelinasharon205@gmail.com
14	1KS23CS014	ANUJA V M	DAY SCHOLAR	0	Female	9902161260	9844526840	8722351441	anujareddy2312@gmail.com
15	1KS23CS015	ANUSHA V	DAY SCHOLAR	0	Female	8217568843	9844382450	8904373459	anusha.vrevankar28@gmail.com
16	1KS23CS016	ANVITHA T A	DAY SCHOLAR	0	Female	9482799166	9902017235	9448574177	anvithata@gmail.com
17	1KS23CS017	APOORVA R NAVDA	DAY SCHOLAR	0	Female	8792720326	9448460721	080-26719793	navadaapoorva90@gmail.com
18	1KS23CS018	ARPITA RATHOD	DAY SCHOLAR	0	Female	6361017133	9900205170	9449663712	arpitarathod7997@gmail.com
19	1KS23CS019	ARUN CHAVAN	DAY SCHOLAR	0	Male	9611155036	8747824066	8747824066	arunchavan1729@gmail.com
20	1KS23CS020	ARYAMAN TIWARI	DAY SCHOLAR	0	Male	9811880073	9811888813	9811888873	aryamantiwari2@gmail.com
21	1KS23CS021	ASIYA NAAZ	DAY SCHOLAR	0	Female	7090066709	9886371147	9353834391	asiyanaaz709@gmail.com
22	1KS23CS022	BHAGYASHREE	DAY SCHOLAR	0	Female	8861287871	8861346907	8861346907	08bhagyashree@gmail.com
23	1KS23CS023	BHAVANI S	DAY SCHOLAR	0	Female	9148893226	9980798636	7411285302	bhavanisonu996@gmail.com
24	1KS23CS024	BHOOMIKA M H	DAY SCHOLAR	0	Female	9180633413	9663140118	9663140118	bhoomikamh24@gmail.com
25	1KS23CS025	BHUVAN B	DAY SCHOLAR	0	Male	6361194424	9731148321	9482727300	bhuvanb2829@gmail.com
26	1KS23CS026	BRINDA G	DAY SCHOLAR	0	Female	7892683362	8884423595	6360284385	brindag160@gmail.com
27	1KS23CS027	C SINDHU	DAY SCHOLAR	0	Female	6300397185	9964391518	-	csindhu045@gmail.com
28	1KS23CS028	CHAITRA N KIRANAGI	Hostel	0	Female	9482497636	9341197609	8884213133	kiranagichaitra@gmail.com
29	1KS23CS029	CHARAN SAI TEJ K V	DAY SCHOLAR	0	Male	8618569955	9741327777	9916566621	charancherry8613@gmail.com
30	1KS23CS030	CHARAN TEJA G S	DAY SCHOLAR	2	Male	9740105129	9880671260	9448513726	charanteja312005@gmail.com
31	1KS23CS031	CHETAN C DESAI	Hostel	1	Male	6361887639	8310822710	7349638436	chetandesai630@gmail.com
32	1KS23CS032	CHIMPARA NAGENDRA REDDY	DAY SCHOLAR	1	Male	8861667941	9493344770	8897163394	cnagendrareddy@gmail.com
33	1KS23CS033	CHINMAY B H	Hostel	0	Male	7795051969	9901325107	9901325107	chinmay2005@gmail.com
34	1KS23CS034	CHIRAG T	DAY SCHOLAR	0	Male	6363641070	9148670352	7204950758	chirag081@gmail.com
35	1KS23CS035	CHIRANTH G	DAY SCHOLAR	0	Male	7204500506	9740517527	7411216091	g.chiranth8750@gmail.com
36	1KS23CS036	CHIRANTH GOWDA S	DAY SCHOLAR	0	Male	8660435979	9900002052	9663051762	chiranthgowda113@gmail.com
37	1KS23CS037	DARSHAN G	DAY SCHOLAR	0	Male	9731727475	9845907079	9739856204	darshan051305@gmail.com
38	1KS23CS038	DEEKSHA J	DAY SCHOLAR	0	Female	8867016760	8618162299	9902261253	jdeeksha69@gmail.com
39	1KS23CS039	DEEPIKA K A	DAY SCHOLAR	0	Female	9591151335	9945112214	9945112214	anandadeepika@gmail.com
40	1KS23CS040	DHANUSH J	DAY SCHOLAR	0	Male	6362189829	7892488997	9448434597	dhanush613@gmail.com

41	1KS23CS041	DHEERAJ A	DAY SCHOLAR	0	Male	9964689559	9663110077	8660946617	[illegible]
42	1KS23CS042	DHEERAJ M S	DAY SCHOLAR	1	Male	9606813792	9606953524	9676913792	[illegible]
43	1KS23CS043	DURGASHREE M	DAY SCHOLAR	0	Female	5363172535	8660102474	9019178787	[illegible]
44	1KS23CS044	G AKASH	DAY SCHOLAR	0	Male	9606831863	9591243564	9448861740	[illegible]
45	1KS23CS045	G C NITH CHOWDARY	DAY SCHOLAR	0	Male	7022547508	7892260761	9901595209	[illegible]
46	1KS23CS046	GAGANA POOJARI	DAY SCHOLAR	0	Female	9078097441	9945033008	9901051333	[illegible]
47	1KS23CS047	GANESH M	DAY SCHOLAR	4	Male	9353574992	7259197653	7259197653	[illegible]
48	1KS23CS048	GARV B JAIN	Hostel	0	Male	9686231409	9844177419	9110885813	garvbjain@gmail.com
49	1KS23CS049	GAYANA V	DAY SCHOLAR	0	Female	6360358330	9050764803	9844570989	gayanav121@gmail.com
50	1KS23CS050	GOPALAKRISHNAN MADHU PRATH	DAY SCHOLAR	0	Female	9902964777	9902628246	9741536736	madhuprathika77@gmail.com
51	1KS23CS051	H K HEMANTH RAJE URS	DAY SCHOLAR	0	Male	8147849964	9900485186	9972193463	hemanthrajeurshk@gmail.com
52	1KS23CS052	H L DARSHAN	Hostel	0	Male	7349058446	9731554790	9686543171	darshanhl2005@gmail.com
53	1KS23CS053	HARISH DEEKSHITH	Hostel	0	Male	9353220461	6361488213	6361488213	dixit.harish11@gmail.com
54	1KS23CS054	HARSH MISHRA	Hostel	0	Male	9470016496	8210443007	8709042605	harshkohli123@gmail.com
55	1KS23CS055	HARSHAVARDHAN B K	Hostel	0	Male	6362863119	9449422468	6362530256	harshavardhabk124@gmail.com
56	1KS23CS056	HARSHITH K	DAY SCHOLAR	0	Male	9110688071	9611444007	9036833097	harshith114114251@gmail.com
57	1KS23CS057	J M HARSHITHA REDDY	Hostel	0	Male	9538140709	8792739227	8904378399	harshithareddy1455@gmail.com
58	1KS23CS058	JANHAVI M	DAY SCHOLAR	0	Female	7619489149	9945712425	9886772419	janhavi2829@gmail.com
59	1KS23CS059	JAYADITYA DEV	Hostel	0	Male	9234509450	9334485831	7004888591	jayadityadev_cse@ksit.edu.in
60	1KS23CS060	JEEVAN M	DAY SCHOLAR	0	Male	8431862066	7483994475	7406651248	jeevanjeeva0304@gmail.com
61	1KS23CS061	JEEVITHA A P	Hostel	0	Female	8088078091	9741206406	9632510955	jeevithagowda18@gmail.com
62	1KS23CS062	K HARINI	DAY SCHOLAR	0	Female	8105560758	8105737666	9980711013	0073hemalatha@gmail.com
63	1KS24CS406	NAVYA K	DAY SCHOLAR	1	Female	8123114489	9900969153	9880428723	navyaprakashshetty@gmail.com
64	1KS24CS407	PAVAN KUMAR M	DAY SCHOLAR	4	Male	7892650009	7899253868	9739856310	pavanm0022@gmail.com
66	1KS24CS417	YASHASWINI B	DAY SCHOLAR	0	Female	9380681446	8884283162	9945358882	yashaswiniyashu2917@gmail.com
67	1KS24CS411	RAKESH J	DAY SCHOLAR	4	Male	6360672928	9686076511	7411711261	rakeshrake763@gmail.com

Class Teacher

HOD

Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K.S. INSTITUTE OF TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGG.
IV B SEC STUDENT LIST 2024-2025

USN	NAME OF THE STUDENT	HOSTEL/ DAY SCHOLAR	Total ARREARS	Gender	STUDENT PHONE NUMBER	FATHER PHONE NUMBER	MOTHER PHONE NUMBER	EMAIL ID
1KS23CS063	KAVYA SHREE R	Day Scholar	0	Female	8660137616	9663617675	7204317006	kavyashree1705@gmail.com
1KS23CS064	KEERTHANA M	Day Scholar	0	Female	9113581864	9538421215	6360811776	keerthanam0516@gmai.com
1KS23CS065	KHUSHI M P	Day Scholar	0	Female	8310859123	9845239169	9845334634	khushi.mp2015@gmail.com
1KS23CS066	KRITHIKA M	Day Scholar	0	Female	8867842598	9449186850	9686585286	Krithikam0111@gmail.com
1KS23CS067	KRUTHIKA B	Day Scholar	0	Female	9019810398	9886749860	8105214859	kruthikab2005@gmail.com
1KS23CS068	LAVANYA B R	Day Scholar	0	Female	8792319709	9902514370	9964599742	lavanyardas5@gmail.com
1KS23CS069	LAVANYA R	Day Scholar	0	female	8310797897	9945334712	9113249992	lavulavu2005@gmail.com
1KS23CS070	LAYAA R	Day Scholar	7	female	9019921801	9448381353	7829777908	layaa.rv1810@gmail.com
1KS23CS071	LEKHANA K	Day Scholar	0	female	7676190927	9008064842	9008064842	klekhana02@gmail.com
1KS23CS072	LIKHITHA H	Day Scholar	0	female	9902498542	8884439672	9880659067	likhithahemanthkumar@gmail.com
1KS23CS073	LIKITHA N	Day Scholar	0	Female	8618741915	8971869841	7019513139	likithan369@gmail.com
1KS23CS074	LOHITH P C	Day Scholar	3	Male	7022154709	9741359068	7411104697	lohithpc4@gmail.com
1KS23CS075	M BHOOMIKA	Day Scholar	0	Female	9108904497	9845049497	9035292997	bhoomikamanjunath8769@gmail.com
1KS23CS076	MAGHAM PRATHIBHA	Hostel	0	Female	7989036833	9963322527	8989036833	prathibhamagham19@gmail.com
1KS23CS077	MAHADEV BASAVARAJ KUDARIMANI	Day scholar	0	Male	7259858696	9008358396	9008358396	mahadevbasavarajk@gmail.com
1KS23CS078	MANAS	Hostel	0	Male	9279370563	7717793202	9473095256	manasmishhraa@gmail.com
1KS23CS079	MANASWINI ANAND M	Day scholar	0	Female	7892827163	9066555590	9900954312	manurupa45@gmail.com
1KS23CS080	MANISH K M	Day scholar	5	Male	8088642065	9849694414	7093657696	manish.musuno@gmail.com
1KS23CS081	MANISH KUMAR RAY	Hostel	0	Male	9315355345	6362777603	8287520149	maniishhroy@gmail.com
1KS23CS082	MANNALA PRAGATHISWARI	Day Scholar	0	Female	9380440320	9880373510	8951222057	narashimha.roshni@gmail.com
1KS23CS083	MANYA B R	Day Scholar	1	Female	8660016017	9900270733	9741231097	manyamanu281@gmail.com
1KS23CS084	MOHAMMAD SUFIYAAN MECCAI	Day scholar	0	Male	8050127035	9845470013	9980935283	sufiyaanmeccai10.tews@gmailcom
1KS23CS085	MOHAMMED SHAZAN	Day Scholar	0	Male	7795074171	9738524296	8710857869	mohammedshazan888@gmail.com
1KS23CS086	MOHAN GOWDA V C	Day Scholar	0	Male	63643758926	9901712999	9901712999	mohangowda4983@gmail.com
1KS23CS087	MOKSHA K S	Day scholar	0	Female	7026850803	9740991212	9620419912	mokshaks14@gmail.com
1KS23CS088	MUHAMMED HAMZA	Day Scholar	0	Male	8792571097	79-96990549	+91 866-0273	hamzapvt225@gmail.com
1KS23CS089	MYTHRI BALAMURUGAN	Day scholar	0	Female	9739589422	9845536417	9980326741	mythribala01@gmail.com
1KS23CS090	NAMRATHA M H	Day Scholar	0	Female	7892135927	9880731555	7760560555	namrathamh03@gmail.com
1KS23CS091	NANDITHA M	Day Scholar	0	Female	9901579464	9880859186	6363066753	nanditham65@gmail.com
1KS23CS092	NAVYA P	Day scholar	0	female	8618474735	9844522325	9480205038	navyap942@gmail.com
1KS23CS093	NETTEM CHANDANA	Hostel	0	female	6304154123	9391786584	8919467841	chandananettem1212@gmail.com
1KS23CS094	NIKHIL KUMAR P E	Day scholar	0	Male	7892675929	9886756714	7892675929	nikhilkumarpe@gmail.com
1KS23CS095	NIKHIL NARAYAN HEGDE	Day scholar	0	Male	9880883255	9480451481	9482067174	hegdenikhil22@gmail.com

34	1KS23CS096	NISARGA N	Day scholar	0	female	9019836804	9535215812	7676089160	niiiiisarga@gmail.com
35	1KS23CS097	NISHANTH C P	Day scholar	0	Male	8618270148	9980465040	9611582887	nishanthcp0902@gmail.com
36	1KS23CS098	NISHANTH P	Day scholar	0	Male	7411748091	8710881333	8105156587	nishanthshetty620@gmail.com
37	1KS23CS099	NIVEDITHA NAG N V S	Hostel	0	Female	9606843900	9448343930	6364754835	nivinagnvs@gmail.com
38	1KS23CS100	P V SRIKANTH KASHYAP	Day scholar	0	Male	7259966201	96860 95447	99017 71928	pvsrikanth06@gmail.com
39	1KS23CS101	PAIDIMUDDALA GOWTHAM	Day scholar	1	Male	8125242758	9704019869	6363736499	pgowtham6363736499@gmail.com
40	1KS23CS102	PAVAN GOWDA S	Day scholar	0	Male	9980690997	9740155596	8660089538	pavangowda30911@gmail.com
41	1KS23CS103	PAVAN SAI P	Day scholar	1	Male	8095589819	9880694302	8309068650	ppavansai765@gmail.com
42	1KS23CS104	PINKEY KAVAR BIKA	Day scholar	0	Female	7406301579	9916167523	9620337067	pinkeyy2004@gmail.com
43	1KS23CS105	POOJA	Hostel	0	Female	7975979687	9739727444	8660148908	wadikarpooja1@gmail.com
44	1KS23CS106	POONAMLAL L	Day scholar	0	Male	7483176991	9964041659	9024084248	poonamlalsuthar518@gmail.com
45	1KS23CS107	PRAGNA M	Day scholar	0	Female	9380231385	9880426250	9663682054	pragnamohan1716@gmail.com
46	1KS23CS108	PRAJWAL B RAGHUVEER	Day scholar	0	Male	8105336328	9980028965	9945597093	prajwal.raghuveer@gmail.com
47	1KS23CS109	PRAJWAL N	Day scholar	0	Male	9513495837	9731187461	9916650762	prajwalgowda1262005@gmail.com
48	1KS23CS110	PRANAV C M	Day scholar	0	Male	9620144467	9620234467	9620003233	cmpranav8@gmail.com
49	1KS23CS111	PRANAV SHASTRI	Day scholar	0	Male	7483986779	9741422332	9611059977	pranav.shastri2005@gmail.com
50	1KS23CS112	PRANAVIKA M	Day scholar	0	Female	7760567219	9449345067	8904262748	manivasakampranavika024@gmail.com
51	1KS23CS114	PRIYADHARSHINI E P	Day scholar	0	Female	7259905558	9538328179	9845198389	priyadharshiniep05@gmail.com
52	1KS23CS115	PRIYANKA M	Day scholar	0	Female	7899012276	9945726197	7760857398	priyankasonu673@gmail.com
53	1KS23CS116	PUNITH P	Day scholar	2	Male	8310563229	9986836134	8971632863	punithp.1307@gmail.com
54	1KS23CS117	PUNYA SHREE B	Day scholar	0	Female	8095833256	9945082693	9535349371	br0718987@gmail.com
55	1KS23CS118	R NITISH	Day scholar	0	MALE	9042408198	9944596895	8431923238	nitish778706@gmail.com
56	1KS23CS119	RAGHU J	Hostel	0	Male	9008443879	7625018209	9148857588	raghuraghu36534@gmail.com
57	1KS23CS120	RAJATH KUMAR Y G	Day scholar	0	Male	9535518184	9535617262	9164182041	rajathkumaryg@gmail.com
58	1KS23CS121	RASHMI SONI	Day scholar	0	Female	9140005370	7992138827	8707736647	sonirashmi12121@gmail.com
59	1KS23CS122	RAVI CHANDRA K	Day scholar	0	Male	7975379859	9945864224	9739616559	ravichandra9859@gmail.com
60	1KS23CS123	RAZIYA KHAN	Day scholar	0	Female	7619353444	9632010279	9620012023	khanraziya790@gmail.com
61	1KS23CS124	REEMA J	Day scholar	0	Female	8088771146	9449829959	9449829958	reemajithu154@gmail.com
62	1KS23CS125	RITIKA SINGH	Day scholar	0	Female	9334842733	7004427163	8521073578	ritikasingh3639@gmail.com
63	1KS24CS401	BHAVITHA E G	Day scholar	0	Female	7625011463	7892303104	8073914668	bhavithachinni85@gmail.com
64	1KS24CS405	NAGASHREE S	Day scholar	2	Female	8431975905	9731715791	8497032051	nagashreenagu304@gmail.com
65	1KS24CS414	SWATHI G A	Hostel	0	Female	8660312017	9008526629	9945246129	swathigowdru1742@gmail.com
66	1KS24CS408	Puneeth S V	Day Scholar	1	Male	9481965861	9282973422	9482973422	punithsv948@gmail.com
67	1KS24CS400	Anil Kumar N	Day Scholar	0	Male	7022142490	8884169277	8884169277	anilammu217@gmail.com
68	1KS24CS410	RAJEEV B S	Day Scholar	0	Male	9739981475	7259827192	9620898303	rajeevrajeev9739@gmail.com

Class Teacher

HOD

Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K S INSTITUTE OF TECNOLOGY BANGALURU -560109

DEPARTMENT OF COMPUTER SCIENCE &ENGG

IV SEMESTER C SECTION

SL. NO	USN	NAME OF THE STUDENT	Hostel/ Day Scholar	Total Arrear	Gender	Mail Id	Student Mobile Number	Father's Name	Father's Number	Mother's Name	Mother's Number	DD/MM/YYYY	Age
1	1KS23CS126	RUBY KUMARI R	Day Scholar	0	Female	rohithkamath492@gmail.com	8050035131	RADHEY SHYAM KAMATH	9980493417	BIMAL DEVI	9980493417	28/01/2004	21
2	1KS23CS127	RUDRESH SIDDAPPA CHAKRASALI	Hostel	0	Male	rudreshsc29@gmail.com	7795387605	Siddappa	9739336155	Shanta	9739336154	02/02/2005	20
3	1KS23CS128	RUSHITHA K	Day Scholar	0	Female	rushithakola@gmail.com	9113361250	Murali naidu .k	9242219371	Nethravathi .k	6363661539	06-07-2006	18
4	1KS23CS129	S AVINASH	Day Scholar	0	Male	savinash9140@gmail.com	7795150609	Surya Prakash	8861646696	Venkata Ramanamma	8861646696	06/03/2005	20
5	1KS23CS130	S HARSHA	Day Scholar	2	Male	harshashivakumar778@gmail.com	7760738390	P Shivakumar	76769 16599	M Suma	8147769838	07/07/2005	20
6	1KS23CS131	S SUMANTH	Day Scholar	0	Male	Sunkavallysumanth@gmail.com	6360665219	S.Ramakrishna	7338265112	S.srilakshmi	8147741585/ 9535380426	21/05/2024	19
7	1KS23CS132	S V NAVYA	Day Scholar	0	Female	s v navya7@gmail com	6364808179	H.A.SUBRAMANYA	9740296439	K.VANI	9535031760	24/05/2005	19
8	1KS23CS133	SACHIN R	Day Scholar	0	Male	Sachinramasamy9845@gmail com	8660871477	K Ramasamy	6361935963	R Revathy	6361935963	21-12-2004	21
9	1KS23CS134	SADHANA M	Day Scholar	0	Female	sadanasadana453@gmail com	7975239724	Mani.S	9341264594	Maheswari	9341264594	07/05/2005	20
10	1KS23CS135	SAGARIKA B PATIL	Day Scholar	0	Female	sagabpatil@gmail com	8310142676	Bhimagouda Patil	9880394004	Vijaylaxmi Patil	9845965544	12/03/2005	20
11	1KS23CS136	SAJJANA D	Day Scholar	0	Female	sahanadsahanad812@gmail com	9108389540	M Devaraju	9845696216	Nagamani	9900098039	8122005	10
12	1KS23CS137	SAKSHI RAMESH	Day Scholar	0	Female	Sakshiramesh9@gmail com	8073222919	Ramesh shantaram	9886709067	Preeti ramesh	8618622647	09/03/2005	20
13	1KS23CS138	SANDHYA	Day Scholar	0	Female	sandhyashet005@gmail com	8197371266	Sachchidananda N	9686716577	Sujatha S	7411275622	01/07/2005	19
14	1KS23CS139	SANJANA JAGANNATHA	Day Scholar	0	Female	sanjanaj250605@gmail com	9449724833	JAGANNATHA V	9449033200	ROOPASHREE M G	9449044258	25/06/2005	20
15	1KS23CS140	SANJANA N	Day Scholar	1	Female	sanjanaa0605@gmail com	8867343404	Nagendra	9972511339	Chanthra	9972511339	26/06/2005	19
16	1KS23CS141	SANJAY T	Day Scholar	0	Male	sanjaytalluri112@gmail com	7892906303	Naresh T	6362319212	T Thrangini	6362319212	09/05/2004	20
17	1KS23CS142	SANKEETH KUMAR K R	Day Scholar	0	Male	sankeethkagod18@gmail com	7019415033	Ramachandra B	6361427993	Pushpa	6361427993	17-05-2005	19
18	1KS23CS143	SARVAGNA S RAO	Day Scholar	0	Male	sarvagnasr@gmail com	7349720933	Sudheendra R Rao	9945516116	Srudevi S	9945516116	30/01/2006	19
19	1KS23CS144	SHAMA SHIVARAJ SHETTY	Day Scholar	0	Female	shamashetty2005@gmail com	7760327926	Shivaraj	9880481222	Shilpa	9482472571	13/05/2005	20
20	1KS23CS145	SHAMITH GOWDA A G	Day Scholar	0	Male	shamithgowda5210@gmail com	7892513941	G Gnappa	9481886146	Shubhamangala B P	9448107279	10/02/2005	20
21	1KS23CS146	SHASHANK GOWDA U	Day Scholar	0	Male	shashankgowda1236628@gmail com	8431532627	UMESH K	7019465431	CHANDRUKALA	7406955619	01/05/2005	20

22	1KS23CS147	SHIVA M	Day Scholar	0	Male	sm3467928@gmail.com	7483873164	Munishami	9663406288	Amaravathi	7338491590	26/12/2005	19
23	1KS23CS148	SHIVAMANI N	Day Scholar	3	Male	shivamanin70@gmail.com	8310951942	V Nagaraj Reddy	9686697392,	Manjula H R	9481329137	27/06/2005	19
24	1KS23CS149	SHRAVYA PRAKASH	Day Scholar	0	Female	shravyaprakash05@gmail.com	6360463335	PRAKASHA C	8904459266	GV LALITHAMBHA	7676369166	27/05/2005	19
25	1KS23CS150	SHREYA S	Day Scholar	0	Female	shreyasathish7@gmail.com	9164506228	Sathish	9741834635	Shashikala	9901604089	08/07/2005	19
26	1KS23CS151	SHREYA S UPADHYA	Day Scholar	1	Female	upadhyashreya05@gmail.com	9480942790	Shivakumar R	702660125	Hemalatha K S	9449311925	26/06/2005	19
27	1KS23CS152	SHREYAS S	Hostel	0	Male	shreyas290806@gmail.com	7259938684	Suresh	8197228694	Shyla	9880788160	14/07/2005	18
28	1KS23CS153	SHRIHARI I B	Day Scholar	0	Male	ibshrihari@gmail.com	8951730070	BALAKRISHNA BHAT I	9380022974	SHASHIKALA	9972307643	05/03/2005	20
29	1KS23CS154	SHRISHA C M	Day Scholar	0	Male	cmshrisha@gmail.com	8073683020	Madhusudana Rao C R	9740091960	Veena H V	9482735368	29/10/2005	19
30	1KS23CS155	SHRUSTI L	Day Scholar	0	Female	shrustishetty016@gmail.com	9845098575	S LINGESH	9980874420	L NAGAMANI	8861182123	16/01/2005	20
31	1KS23CS156	SHRUSTI L	Day Scholar	1	Female	srustishrusti@gmail.com	7795010916	LINGARAJU	9880355096	RAMYA	7019812887	17/02/2004	21
32	1KS23CS157	SOMESH K N	Day Scholar	0	Male	someshkori07@gmail.com	9481488388	NATARAJ K S	9480100255	REKHA K N	9480100255	27/06/2005	20
33	1KS23CS158	SRAVYA ILLURI	Hostel	0	Female	sravyailluri0203@gmail.com	9490054888	I SRIDHAR BABU	9866654888	I LAKSHMI TULASI	9963629977	02/03/2006	19
34	1KS23CS159	SRIGOWRI S KULKARNI	Day Scholar	0	Female	kulkarnisrigowri@gmail.com	7019636214	Sriharı P Kulkarni	8792719957	Anitha S	9972678787	23/04/2005	20
35	1KS23CS160	SUDARSHAN VEERABHADRAPPA GONDI	Day Scholar	0	Male	sudarshanvg4@gmail.com	9844678899	Veerabhadrappa	8904501625	Sudha	8904501625	26/01/2004	21
36	1KS23CS161	SUDHANVA K JOSHI	Hostel	0	Male	sudhanvajoshi.dp@gmail.com	7483403723	Karan Joshi	9740317739	Samana Joshi	9740317739	12/10/2005	19
37	1KS23CS162	SUREKHA T S	Hostel	0	Female	surekhatssridharatv2119@gmail.com	8073732119	SRIDHARA T V	7095408941	RAMAKKA	7095408941	13/02/2005	20
38	1KS23CS163	T S R SRIRAGA	Day Scholar	0	Female	tsrsriraga@gmail.com	8277089213	TVS VEERESH BABU	9663310795	T NEELIMA	9448309071	13/04/2005	20
39	1KS23CS164	TALLURU SAHITHYA	Day Scholar	0	Female	sahithya6360@gmail.com	6361800724	TALLURU BABU	7675914003	TALLURU RAJESWARI	7675914012	10/08/2006	18
40	1KS23CS166	TARUN R	Day Scholar	0	Male	rtarun2005@gmail.com	7259310465	Roopesh V	9980788032	Mamatha MB	9535651739	06/01/2005	20
41	1KS23CS167	THANUSHREE V S	Hostel	0	Female	thanushreethanu872@gmail.com	9731794248	Siddheshwaraih	8694921045	Umadevi	8694921045	07/10/2005	19
42	1KS23CS168	UJWAL G NAIK	Day Scholar	0	Male	ujwalgnaik7@gmail.com	8762700373	Ganapati	9353605225	Bhagyalakshmi	9341126269	05/06/2005	19
43	1KS23CS169	VARNIKA G	Day Scholar	0	Female	varnikanirmala@gmail.com	9108650379	Ganesh	9611923741	Nirmala	9611923741	11/01/2006	19
44	1KS23CS170	VARSHA D R	Hostel	0	Female	Varshadraj2@gmail.com	7676310939	RAJU D N	99001926149,	ASHA	94829261 49	09/04/2005	20
45	1KS23CS171	VARSHA DATTATREYA BHAT	Hostel	0	Female	varshabhatbekemath10@gmail.com	7975803851	DATTATREYA NARAYAN BHAT	9482557221	SOUBHADRA DATTATREYA BHAT	9482557221	10/05/2005	20
46	1KS23CS172	VARSHA S K	Hostel	1	Female	varshask54@gmail.com	6360381312	KODANDA RAMAIAH SN	99458792?8	SUNANDAMMA R	7483612020	10/05/2004	20

47	1KS23CS173	VARSHITHA	Hostel	0	Female	varshithachowdharyvarsha@gmail.co	6361328338	S PURUSHOTHAMA	7022299772	VENKATALAKSHMI	9353197849	12/04/2005	20
48	1KS23CS175	VATSAL VIGNESH B C	Day Scholar	3	Male	vatsalvignesh@gmail.com	9535380426	Chalapathy BG	9035434965	Dakshayeni BA	9035434965	31/10/2004	20
49	1KS23CS176	VEERENDRA R	Hostel	0	Male	rvirupakshigouda@gmail.com	7483620244	Virupakshi gowda R	9741244989	Sharanamma R	8618146877	03/11/2005	19
50	1KS23CS177	VENKAT S S	Day Scholar	0	Male	venkatss827@gmail.com	8496920926	Srirama s b	8496920926	Aruna k v	7259938684	11,01,2006	19
51	1KS23CS178	VIGASINI S	Day Scholar	0	Female	vigasini06@gmail.com	8762980085	Shankar L	9739540099	Nandini Devi P	7259804158	08/05/2005	19
52	1KS23CS179	VIJAYALAKSHMI C	Day Scholar	0	Female	vijayalakshmics05@gmail.com	8884363235	Cheluvappa S	9743034043	Shanthala C P	9743034043	23/09/ 2005	19
53	1KS23CS180	VIKAS K B	Day Scholar	0	Male	vikasvikki533@gmail.com	7019490781	Bhaskar C	9740130775	Rathnamma	9663428195	17-07-2005	19
54	1KS23CS181	VINITH M R	Day Scholar	2	Male	vinith.m45@gmail.com	9353798842	Ramesh M	7795183286	Geetha	9740105128	27/08/2005	19
55	1KS23CS182	VISHAL R	Day Scholar	0	Male	vishalravi163@gmail.com	8147741585	Ravi	9886482264	Sandhya	9036091585	21/04/2004	21
56	1KS23CS183	VISHAL T K	Hostel	0	Male	tkvishal637@gmail.com	8088813558	Krishna Murthy TG	8431445583	Lavanya TK	9611130950	30/04/2006	19
57	1KS23CS184	VISHAL VASS S	Day Scholar	4	Male	vishalvass@gmail.com	9535075934	Srinivas	9448067392	Radhika	99020 13385	20/01/2005	20
58	1KS23CS185	VUNNAM THANUJA	Hostel	0	Female	vunnamthanuja20@gmail.com	9014514961	VUNNAM RAVIKUMAR	9494124709	VUNNAM SIRISHA	9908316393	20/02/2006	19
59	1KS23CS186	YASHASWI R	Day Scholar	0	Female	yashaswi0621@gmail.com	9019908189	Raghavendra B S	8550085155,	Ashwini B C	7899130445	21/03/2006	19
60	1KS23CS187	YASHASWINI K T	Hostel	0	Female	yashaswinik03@gmail.com	8088941393	D Thibbegowda	9110262771	Sujatha	7022094411	30/05/2005	19
61	1KS23CS188	YASHASWINI S	Day Scholar	0	Female	syashaswini32@gmail.com	9448617542	Suresh M	9964649955	Devaki S	9036705040	12/09/2005	19
62	1KS24CS402	DARSHAN K R	Day Scholar	0	Male	darshankr1359cse@gmail.com	8867208294	RAMACHANDRA	9632891368	SUKANYA	9008016065	09/08/2005	19
63	1KS24CS409	RACHANA	Day Scholar	0	Female	ramaswamy370@gmail.com	8123361638	Jayaramu	9741037258	Sowmya	9591037258	25/05/2005	20
64	1KS24CS403	GAGAN GOWDA D	Day Scholar	3	Male	gagangowda200410@gmail.com	7676963792	DODDAVEERE GOWDA	7406968020	PAVITHRA	7406968020	16/12/2004	20
65	1KS24CS413	VARSHINI J	Day Scholar	0	Female	varshaneela19@gmail.com	9902102377	JayaKumar S	9482546695	Neelamma M	9482546695	19/02/2005	21
66	1KS24CS404	KEERTHAN A	Hostel	5	Male	keerthan3105@gmail.com	9686362920	ARUN KUMAR N	9342223606	SHARADA G	9731715605	31/05/2003	21
67	1KS24CS412	RAKESH R	Day Scholar	0	Male	ravivishalamma@gmail.com	7975562971	RAVI P	8496044642	VISHALAMMA	8496044642	21/03/2004	20

CLASS TEACHER SIGNATURE

HOD SIGNATURE

Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU-109

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

IV SEMESTER TIME TABLE FOR THE YEAR 2024-2025 (EVEN SEMESTER)

W.E.F: 10-02-2025

SEM: IV A

CLASS TEACHER: Mr. Lakshmikantha K

CLASS ROOM: OB 206

PERIOD	1	2	10:20 AM-10.35 AM	3	4		5	6	7
TIME DAY	8:30 AM-9:25AM	9:25 AM-10.20 AM		10:35 AM-11:30 AM	11:30 AM-12.25 PM	12:25 PM-01:15 PM	01:15PM-02:10 PM	02.10 PM - 03.05 PM	03.05 PM - 04.00 PM
MON	ANALYSIS & DESIGN OF ALGORITHMS LAB (BCSL404) - A1 BATCH		TEA BREAK		DMS (BCS405A)	LUNCH BREAK	DBMS (BCS403)	ADA (BCS401)	MC (BCS402)
TUE	BE (BBOK407)	DMS (BCS405A)		MC (BCS402)	ADA (BCS401)		MICROCONTRLOLLERS LAB - A1 BATCH DBMS LAB - A2 BATCH		
WED	BE (BBOK407)	ADA (BCS401)		DMS (BCS405A)	MC (BCS402)		UHV (BUHK408)	DBMS (BCS403)	UI/UX (BCS456C)
THUR	MICROCONTRLOLLERS LAB - A2 BATCH DBMS LAB - A1 BATCH				DBMS (BCS403)		SKILL LAB		
FRI	DBMS (BCS403)	DMS (BCS405A)		ADA (BCS401)	MC (BCS402)		ANALYSIS & DESIGN OF ALGORITHMS LAB (BCSL404) - A2 BATCH		

Subject Code	Subject Name	Faculty Name
BCS401	ANALYSIS & DESIGN OF ALGORITHMS	Dr. Vijayalaxmi Mekali
BCS402	MICROCONTRLOLLERS	Mrs. Amritha R
BCS403	DATABASE MANAGEMENT SYSTEMS	Mr. Somashekar T
BCSL404	ANALYSIS & DESIGN OF ALGORITHMS LAB	Mrs. Sheba Jebakani , Mr. Lakshmikantha K
BCS405A	DISCRETE MATHEMATICAL STRUCTURES	Dr. Jalaja P
BCS456C	UI/UX	Ms. Namyapriya D
BCS402	MICROCONTRLOLLERS LAB	Mrs. Amritha R & Mr. Vishvakiran R C
BCS403	DATABASE MANAGEMENT SYSTEMS LAB	Mr. Somasekhar T & Mrs. Roopa Deshpande & Mrs.Majula V
BBOK407	BIOLOGY FOR ENGINEERS	Dr. Shobha
BUHK408	UNIVERSAL HUMAN VALUES COURSE	Mrs. Amritha R

TIME TABLE INCHARGE

HOD
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

PRINCIPAL
K.S. INSTITUTE OF TECHNC
BENGALURU - 560 109.

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU-109

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

IV SEMESTER TIME TABLE FOR THE YEAR 2024-25 (EVEN SEMESTER)

W.E.F: 10-02-2025
SEM: IV B

CLASS TEACHER: Mr. Vishvakiran R C
CLASS ROOM: OB 207

PERIOD	1	2	10:20 AM-10.35 AM	3	4	12:25 PM-01:15 PM	5	6	7
TIME / DAY	8:30 AM-9:25AM	9:25 AM-10.20 AM		10:35 AM-11:30 AM	11:30 AM-12.25 PM		01:15PM-02:10 PM	02.10 PM - 03.05 PM	03.05 PM - 04.00 PM
MON	MC (BCS402)	ADA (BCS401)		BE (BBOK407)	MC (BCS402)		B1-ADA LAB (BCSL404)		
TUE	B2 - MC LAB (BCS402) / B1 - DBMS LAB (BCS403)				BE (BBOK407)		DMS (BCS405A)	DBMS (BCS403)	ADA (BCS401)
WED	DBMS (BCS403)	MC (BCS402)		DMS (BCS405A)	UI/UX (BCS456C)		B1 - MC LAB (BCS402) /B2 - DBMS LAB (BCS403)		
THUR	B2-ADA LAB (BCSL404)				DMS (BCS405A)		DBMS (BCS403)	MC (BCS402)	DMS (BCS405A)
FRI	ADA (BCS401)	DBMS (BCS403)		ADA (BCS401)	UHV (BUHK408)		SKILL LAB		

TEA BREAK

LUNCH BREAK

Subject Code	Subject Name	Faculty Name
BCS401	ANALYSIS & DESIGN OF ALGORITHMS	Dr. Sowbhagya M P
BCS402	MICROCONTRLOLLERS	Mr. Vishvakiran R C
BCS403	DATABASE MANAGEMENT SYSTEMS	Dr. P Soubhagyalakshmi
BCSL404	ANALYSIS & DESIGN OF ALGORITHMS LAB	Dr. Sowbhagya M P & Mr. Abhilash L Bhat
BCS405A	DISCRETE MATHEMATICAL STRUCTURES	Mr. Venkataramana B S
BCS456C	UI/UX	Ms. Namyapriya D
BCS402	MICROCONTRLOLLERS LAB	Mr. Vishvakiran R C & Mrs. Amritha R
BCS403	DATABASE MANAGEMENT SYSTEMS LAB	Dr. P Soubhagyalakshmi & Mrs. Ramya R
BBOK407	BIOLOGY FOR ENGINEERS	Dr. Shobha
BUHK408	UNIVERSAL HUMAN VALUES COURSE	Mrs. Swapna S Banasode

TIME TABLE INCHARGE

HOD
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

PRINCIPAL
PRINCIPAL
K.S. INSTITUTE OF TECHNOL
BENGALURU - 560 109.

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU-109

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

IV SEMESTER TIME TABLE FOR THE YEAR 2023-2024 (EVEN SEMESTER)

W.E.F: 10-02-2025

CLASS TEACHER: Mrs. Sheba Jebakani

SEM: IV C

CLASS ROOM: OB 208

PERIOD	1	2	10:20 AM-10.35 AM	3	4		5	6	7
TIME / DAY	8:30 AM-9:25AM	9:25 AM-10.20 AM		10:35 AM-11:30 AM	11:30 AM-12.25 PM	12:25 PM-01:15 PM	01:15PM-02:10 PM	02.10 PM - 03.05 PM	03.05 PM - 04.00 PM
MON	DMS (BCS405A)	MC (BCS402)	TEA BREAK	DBMS (BCS403)	UHV (BUHK408)	LUNCH BREAK	MC (BCS402)	ADA (BCS401)	UI/UX (BCS456C)
TUE	ADA (BCS401)	DBMS (BCS403)		DMS (BCS405A)	MC (BCS402)		C1 -ADA LAB (BCSL404)		
WED	C2 - MC LAB (BCS402) / C1 - DBMS LAB (BCS403)				ADA (BCS401)		SKILL LAB		
THUR	BE (BBOK407)	DMS (BCS405A)		ADA (BCS401)	DBMS (BCS403)		C1 - MC LAB (BCS402) / C2 - DBMS LAB (BCS403)		
FRI	C2 -ADA LAB (BCSL404)				BE (BBOK407)		DBMS (BCS403)	MC (BCS402)	DMS (BCS405A)

Subject Code	Subject Name	Faculty Name
BCS401	ANALYSIS & DESIGN OF ALGORITHMS	Mrs. Sheba Jebakani
BCS402	MICROCONTRLOLLERS	Mrs. Amritha R
BCS403	DATABASE MANAGEMENT SYSTEMS	Mrs. Suma Rajesh Ananthakrishna
BCSL404	ANALYSIS & DESIGN OF ALGORITHMS LAB	Mr. Lakshmikantha K & Mrs. Sheba Jebakani
BCS405A	DISCRETE MATHEMATICAL STRUCTURES	Mrs. Rekha
BCS456C	UI/UX	Ms. Namyapriya D
BCS402	MICROCONTRLOLLERS LAB	Mrs. Amritha R & Mr. Sanjoy Das
BCS403	DATABASE MANAGEMENT SYSTEMS LAB	Mrs. Suma Rajesh Ananthakrishna & Mrs. Ramya R
BBOK407	BIOLOGY FOR ENGINEERS	Dr. Shobha
BUHK408	UNIVERSAL HUMAN VALUES COURSE	Mrs. Kodur Srividya

TIME TABLE INCHARGE

HOD
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

PRINCIPAL
PRINCIPAL
K.S. INSTITUTE OF TECHNOLOGY
BENGALURU - 560 109.

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU-109

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

INDIVIDUAL TIME TABLE FOR THE YEAR 2024-2025 (EVEN SEMESTER)

W.E.F:10-02-2025

NAME OF THE FACULTY: Dr. Vijayalaxmi Mekali **DESIGNATION:Professor**

PERIOD	1	2	10:20 AM-10.35 AM	3	4		5	6	7
TIME DAY	8:30 AM-9:25AM	9:25 AM-10.20 AM		10:35 AM-11:30 AM	11:30 AM-12.25 PM	12:25 PM-01:15 PM	01:15PM-02:10 PM	02.10 PM - 03.05 PM	03.05 PM - 04.00 PM
MON	DS & APS (M.TECH)		TEA BREAK	DS & APS (M.TECH)		LUNCH BREAK		ADA (A)	
TUE					ADA (A)		TECHNICAL SEMINAR		
WED		ADA (A)		DS & APS (M.TECH)					
THUR							PW -1 (BCS685) - A1		
FRI				ADA (A)			PW -1 (BCS685) - A1		

	Subject Code	Subject Name	Sem	Section	Work Load
Subject	BCS401	ANALYSIS & DESIGN OF ALGORITHMS	IV	A	4 Hrs / Week
	MCS103	DATA STRUCTURES & ALGORITHMS FOR PROBLEM SOLVING	I	M.TECH	3 Hrs / Week
Lab	21CS81	TECHNICAL SEMINAR	VIII		3 Hrs / Week
	BCS685	PROJECT PHASE I	VI	A1	4 Hrs / Week
TOTAL LOAD= 14 Hrs/Week					

TIME TABLE INCHARGE

HOD
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

PRINCIPAL
PRINCIPAL
K.S. INSTITUTE OF TECHNOLOGY
BENGALURU - 560 109.

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU-109

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

INDIVIDUAL TIME TABLE FOR THE YEAR 2024-2025 (EVEN SEMESTER)

W.E.F:10-02-2025

NAME OF THE FACULTY: Dr. Sowbhagya M P **DESIGNATION: Associate Professor**

PERIOD	1	2	10:20 AM-10.35 AM	3	4		5	6	7
TIME DAY	8:30 AM-9:25AM	9:25 AM-10.20 AM		10:35 AM-11:30 AM	11:30 AM-12.25 PM	12:25 PM-01:15 PM	01:15PM-02:10 PM	02.10 PM - 03.05 PM	03.05 PM - 04.00 PM
MON		ADA (B)	TEA BREAK			LUNCH BREAK	B1 -ADA LAB (BCSL404)		
TUE	PW -1 (BCS685) - B2								ADA (B)
WED				CD (BCS613C)	CD (BCS613C)				
THUR	B2 -ADA LAB (BCSL404)				CD (BCS613C)				
FRI	ADA (B)			ADA (B)					CD (BCS613C)

	Subject Code	Subject Name	Sem	Section	Work Load
Subject	BCS401	ANALYSIS & DESIGN OF ALGORITHMS	IV	B	4 Hrs/ Week
	BCS613C	COMPILER DESIGN	VI		4 Hrs / Week
Lab-1	BCSL404	ANALYSIS & DESIGN OF ALGORITHMS LAB	IV	B	6 Hrs /Week
Lab-2	BCS685	PROJECT PHASE I	VI	B	2 Hrs / Week
TOTAL LOAD= 16 Hrs/Week					

TIME TABLE INCHARGE

HOD
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

PRINCIPAL
PRINCIPAL
K.S. INSTITUTE OF TECHNOLOGY
BENGALURU - 560 109.

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU-109

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

INDIVIDUAL TIME TABLE FOR THE YEAR 2024-2025 (EVEN SEMESTER)

W.E.F:10-02-2025

NAME OF THE FACULTY: Mrs.Sheba Jebakani **DESIGNATION:Assistant Professor**

PERIOD	1	2	10:20 AM-10.35 AM	3	4		5	6	7
TIME DAY	8:30 AM-9:25AM	9:25 AM-10.20 AM		10:35 AM-11:30 AM	11:30 AM-12.25 PM	12:25 PM-01:15 PM	01:15PM-02:10 PM	02.10 PM - 03.05 PM	03.05 PM - 04.00 PM
MON	ADA(BCSL404) - A1 BATCH		TEA BREAK			LUNCH BREAK		ADA (C)	
TUE	ADA (C)						ADA LAB (BCSL404) - C1 BATCH		
WED					ADA (C)		ICP LAB (BESCK204E) - G1		
THUR				ADA (C)					
FRI	ADA LAB (BCSL404) - C1 BATCH						ADA LAB (BCSL404) - A2 BATCH		

	Subject Code	Subject Name	Sem	Section	Work Load
Subject - 1	BCS401	ANALYSIS & DESIGN OF ALGORITHMS	IV	C	4Hrs /Week
Lab -1	BCSL404	ANALYSIS & DESIGN OF ALGORITHMS LAB	IV	A & C	12Hrs /Week
Lab -2	BESCK204E	INRODUCTION TO C PROGRAMMING	II	G	2 Hrs/ Week
TOTAL LOAD= 18 Hrs/Week					

TIME TABLE INCHARGE

HOD
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

PRINCIPAL
PRINCIPAL
K.S. INSTITUTE OF TECHNOLOGY
BENGALURU - 560 109.

K INSTITUTE OF TECHNOLOGY, Bangalore

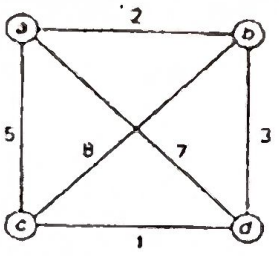
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

ASSIGNMENT QUESTIONS

Academic Year	**2024-2025**		
Batch	**2023-2027**		
Year/Semester/section	**II/IV/A, B, C**		
Subject Code-Title	**BCS401-Analysis and Design of Algorithms**		
Name of the Instructor	**Dr. Vijayalaxmi Mekali, Dr. Soubhagya M P Mrs. Sheba Jebakani**	**Dept**	**CSE**

Assignment No: 1 **Total marks:25**

Date of Issue: 8/4/2025 **Date of Submission: 17/4/2025**

Sl. No	Assignment Questions	K Level	CO	Marks
1.	**Make use of Example to explain** Asymptotic notations	Apply	CO1	2
2.	**Develop** an algorithm to find the maximum element in the list of n numbers. **Identify** the following a) Algorithm's basic operation b) Number of times the basic operation executes c) Derive its efficiency.	Apply	CO1	2
3.	**Show that** If $t1(n) \in O(g1(n))$ and $t2(n) \in O(g2(n))$ then $t1(n)+t2(n) \in O(\max\{g1(n), g2(n)\})$	Apply	CO1	1
4.	**Apply** Exhaustive Search to Find the optimal solution for the knapsack instance **n=4, m=20n=3, m=10, Profits (p_1, p_2, p_3) = (42, 12, 40, 25) and Weights (w_1, w_2, w_3) = (7, 3, 4, 5)**	Apply	CO2	2
5.	**Apply** Exhaustive Search to Find the optimal solution for given graph 	Apply	CO2	2
6.	**Experiment with** binary tree traversal with example	Apply	CO2	1
7.	**Apply** the Harspool string matching algorithm for the given text and pattern = TCCTATTCTT Text=TTATAGATCTCGTATTCTTTTTATAGATCTCCTATTCTT	Apply	CO3	2
8.	**Make use of** Distribution Counting Sorting algorithm to the list of elements **14, 12, 14, 14, 14, 13, 13, 10, 12**	Apply	CO3	1
	Practical activities (Execute the program and Submit the printout of program along with output)			
1.	**Develop** a C program to implement Bubble sort algorithm	Apply	CO1	1
	Build a C program for sequential search algorithm			

3.	**Build** a C program to find Unique element in the list of elements	Apply	CO1	1
4.	**Develop** a C program to implement Exhaustive solution for Knapsack problem	Apply	CO2	1
5.	**Build** a C program to implement insertion sort algorithm	Apply	CO2	1
6.	**Build** a C program to implement multiplication of large integers	Apply	CO2	1
7.	**Develop** a C program to implement Comparison counting sort algorithm	Apply	CO3	1
	Hacker Rank problem solving activity			
8	**Create** login credentials, if not already registered, in https://www.hackerrank.com/ website. Then go to prepare by Topics → Algorithms and click on solve problem. You need to solve alteast a few problems to get 30 points to obtain a badge for this assignment. Save a screenshot of the badge obtained. For each problem you solve, make a copy of the question, the program and a screenshot of how many hidden test cases were solved after you submit your program.	Apply	CO1 CO2 CO3	2 2 1

Signature of course in charge

Signature of HOD-CSE

Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
First ASSIGNMENT 2024-25 EVEN SEMESTER

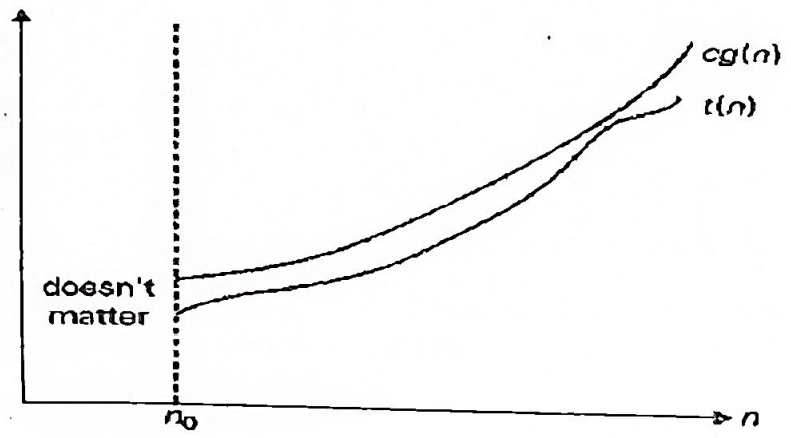
SCHEME AND SOLUTION
Assingment-1

Q. No	Answers	Marks
1	Make use of Example to explain Asymptotic notations	1

O-notation

DEFINITION 1 A function $t(n)$ is said to be in $O(g(n))$, denoted $t(n) \in O(g(n))$, if $t(n)$ is bounded above by some constant multiple of $g(n)$ for all large n, i.e., if there exist some positive constant c and some nonnegative integer n_0 such that

$$t(n) \leq cg(n) \quad \text{for all } n \geq n_0.$$

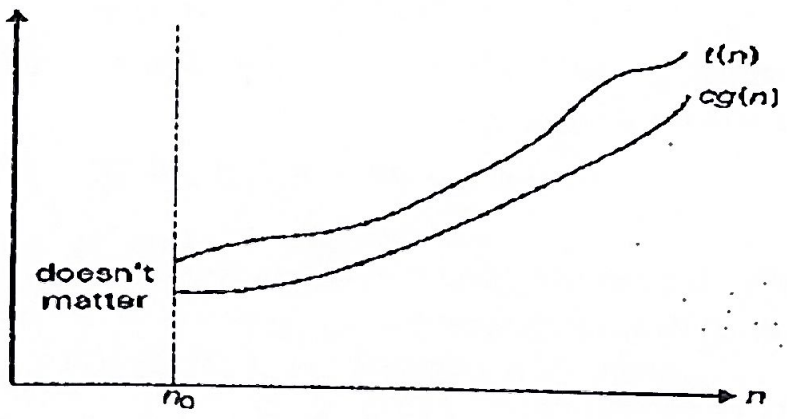


Ω-notation

DEFINITION 2 A function $t(n)$ is said to be in $\Omega(g(n))$, denoted $t(n) \in \Omega(g(n))$, if $t(n)$ is bounded below by some positive constant multiple of $g(n)$ for all large n, i.e., if there exist some positive constant c and some nonnegative integer n_0 such that

$$t(n) \geq cg(n) \quad \text{for all } n \geq n_0.$$

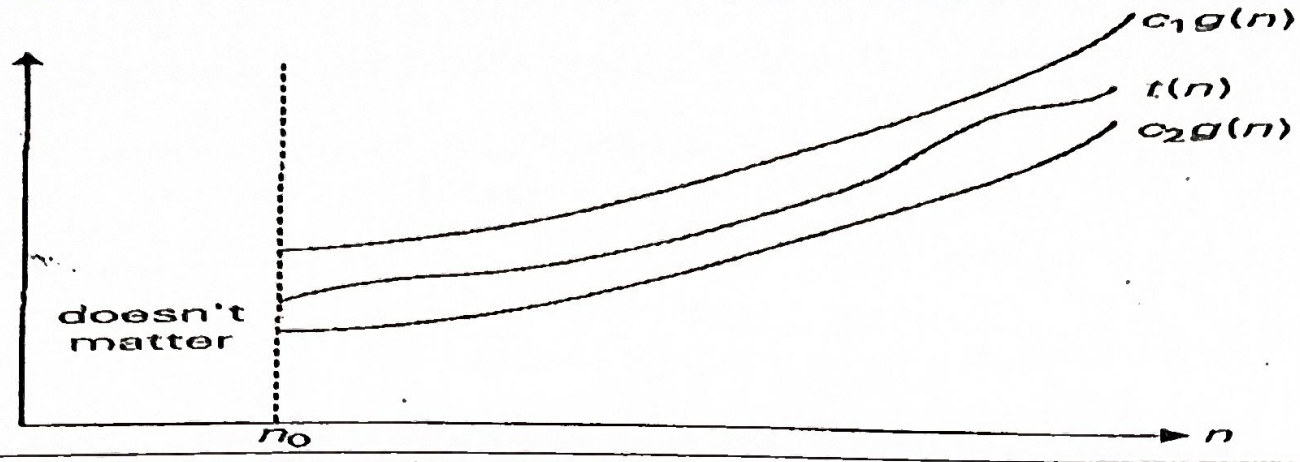
The definition is illustrated in Figure 2.2.



Θ-notation

DEFINITION 3 A function $t(n)$ is said to be in $\Theta(g(n))$, denoted $t(n) \in \Theta(g(n))$, if $t(n)$ is bounded both above and below by some positive constant multiples of $g(n)$ for all large n, i.e., if there exist some positive constant c_1 and c_2 and some nonnegative integer n_0 such that

$$c_2 g(n) \leq t(n) \leq c_1 g(n) \quad \text{for all } n \geq n_0.$$



2 Develop an algorithm to find the maximum element in the list of n numbers. Identify the following a) Algorithm's basic operation b) Number of times the basic operation executes c) Derive its efficiency. — 1

ALGORITHM *MaxElement*$(A[0..n-1])$
//Determines the value of the largest element in a given array
//Input: An array $A[0..n-1]$ of real numbers
//Output: The value of the largest element in A
$maxval \leftarrow A[0]$
for $i \leftarrow 1$ **to** $n-1$ **do**
  if $A[i] > maxval$
    $maxval \leftarrow A[i]$
return $maxval$

Basic operation: A[i] >max val

Let us denote $C(n)$ the number of times this comparison is executed and try to find a formula expressing it as a function of size n. The algorithm makes one comparison on each execution of the loop, which is repeated for each value of the loop's variable i within the bounds 1 and $n-1$ (inclusively). Therefore, we get the following sum for $C(n)$:

$$C(n) = \sum_{i=1}^{n-1} 1.$$

This is an easy sum to compute because it is nothing else but 1 repeated $n-1$ times. Thus,

$$C(n) = \sum_{i=1}^{n-1} 1 = n - 1 \in \Theta(n).$$ ■

3 Show that If t1(n) ∈ O(g1(n)) and t2(n) ∈ O(g2(n)) then t1(n)+t2(n) ∈ O(max{g1(n), g2(n)} — 1

PROOF (As you will see, the proof extends to orders of growth the following simple fact about four arbitrary real numbers a_1, b_1, a_2, and b_2: if $a_1 \le b_1$ and $a_2 \le b_2$, then $a_1 + a_2 \le 2 \max\{b_1, b_2\}$.) Since $t_1(n) \in O(g_1(n))$, there exist some positive constant c_1 and some nonnegative integer n_1 such that

$$t_1(n) \le c_1 g_1(n) \quad \text{for all } n \ge n_1.$$

Similarly, since $t_2(n) \in O(g_2(n))$,

$$t_2(n) \le c_2 g_2(n) \quad \text{for all } n \ge n_2.$$

Let us denote $c_3 = \max\{c_1, c_2\}$ and consider $n \ge \max\{n_1, n_2\}$ so that we can use both inequalities. Adding the two inequalities above yields the following:

$$\begin{aligned} t_1(n) + t_2(n) &\le c_1 g_1(n) + c_2 g_2(n) \\ &\le c_3 g_1(n) + c_3 g_2(n) = c_3[g_1(n) + g_2(n)] \\ &\le c_3 2 \max\{g_1(n), g_2(n)\}. \end{aligned}$$

Hence, $t_1(n) + t_2(n) \in O(\max\{g_1(n), g_2(n)\})$, with the constants c and n_0 required by the O definition being $2c_3 = 2\max\{c_1, c_2\}$ and $\max\{n_1, n_2\}$, respectively. ■

So what does this property imply for an algorithm that comprises two consecutively executed parts? It implies that the algorithm's overall efficiency is determined by the part with a larger order of growth, i.e., its least efficient part:

$$\left.\begin{array}{|l|}\hline t_1(n) \in O(g_1(n)) \\ \hline t_2(n) \in O(g_2(n)) \\ \hline \end{array}\right\} \quad t_1(n) + t_2(n) \in O(\max\{g_1(n), g_2(n)\}).$$

4	**Apply Exhaustive Search to Find the optimal solution for the knapsack instance n=4, m=20,n=3, m=10, Profits (p1, p2, p3) = (42, 12, 40, 25) and Weights (w1, w2, w3) = (7, 3, 4, 5)**	1

n = 4, m = 20, n = 3, m = 10

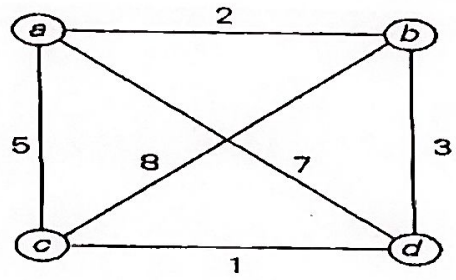
Profits $(P_1, P_2, P_3) = (42, 12, 40, 25)$ and

Weights $(W_1, W_2, W_3) = (7, 3, 4, 5)$

Subset	Total weight	Total value
Null set	0	0
{1}	7	42
{2}	3	12
{3}	4	40
{4}	5	25
{1, 2}	10	52
{1, 3}	11	Not feasible
{1, 4}	12	Not feasible
{2, 3}	7	52
{2, 4}	8	137
{3, 4}	9	65

Optimal value :- 65

5	**Apply Exhaustive Search to Fin d the optimal solution for given graph**	1



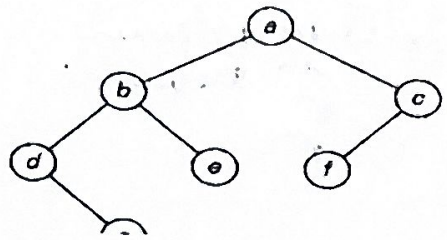
Tour	Length	
a —> b —> c —> d —> a	l = 2 + 8 + 1 + 7 = 18	
a —> b —> d —> c —> a	l = 2 + 3 + 1 + 5 = 11	optimal
a —> c —> b —> d —> a	l = 5 + 8 + 3 + 7 = 23	
a —> c —> d —> b —> a	l = 5 + 1 + 3 + 2 = 11	optimal
a —> d —> b —> c —> a	l = 7 + 3 + 8 + 5 = 23	
a —> d —> c —> b —> a	l = 7 + 1 + 8 + 2 = 18	

6	**Experiment with binary tree traversal with example**	1

A *binary tree T* is defined as a finite set of nodes that is either empty or consists of a root and two disjoint binary trees *TL* and *T11* called, respectively, the. left and right subtree of the root.

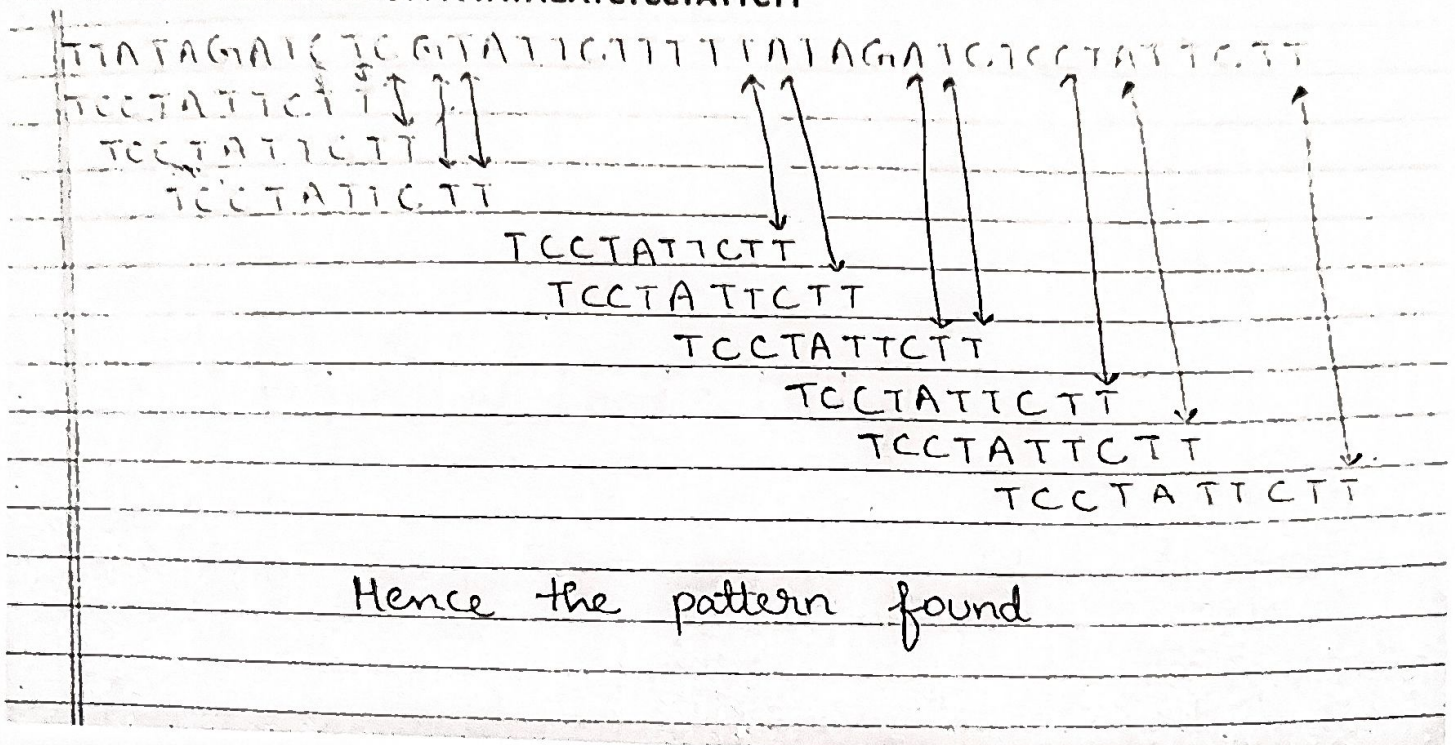
The most important divide-and-conquer algorithms for binary trees are the three classic traversals: preorder, inorder, and postorder. All three traversals visit nodes of a binary tree recursively, i.e., by visiting the tree's root and its left and right subtrees. They differ just by the timing of the root's visit:

- In the ***preorder traversal,*** the root is visited before the left and right subtrees are visited (in that order).
- In the ***inorder traversal,*** the root is visited after visiting its left subtree but before visiting the right subtree.
- In the ***postorder traversal,*** the root is visited after visiting the left and right subtrees (in that order).



Preorder: *a, b, d, g, e, c, f*
Inorder: *d, g, b, e, a, f, c*
Postorder: *g, d, e, b, f, c, a*

7	**Apply the Harspool string matching algorithm for the given text and pattern = TCCTATTCTT** **Text=TTATAGATCTCGTATTCTTTTTATAGATCTCCTATTCTT**	1
8	**Make use of Distribution Counting Sorting algorithm to the list of elements 14, 12, 14, 14, 14, 13, 13, 10, 12**	1



Array Values	10	12	13	14
Frequency	1	2	2	4
Dist Values	1	3	5	9

	0	1	2	3	4	5	6	7	8
A[8]=12	1	3	5	9		12			0
A[7]=10	1	2	5	9	10	12			
A[6]=13	0	2	5	9	10	12	13		
A[5]=13	0	2	4	9	10	12	13	13	
A[4]=14	0	2	3	9	10	12	13	13	14
A[3]=14	0	2	3	8				14	
A[2]=14	0	2	3	7			14		
A[1]=12	0	2	3	6	12				
A[0]=14	0	1	3	6		14			
	0	1	3	5	10	12	12	13	13	14	14	14	14

Name & Signature of Course In-charge:

Sheba Jebakani

Name & Signature of Module Coordinator:

Dr. Nagaratna Hegde

HOD-CSE
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

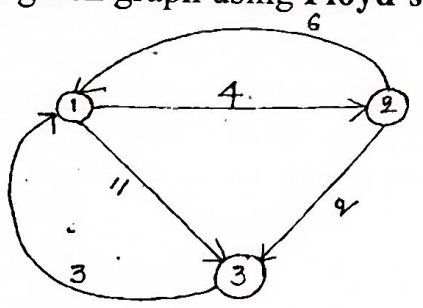
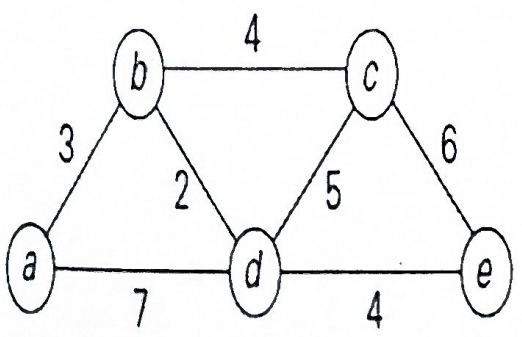
K INSTITUTE OF TECHNOLOGY, Bangalore

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

ASSIGNMENT QUESTIONS

Academic Year	**2024-2025**		
Batch	**2023-2027**		
Year/Semester/section	**II/IV/A, B, C**		
Subject Code-Title	**BCS401-Analysis and Design of Algorithms**		
Name of the Instructor	**Dr. Vijayalaxmi Mekali, Dr. Sowbhagya M P Mrs. Sheba Jebakani**	**Dept**	**CSE**

Assignment No: 2 **Total marks:25**
Date of Issue: 16/5/2025 **Date of Submission: 26/5/2025**

Sl.	Assignment Questions	K Level	CO	Marks
1.	i) **Construct** the AVL tree by inserting the elements 100, 200, 300,250, 270, 70 and 40 ii) **Experiment with** 2-3 tree with example	Apply	CO3	2
2.	Find all-pair shortest path of given graph using **Floyd's algorithm** 	Apply	CO4	2
3.	Using Dynamic programming design technique obtain optimal solution for the Knapsack instance. Knapsack capacity W = 10 **Item** / **Weight** / **Value/Profit** 1 / 4 / 40 2 / 7 / 42 3 / 5 / 25 4 / 3 / 12	Apply	CO4	3
4.	Apply the Dijkstra algorithm for the following graph. With source node 1 	Apply	CO4	3

5.	Find all possible subsets of S that sum to m. Draw the state space tree that it generates. Let S = {4, 6, 7, 8, 9, 11} and m = 15.	Apply	CO5	
6.	Construct state space tree to generate solutions to 4-Queen's problem.	Apply	CO5	1
7.	**Apply** design technique to obtain optimal solution for the Knapsack instance. Knapsack capacity W = 16 **Item** / **Weight** / **Value/Profit** 1 / 10 / 100 2 / 7 / 63 3 / 8 / 56 4 / 4 / 12	Apply	CO5	2
	Practical activities **(Execute the program and Submit the printout of program along with output)**			
1.	**Develop** a C program to implement heap sort			
5.	**Build** a C program to implement Kanpsack problem using Branch and Bound.	Apply	CO3	2
6.	**Build** a C program to implement Binary search and display decision tree for the same.	Apply	CO5	
7.	**Develop** a C program to generate State space tree for Sum of subset problem (With proper input)	Apply	CO5	1
	Online course			
8	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01329471493613158425462_shared/overview#iss=https:/infyspringboard.onwingspan.com/auth/realms/infyspringboard&iss=https://infyspringboard.onwingspan.com/auth/realms/infyspringboard	Apply	CO3 CO4 CO5	1 2 2

Signature of course in-charge

Signature of HOD - CSE

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
SECONDASSIGNMENT 2024-25EVEN SEMESTER

ASSIGNMENT-2SCHEME AND SOLUTION

Q.N	SCHEME AND SOLUTION	
1	i) To construct an **AVL tree**, we insert elements **one by one**, rebalancing the tree using **rotations** whenever the **balance factor** (difference between heights of left and right subtrees) becomes less than -1 or greater than 1.	

```
          200
         /   \
       70     300
      /  \     /
    40   100  250
                  \
                  270
```

ii) **2-3 tree with example**

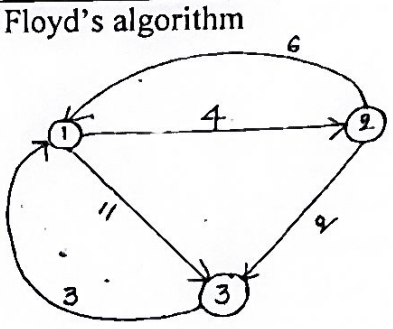
Properties of 2-3 Tree:

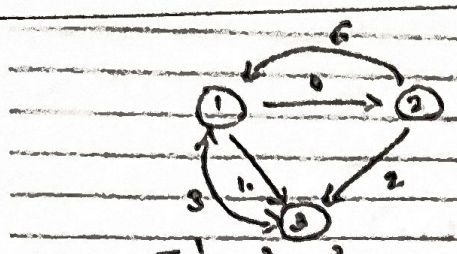
1. **Every internal node** can have:
   - **2 children** and **1 data element**, or
   - **3 children** and **2 data elements**
2. All **leaves** are at the **same level** (tree is always height-balanced)
3. **In-order traversal** gives **sorted order**
4. Insertions and deletions may **split** or **merge** nodes to maintain balance

Example:

```
      [20, 40]
     /    |    \
[10]  [30]  [50, 60]
```

2 Floyd's algorithm





$$\begin{array}{c} \\ 1 \\ 2 \\ 3 \end{array} \begin{bmatrix} 0 & 4 & 11 \\ 6 & 0 & 2 \\ 3 & \infty & 0 \end{bmatrix}$$

D(0)	1	2	3
1	0	4	11
2	6	0	2
3	3	∞	0

$D(1,3) = \min\{D(2,3), D(1,1)+D(1,3)\}$
$= \min\{2, 6+11\} = 2$
$D(3,2) = \min\{D(3,2), D(3,1)+D(1,2)\}$
$= \min\{\infty, 3+4\ 8\} = 7$

D(1)	1	2	3
1	0	4	11
2	6	0	2
3	3	7	0

$D(1,3) = \min\{D(1,3), D(1,2)+D(2,3)\}$
$= \min\{11, 4+2\} = 6$
$D(3,1) = \min\{D(3,1), D(3,2)+D(2,1)\}$
$= \min\{3, 7+6\} = 3$ NOT

D(2)	1	2	3
1	0	4	6
2	6	0	2
3	3	7	0

$D(1,2) = \min\{D(1,2), D(1,3)+D(3,2)\}$
$= \min\{4, 6+7\} = 4$
$D(2,1) = \min\{D(2,1), D(2,3)+D(3,1)\}$
$= \min\{6, 2+3\} = 5$

D(3)	1	2	3
1	0	4	6
2	5	0	2
3	3	7	0

3

Item	Weight	Value/Profit
1	4	40
2	7	42
3	5	25
4	3	12

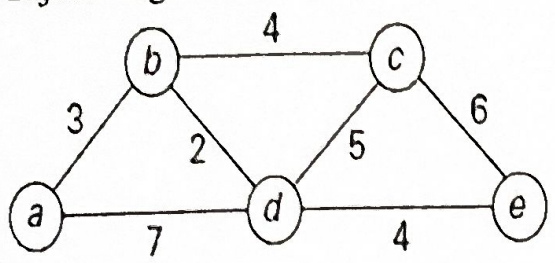
$F[i,0] = 0 \quad \& \quad F(0,j) = 0$

$$F[i,w] = \begin{cases} \max(F[i-1,j], vi + F(i-1, j-wi)) & \text{if } j \geq wi \\ F(i-1,j) & \text{if } j < wi \end{cases}$$

$F(4,10) = \max\{F(3,10), 12 + F(3,7)\} = 65$
$F(3,10) = \max\{F(2,10), 25 + F(3,5)\} = 65$
$F(3,7) = \max\{F(2,7), 25 + F(3,2)\} = 42$
$F(2,10) = \max\{F(1,10), 42 + F(1,3)\} = 42$
$F(3,5) = \max\{F(2,5), 25 + F(2,0)\} = 40$
$F(2,7) = \max\{F(1,7), 42 + F(1,0)\} = 42$
$F(3,2) = F(2,2) = 0$
$F(1,10) = \max\{(0,10), 40 + F(0,6)\} = 40$
$F(2,5) = F(1,5) = 40$
$F(2,0) = 0$
$F(1,7) = \max\{F(0,7), 40 + F(0,3)\} = 40$
$F(1,0) = 0$
$F(2,2) = F(1,2) = 0$
$F(1,6) = \max\{(0,6), 40 + F(0,2)\} = 40$
$F(1,3) = F(0,3) = 0$
$F(1,5) = \max\{(0,5), 40 + F(0,1)\} = 40$
$F(1,2) = F(0,2) = 0$

F	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	–	0	0	–	40	40	40	–	–	40
2	0	–	0	0	–	40	–	42	–	–	42
3	0	–	0	–	–	40	–	42	–	–	65
4	0	–	–	–	–	–	–	–	–	–	65

4 Dijkstraalgorithm



	a	b	c	d	e
a	0	3	∞	7	∞
b	3	0	4	2	∞
c	∞	4	0	5	6
d	7	2	5	0	4
e	∞	∞	6	4	0

Solutions are
a-> a =0
a-> b =3
a-> c =7
a-> d =5
a-> e =9

5 subsetsofSthatsumtom
S = {4, 6, 7, 8, 9, 11} and m = 15.

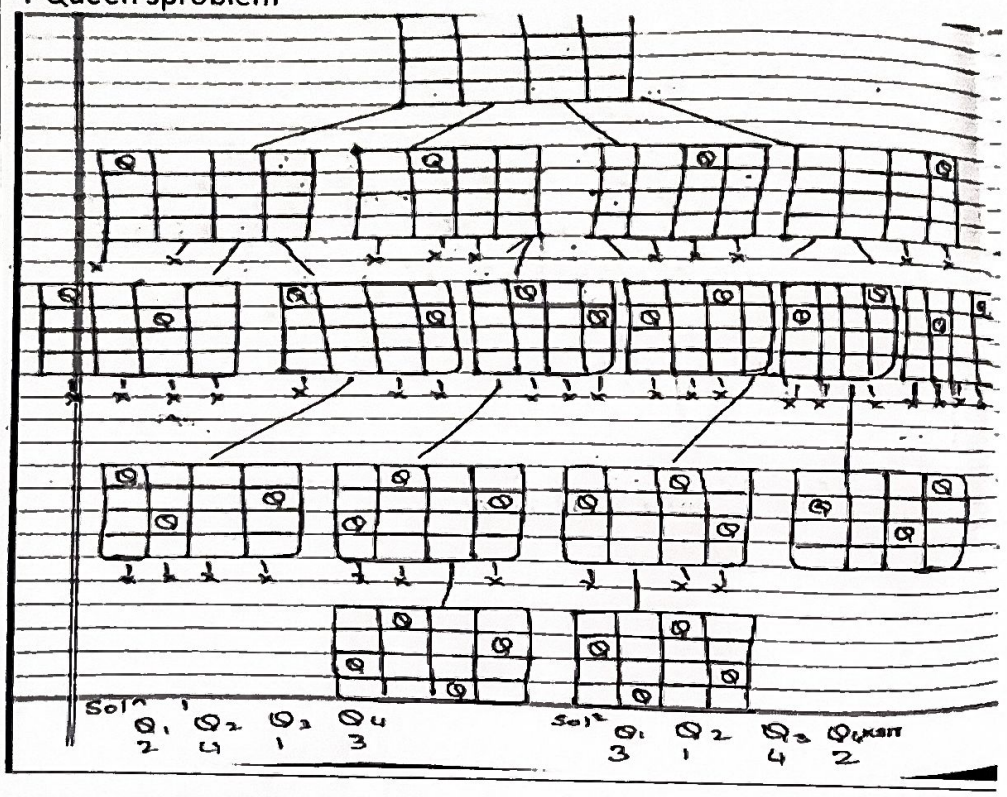
Solution is :
Draw State space tree.

- [4, 6, 7] = 17 → too big, discard
- [4, 7, 8] = 19 → discard
- [6, 9] = 15 → valid
- [7, 8] = 15 → valid
- [4, 11] = 15 → valid

The subsets of S summing to 15 are:

- **{6, 9}**
- **{7, 8}**
- **{4, 11}**

6 4-Queen'sproblem

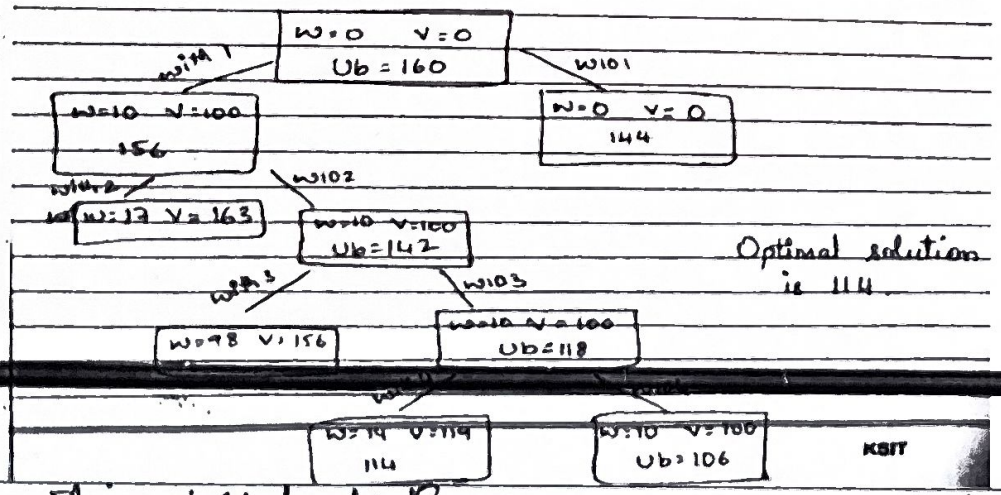


7 Kanpsack using **BranchandBoundalgorithm**

Item	Weight	Value/Profit
1	10	100
2	7	63
3	8	56
4	4	12

Ub = v + (w-w) (vi+1/wi+1)

1. Ub = 0 + (16-0) (10) = 160
2. Ub = 100 + (16-10) (9) = 154
   Ub = 0 + (16-0) (9) = 144
3. Ub = 100 + (16-10) (7) = 142
4. Ub = 100 + (16-10) (3) = 118
5. Ub = 112 + (16-14) (1) = 114
6. Ub = 100 + (16-10) (1) = 106



Optimal solution is 114.

KSIT

Dr. Uyayalaxmi Nekar B.

Name & Signature of Course In-charge:

MP

Dr. Uyayalaxmi Nekar

Name & Signature of Module Coordinator:

HOD CSE
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K S INSTITUTE OF TECHNOLOGY
Bangalore – 560109

DEPARTMENT OFCOMPUTER SCIENCE &ENGINEERING

CIE Question paper Scrutiny format

Course Name	**Analysis and Design of Algorithms**
Course Code	**BCS401**
Course Incharge	**Dr.Vijayalaxmi Mekali**
Academic year	**2024-2025**
Semester	**4th**
CIE #	**IA - 1**
Set	A☑ B☑
Scrutiny parameters	
Whether questions are according to assessment plan?	Yes ☐ No☐ ; If No, Suggestions:
Whether questions prepared are within the covered syllabus?	Yes ☐ No ☐ ; If No, Suggestions:
Whether all questions are mapped to CO/PO properly?	Yes ☐ No ☐ ; If No, Suggestions:
Whether questions framed are according to Blooms level?	Yes ☐ No ☐ ; If No, Suggestions:
Whether marks distribution for each question are correct?	Yes ☐ No ☐ ; If No, Suggestions:
Whether questions paper follows the format displayed?	Yes ☐ No ☐ ; If No, Suggestions:
Difficulty level	Very High ☐High ☐ Moderate ☐ Low☐
Percentage of Similarity questions in Set A & B	5%
Final decision	Accepted without corrections☐ Accepted with minor corrections☐ Not accepted☐

Signature with date
of CIE Question paper setter

Dr. Vijayalaxmi Mekali
10/3/2025
Name and Signature with date
of CIE Question paper Scrutiniser

K. S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
FIRST INTERNAL TEST QUESTION PAPER 2024-25 EVEN SEMESTER

SET: A/B

USN | | | | | | | | | | |

Degree	:	B.E	Semester	:	IV
Branch - Stream	:	CSE/CSD/CCE/AIML/CSE(ICB)	Course Type / Code	:	BCS401/BCO402
Course Title	:	Analysis and Design of Algorithms	Date	:	17/3/2025
Duration	:	1 Hr (60 minutes)	Max Marks	:	25

Note: Answer **ONE full** question from each Module.

L-Bloom's Level: L1-Remebering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, L6-Creating

Q No.	Questions	Marks	CO	L
	Module-1			
1(a)	**Design** the algorithm to find the maximum element in the list of **n** numbers. **Find** the following a) Basic operation of algorithm b) How many times the basic operation executes c) Time efficiency.	4	CO1	L3
(b)	**Build** a general plan for analyzing the time efficiency of **non-recursive algorithms**. **Develop** the **recursive algorithm** to find the number of binary digits in a positive decimal integer **n** and Derive its efficiency.	7	CO1	L3
(c)	**Interview** asymptotic notations in detail with examples.	4	CO1	L3
	OR			
2(a)	**Build** the Selection sort Algorithm and analyze its time complexity. Sort the given list of elements using Selection sort **45, 53, 12, 87, 46, 45, 74, 55, 90, 34**	4	CO1	L3
(b)	**Prove that** If $t_1(n) \in O(g_1(n))$ and $t_2(n) \in O(g_2(n))$ then $t_1(n) + t_2(n) \in O(\max\{g_1(n), g_2(n)\})$	4	CO1	L3
(c)	**Build** a general plan for analyzing the time efficiency of **recursive algorithms**. **Design** the recursive algorithm to find the **factorial of a number and derive its time efficiency**.	7	CO1	L3
	Module-2			
3(a)	**Develop** merge sort algorithm. **Choose** the Merge sort algorithm to sort the following list of elements **23, 45, 12, 80, 98, 100, 105, 103, 7, 154**	4	CO2	L3
(b)	i) Show how to **Make use of** Master's theorem to solve the recurrence relations. ii) **Experiment with** the general divide and conquer technique with control abstraction and recurrence relation.	6	CO2	L3
	OR			
4(a)	**Apply** the Quick sort algorithm for given list of elements and also construct the tree of recursive calls **31, 52, 15, 30, 25, 10, 24, 20**	6	CO2	L3
(b)	**Build** a Quick sort algorithm.	4	CO2	L3

Dr. Uyyapalaiyam Mekala

Name & Signature of Course In charge:

Dr. Uyyapalaiyam Mekala

Name & Signature of Module Coordinator:

HOD

Principal

Selected

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
FIRST INTERNAL TEST QUESTION PAPER 2024-25 EVEN SEMESTER

SET: A

USN | | | | | | | | | | |

Degree : B.E
Branch - Stream : CSE/CSD/CCE/AIML
Course Title : Analysis and Design of Algorithms
Duration : 1 Hr (60 minutes)

Semester : IV
Course Type / Code : BCS401
Date : 17/3/2025
Max Marks : 25

Note: Answer **ONE full** question from each Module.

L-Bloom's Level: L1-Remebering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, L6-Creating

Q No.	Questions	Marks	CO	L
	Module-1			
1(a)	**Experiment** with asymptotic notations in detail with examples.	5	CO1	Applying (K3)
(b)	**Model** a general plan for analyzing the time efficiency of **recursive algorithms**. Develop the recursive algorithm to find the **factorial of a number and derive its time efficiency.**	5	CO1	Applying (K3)
(c)	**Develop** the algorithm to find the maximum element in the list of **n** numbers. **Identify** the following a) Algorithm's basic operation b) Number of times the basic operation executes c) Derive its efficiency.	5	CO1	Applying (K3)
	OR			
2(a)	**Prove that** If $t_1(n) \in O(g_1(n))$ and $t_2(n) \in O(g_2(n))$ then $t_1(n) + t_2(n) \in O(\max\{g_1(n), g_2(n)\})$	5	CO1	Applying (K3)
(b)	**Model** the Selection sort Algorithm and analyze its time complexity. Sort the given list of elements using Selection sort **89, 45, 68, 90, 29, 34, 17**	5	CO1	Applying (K3)
(c)	Build Sequential search algorithm and give analysis of its best, average and worst case time complexity. Apply sequential search algorithm on the given list of elements **23, 45, 12, 67, 44, 17, 34, 68** for **key element 34**	5	CO1	Applying (K3)
	Module-2			
3(a)	**Develop** a Merge sort algorithm and model its time complexity.	5	CO2	Applying (K3)
(b)	Apply the Merge sort algorithm for following list of elements **60, 50, 25, 10, 35, 25, 75, 30**	5	CO2	Applying (K3)
	OR			
4(a)	**Apply** the Quick sort algorithm for given list of elements and also construct the tree of recursive calls **5, 3, 1, 4, 8, 2, 9, 7**	5	CO2	Applying (K3)
(b)	**Experiment with** the general divide and conquer technique with control abstraction and recurrence relation.	5	CO2	Applying (K3)

Dr. Vijayalaxmi Patkeri Dr. Vijayalaxmi Patkeri Dr. Kumar G

Name & Signature of Course In charge: | Name & Signature of Module Coordinator: | HOD | Principal

Selected

K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109
I SESSIONAL TEST QUESTION PAPER 2024 – 25 EVEN SEMESTER

SCHEME AND SOLUTION

Degree	:	**B.E**	**Semester**	:	**IV**
Branch	:	**CSE/CSD/CCE/CSE(ICB)/AIML**	**Course Code**	:	**BCS401/BC0402**
Course Title	:	**Analysis and Design of Algorithms**	**Max Marks**	:	**25**

Q.NO.	POINTS	MARKS

1a.	**Algorithm to find the maximum element in the list of n numbers.**
	Ans: Algorithm
	
	Algorithm MaxElement (A[0…..n-1])
	//input an array A[0…..n-1] of size n
	// maximum element in the array A
	max←A[0]
	for i ← 1 to n-1 do
	if(A[i] > max)
	max=A[i]
	return max
	Analysis
	➢ Input size n is number of elements in an Array
	➢ Basic operation is comparison statement if(A[i] > max)
	Let consider C(n) number of times basic operation executes
	for i ← 1 to n-1 do
	if(A[i] > max)
	$C(n) = \sum_{i=1}^{n-1} 1 = n - 1$
	C(n) = (n-1)-1+1
	C(n) = (n-1)
	C(n) = O(n)
		2M+1M
		+1M

1b.	**Build** a general plan for analyzing the time efficiency of **non-recursive algorithms**. **Develop** the **recursive algorithm** to find the number of binary digits in a positive decimal integer **n** and Derive its efficiency. **Ans:** General plan for analysing time efficiency of non-recursive algorithms 1. Decide the parameters (or parameter) indicating the size of input 2. Identify algorithm's basic operation (it is located in innermost loop) 3. Check whether the number of times the basic operation executed is depends only on the size of an input. If it also depends on some additional property, the worst-case, average-case, and, if necessary, best-case efficiencies have to be investigated separately. 4. Set up a sum expressing the number of times the algorithm's basic operation is executed. 5. Using standard formulas and rules of sum manipulation, either find a closed form formula for the count or, at the very least, establish its order of growth. 6.	2M+3M +2M

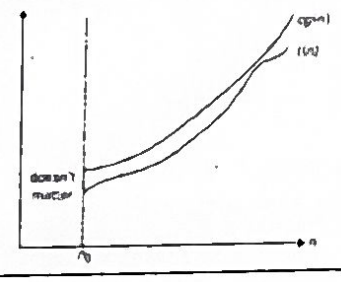
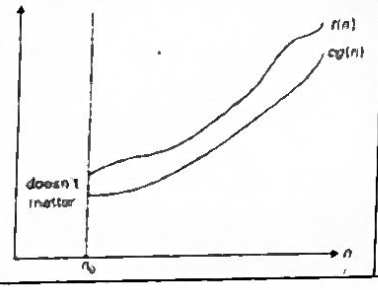
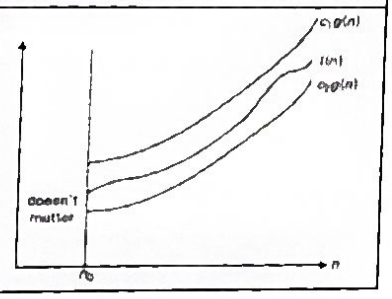
```
Algorithm
Algorithm Binrec(n)
//input positive decimal integer n
// output number of binary digits in
      binary representation of n
      if n=1
          return 1;
      else
          return Binrec (⌊n/2⌋)+1
```

$$t(n) = \begin{cases} 0 & \text{if } n \le 1 \\ 1 + t(n/2) & \text{otherwise} \end{cases}$$

Thus time complexity is t(n)=O(log $_2$ n)

1c. **Experiment with** asymptotic notations in detail with examples. **2M+1M +1M**

Ans:

Time complexity is t(n)=O(n)Big-Oh (O)	**Big Omega (Ω)**	**Big Theta (Θ)**
Definition of A function t(n) is said to be in O(g(n)), denoted as t(n) ∈ O(g(n)), if t(n) is bounded above by some constant multiple of g(n) for all large n ie if there exist some positive constant C and some non-negative integer n_0 such that	A function t(n) is said to be in Ω(g(n)), denoted as t(n) ∈ Ω(g(n)), if t(n) is bounded below by some constant multiple of g(n) for all large n ie if there exist some positive constant C and some non negative integer n0 such that	A function t(n) is said to be in Θ(g(n)), denoted as t(n) ∈ Θ(g(n)), if t(n) is bounded above and below by some constant multiple of g(n) for all large n ie if there exist some positive constant C and some non-negative integer n_0 such that
$t(n) \le C.(g(n))$, for all $n \ge n_0$	**$t(n) \ge C.(g(n))$, for all $n \ge n_0$**	**$C_2.(g(n)) \le t(n) \le C_1.(g(n))$, for all $n \ge n_0$**
		

2a. **Build** the Selection sort Algorithm and analyze its time complexity. Sort the given list of elements using Selection sort **2M+2**

45, 53, 12, 87, 46, 45, 74, 55, 90, 34

Ans: 12, 34, 45, 45, 46, 53, 55, 74, 87,90

```
Selectionsort(A[0....n-1])
//input: An array A[0...n-1]
//output: An array A[0...n-1]
for(i=0 to n-2) do
    min=← i
        for j← i+1 to n-1 do
            if( A[j] <A[min]
                min=←j
    swap A[i] and A[min]
```

Sorted list: 17, 29, 34, 45, 68, 89, 90

$C(n) = \sum_{i=0}^{n-2} \sum_{j+1}^{n-1} 1 = \sum_{i=0}^{n-2} (n-1) - ((i+1)+1) = \sum_{i=0}^{n-2} (n-1-i)$

Time complexity is O(n)

2b. **Prove that** — **4M**

If $t_1(n) \in O(g_1(n))$ and $t_2(n) \in O(g_2(n))$
then $t_1(n) + t_2(n) \in O(\max\{g_1(n), g_2(n)\})$

Ans Proof

Let us consider four arbitrary real numbers a_1, b_1, a_2, and b_2
Then $a_1 \leq b_1$ and $a_2 \leq b_2$ then $a_1 + a_2 \leq 2 \max\{b_1, b_2\}$
Since
integer n_1 such that
$t_1(n) \leq C_1.g_1(n))$, for all $n \geq n_1$ and $t_2(n) \in O(g_2(n))$,
$t_2(n) \leq C_2.g_2(n))$, for all $n \geq n_2$
Let us denote $C_3 = \max\{C_1, C_2\}$ and consider $n \geq \max\{n_1, n_2\}$ so that
$t_1(n)+t_2(n) \leq C_1.g_1(n)+C_2.g_2(n)$
$t_1(n)+t_2(n) \leq C_3.g_1(n)+C_3.g_2(n)$
$t_1(n)+t_2(n) \leq C_3[g_1(n)+g_2(n)]$
$t_1(n)+t_2(n) \leq C_3.2\max\{g_1(n), g_2(n)\}$
$t_1(n) \in O(g_1(n))$, then there exist some positive constant C_1 and some non negative
$t_1(n)+t_2(n) \in O(\max\{g_1(n), g_2(n)\})$

2c. **Build** a general plan for analyzing the time efficiency of **recursive algorithms. Design** the recursive algorithm to find the **factorial of a number and derive its time efficiency.** — **3M+3M +1M**

Ans:

1. Decide on a parameter (or parameters) indicating an input's size.
2. Identify the algorithm's basic operation.
3. Check whether the number of times the basic operation is executed can vary on different inputs of the same size; if it can, the worst-case, average-case, and best-case efficiencies must be investigated separately.
4. Set up a recurrence relation, with an appropriate initial condition, for the number of times the basic operation is executed.
5. Solve the recurrence or, at least, ascertain the order of growth of its solution.

Recursive algorithm to find the factorial of a number.

```
Algorithm fact(n)
//input non integer n
      // output n!
   if n==0   return 1;
   else      fact(n-1)*n
```

Input size is number **n** and Basic operation is multiplication Number of times multiplication executes is obtained with recurrence relation given below

$$t(n) = \begin{cases} 1 & \text{if } n = 0 \\ 1 + t(n-1) & \text{otherwise} \end{cases}$$

3a. **Develop** merge sort algorithm. **Choose** the Merge sort algorithm to sort the following list of elements — **2M+2M**

23, 45, 12, 80, 98, 100, 105, 103, 7, 154

Ans:

Merge sort

ALGORITHM

Mergesort (A[0..n − 1])

//Sorts array *A*[0..*n* − 1] by recursive mergesort

//Input: An array *A*[0..*n* − 1] of orderable elements

//Output: Array *A*[0..*n* − 1] sorted in nondecreasing order

if *n* > 1

copy *A*[0..*n*/2 − 1] to *B*[0..*n*/2 − 1]

copy *A*[*n*/2..*n* − 1] to *C*[0..*n*/2 − 1]

Mergesort(B[0..*n*/2 − 1]*)*

Mergesort(C[0..*n*/2 − 1]*)*

Merge(B, C, A)

ALGORITHM

Merge (B[0..*p* − 1], *C*[0..*q* − 1], *A*[0..*p* + *q* − 1]*)*

//Merges two sorted arrays into one sorted array

//Input: Arrays B[0..p − 1] and C[0..q − 1] both sorted

//Output: Sorted array A[0..p + q − 1] of the elements of B and C

i ←0; j ←0; k←0

while i <p and j <q do

if B[i]≤ C[j]

A[k]←B[i]; i ←i + 1

else

A[k]←C[j]; j ←j + 1

k←k + 1

if i = p

copy C[j..q − 1] to A[k..p + q − 1]

else

copy B[i..p − 1] to A[k..p + q − 1]

Merge sort: sorted list

7, 12, 23, 45, 80, 98, 100, 103, 105, 154

3b.

Masters theorem

In divide and conquer technique problem instance of size n is divided into two instances of size n/2.

3M+3M

More generally, an instance of size *n* can be divided into *b* instances of size *n/b*, with *a* of them needing to be solved. (Here, *a* and *b* are constants; $a \geq 1$ and $b > 1$.) Assuming that size *n* is a power of *b* to simplify our analysis, we get the following recurrence

The recurrence relation for divide and conquer

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

- This recurrence relation is called general divide and conquer recurrence relation.
- The order of growth of its solution T (n) depends on the values of the constants a and b and the order of growth of the function f (n).

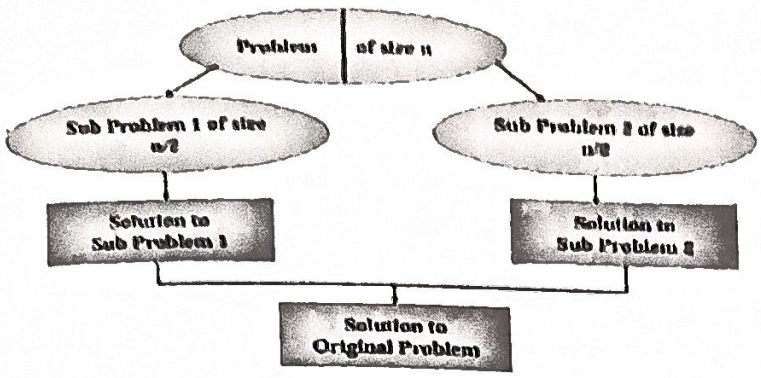
Where,
a and b → known as constants.
T(1) → assume that its value is known,
n → power of b ie $n=b^k$
f(n) → Time to divide the problem and combining the solution.

The efficiency analysis of many divide-and-conquer algorithms is greatly simplified by the following master theorem

Master theorem: If $f(n) \in \Theta(n^d)$ where $d \geq 0$ in the recurrence relation then

$$T(n) \in \begin{cases} \Theta(nd) & \text{if } a < bd \\ \Theta(nd \log n) & \text{if } a = bd \\ \Theta(n^{\log_a b}) & \text{if } a > bd \end{cases}$$

Analogous results hold for the O and Ω notations, too.



Divide and Conquer is best known algorithm design technique.

Divide and Conquer algorithm works according to the following general plan

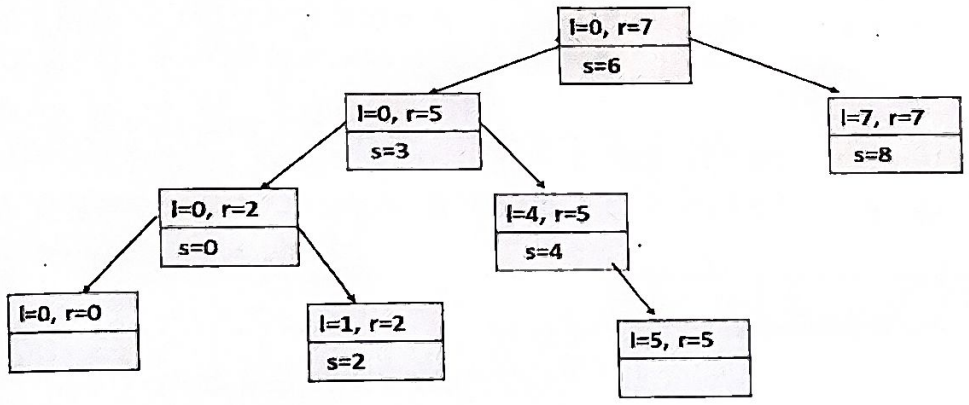
- A problem instance is divided into several smaller instances of the same problem (smaller sub problems of same size)
- Smaller instances are solved (recursively)
- Solution obtained from smaller instances are combined to get the solution for the original problem.

Control Abstraction of Divide and Conquer

```
Type DandC (P)
{
  if small (P)
       return S(P);
  else
     {
        Divide P into smaller instances P1, P2, .....Pn,  n≥1
        Apply DandC each of smaller instances
        Return Combine (DandC(P1), DandC(P2), ..... DandC(Pn)),
      }
}
```

Where P is problem,
small (P) Boolean valued function, returns true if P is very small.

4a. **Apply** the Quick sort algorithm for given list of elements and also construct the tree of recursive calls **31, 52, 15, 30, 25, 10, 24, 20** **6M**



4b.

Quick sort Algorithm

ALGORITHM Quicksort(A[l . . . . . r])

//Sorts a subarray by quicksort

//Input: Subarray of array A[0..n − 1], defined by its left indices l and right indices r

//Output: Subarray A[l . . . . . r] sorted in nondecreasing order

```
if l < r
    s ←Partition(A[l. . . .r]) //s is a split position
    Quicksort(A[l. . . s − 1])
    Quicksort(A[s + 1. . . . r])
```

Quick sort Algorithm

Quicksort(A[s + 1. . . . r])

ALGORITHM Partition(A[l..r])

//Partitions a subarray by Hoare's algorithm, using the first element as a pivot

//Input: Subarray of array A[0..n − 1], defined by its left and right indices l and r (l<r)

//Output: Partition of A[l..r], with the split position returned as this function's value

```
 p←A[l]
 i ←l;    j ←r + 1
 repeat
       repeat i ←i + 1 until A[i]≥ p
       repeat j ←j − 1 until A[j ]≤ p
       swap(A[i], A[j ])
until i ≥ j
swap(A[i], A[j ]) //undo last swap when i ≥ j
swap(A[l], A[j ])  // swap pivot p with A[j]
return j
```

4M

Course in charge

HOD

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
FIRST INTERNAL TEST QUESTION PAPER 2024-25 EVEN SEMESTER

SET: B

USN | | | | | | | | | | |

Degree : B.E
Branch - Stream : CSE/CSD/CCE/AIML
Course Title : Analysis and Design of Algorithms
Duration : 1 Hr (60 minutes)

Semester : IV
Course Type / Code : BCS401
Date : 17/3/2025
Max Marks : 25

Note: Answer **ONE full** question from each Module.

L-Bloom's Level: L1-Remebering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, L6-Creating

Q No.	Questions	Marks	CO	L
	Module-1			
1(a)	**Experiment** with asymptotic notations in detail with examples.	5	CO1	Applying (K3)
(b)	**Develop** the **recursive algorithm** to find the number of binary digits in a positive decimal integer **n** and Derive its efficiency.	5	CO1	Applying (K3)
(c)	**Develop** an algorithm to check if all elements in an array are **Unique (Element Uniqueness problem)** **Identify** the following a) Algorithm basic operation b) Number of times the basic operation executes c) Derive its efficiency.	5	CO1	Applying (K3)
	OR			
2(a)	**Apply** three asymptotic notations on the following assertions a) 100n+5 b) $6*2^n+8$	5	CO1	Applying (K3)
(b)	**Model** the Bubble sort Algorithm and analyze its time complexity. Sort the given list of elements using Bubble sort 69, 25, 98, 90, 29, 34, 27	5	CO1	Applying (K3)
(c)	**Model** a general plan for the analyzing time efficiency of **non-recursive algorithms** with an example. Build the Matrix multiplication algorithm and derive its time complexity.	5	CO1	Applying (K3)
	Module-2			
3(a)	Develop a Quick sort algorithm.	5	CO2	Applying (K3)
(b)	Apply the Merge sort algorithm for following list of elements 80, 55, 15, 90, 35, 25, 75, 30, 67, 54, 77	5	CO2	Applying (K3)
	OR			
4(a)	Apply the Quick sort algorithm for given list of elements and also construct the tree of recursive calls **65, 70, 75, 80, 85, 60, 55, 50, 45**	5	CO2	Applying (K3)
(b)	Show how to **Make use of** Master's theorem to solve the recurrence relations.	5	CO2	Applying (K3)

Dr. Uma Mahesh Mukul
Name & Signature of Course In charge:

Dr. Uma Mahesh Mukul
Name & Signature of Module Coordinator:

HOD

Principal

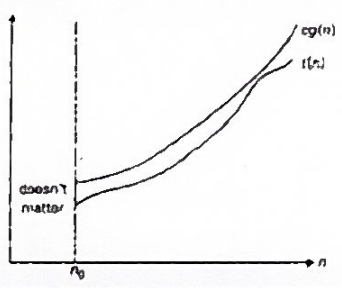
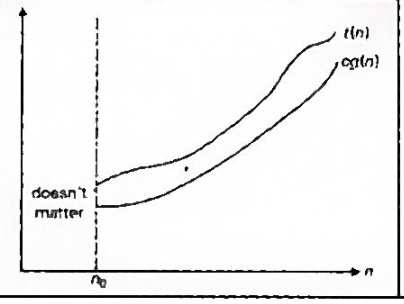
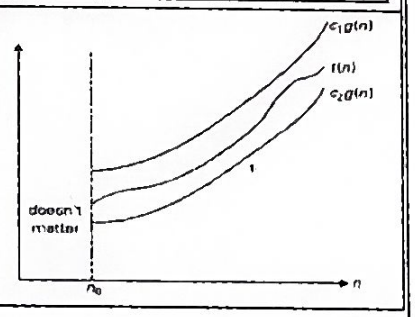
K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109
I SESSIONAL TEST QUESTION PAPER 2024 – 25 EVEN SEMESTER

SCHEME AND SOLUTION

Degree : B.E
Branch : CSE/CSE/CCE/CSE(ICB)/AIML
Course Title : Analysis and Design of Algorithms

Semester : IV
Course Code : BCS401
Max Marks : 25

Q.NO.	POINTS	MARKS
1a.	**Experiment withasymptotic notations in detail with examples.** **Ans:**	3M+2M

Time complexity is t(n)=O(n)Big-Oh (O)	Big Omega (Ω)	Big Theta (Θ)
Definition of A function t(n) is said to be in O(g(n)), denoted as t(n) ∈ O(g(n)), if t(n) is bounded above by some constant multiple of g(n) for all large n ie if there exist some positive constant C and some non-negative integer n_0 such that	A function t(n) is said to be in Ω(g(n)), denoted as t(n) ∈ Ω(g(n)), if t(n) is bounded below by some constant multiple of g(n) for all large n ie if there exist some positive constant C and some non negative integer n0 such that	A function t(n) is said to be in Θ(g(n)), denoted as t(n) ∈ Θ(g(n)), if t(n) is bounded above and below by some constant multiple of g(n) for all large n ie if there exist some positive constant C and some non-negative integer n_0 such that
$t(n) \leq C.(g(n))$, for all $n \geq n_0$	$t(n) \geq C.(g(n))$, for all $n \geq n_0$	$C_2.(g(n)) \leq t(n) \leq C_1.(g(n))$, for all $n \geq n_0$
		

1b.	**The general plan for analyzing time efficiency of recursive algorithms with example.** **Ans:** 1. Decide on a parameter (or parameters) indicating an input's size. 2. Identify the algorithm's basic operation. 3. Check whether the number of times the basic operation is executed can vary on different inputs of the same size; if it can, the worst-case, average-case, and best-case efficiencies must be investigated separately. 4. Set up a recurrence relation, with an appropriate initial condition, for the number of times the basic operation is executed. 5. Solve the recurrence or, at least, ascertain the order of growth of its solution. **Recursive algorithm to find the factorial of a number.**	2M+2M+1M

Algorithm fact(n)
//input non integer n
// output n!
if n==0 return 1;
else fact(n-1)*n

Input size is number n and Basic operation is multiplication Number of times multiplication executes is obtained with recurrence relation given below

$$t(n) = \begin{cases} 1 & \text{if } n = 0 \\ 1 + t(n-1) & \text{otherwise} \end{cases}$$

1c. **Algorithm to find the maximum element in the list of n numbers.** **2M+2M+1M**

Ans: Algorithm

```
Algorithm MaxElement (A[0.....n-1])
//input an array A[0.....n-1] of size n
// maximum element in the array A
max←A[0]
      for i ← 1 to n-1 do
          if(A[i] > max)
               max=A[i]
      return max
```

Analysis

- Input size n is number of elements in an Array
- Basic operation is comparison statement if(A[i] > max)

Let consider C(n) number of times basic operation executes

```
for i ← 1 to n-1 do
if(A[i] > max)
```

$C(n) = \sum_{i=1}^{n-1} 1 = n - 1$

C(n) = (n-1)-1+1

C(n) = (n-1)

C(n) = O(n)

2a. **Prove that** **5M**

If t1(n) ∈ O(g1(n)) and t2(n) ∈ O(g2(n))
then t1(n)+t2(n) ∈ O(max{g1(n), g2(n)})

Ans

Prove that

If $t_1(n) \in O(g_1(n))$ and $t_2(n) \in O(g_2(n))$ then $t_1(n)+t_2(n) \in O(\max\{g_1(n), g_2(n)\})$

Ans Proof

Let us consider four arbitrary real numbers a_1, b_1, a_2, and b_2
Then $a_1 \leq b_1$ and $a_2 \leq b_2$ then $a_1 + a_2 \leq 2 \max\{b_1, b_2\}$
Since
integer n_1 such that
$t_1(n) \leq C_1.g_1(n))$, for all $n \geq n_1$ and $t_2(n) \in O(g_2(n))$,
$t_2(n) \leq C_2.g_2(n))$, for all $n \geq n_2$
Let us denote $C_3=\max\{C_1,C_2\}$ and consider $n \geq \max\{n_1,n_2\}$ so that
$t_1(n)+t_2(n) \leq C_1.g_1(n)+C_2.g_2(n)$

$t_1(n)+t_2(n) \leq C_3.g_1(n)+C_3.g_2(n)$
$t_1(n)+t_2(n) \leq C_3[g_1(n)+g_2(n)]$
$t_1(n)+t_2(n) \leq C_3.2\max\{g_1(n), g_2(n)\}$
$t_1(n) \in O(g_1(n))$, then there exist some positive constant C_1 and some non negative
$t_1(n)+t_2(n) \in O(\max\{g_1(n), g_2(n)\})$

2b. Model the Selection sort Algorithm and analysis its time complexity. Sort the given list of elements using Selection sort

89, 45, 68, 90, 29, 34, 17 **2M+2M+1M**

Ans

Selectionsort(A[0....n-1])

```
//input: An array A[0...n-1]
//output: An array A[0...n-1]
for(i=0 to n-2) do
    min=← i
        for j← i+1 to n-1 do
            if( A[j] <A[min]
                    min=←j
    swap A[i] and A[min]
```

Sorted list: 17, 29, 34, 45, 68, 89, 90

$C(n) = \sum_{i=0}^{n-2} \sum_{i+1}^{n-1} 1 = \sum_{i=0}^{n-2} (n-1) - ((i+1)+1) = \sum_{i=0}^{n-2} (n-1-i)$

Time complexity is O(n)

2c. **Build** Sequential search algorithm and analysis its time complexity. Apply sequential search algorithm for a given list of elements **2M+2M+1M**
23, 45, 12, 67, 44, 17, 34, 68 and a key 34

Ans:

Sequentialsearch(A[0....n], K)

```
//input: An array A[0...n-1]
//Index of first matching element or -1 if key is not in the array
A[n]←K
i=0
while( A[j] ≠ K do
    i=i+1
if i < n return i
else return -1
```

Key found at position 7

Cbest(n) = Θ(1)

Cworst(n) = O(n)

3a. **Merge sort algorithm and Time complexity analysis** **3M+2M**

Ans:

Merge sort

ALGORITHM

Mergesort (A[0..n − 1])

//Sorts array *A[0..n − 1]* by recursive mergesort

//Input: An array *A[0..n − 1]* of orderable elements

//Output: Array *A[0..n − 1]* sorted in nondecreasing order

if $n > 1$

copy *A[0..n/2 − 1]* to *B[0..n/2 − 1]*

copy *A[n/2..n − 1]* to *C[0..n/2 − 1]*

Mergesort(B[0..n/2 − 1])

Mergesort(C[0..n/2 − 1])

Merge(B, C, A)

ALGORITHM

Merge (B[0..p − 1], C[0..q − 1], A[0..p + q − 1])

//Merges two sorted arrays into one sorted array

//Input: Arrays B[0..p − 1] and C[0..q − 1] both sorted

//Output: Sorted array A[0..p + q − 1] of the elements of B and C

i ←0; j ←0; k←0

while i <p and j <q do

  if B[i]≤ C[j]

    A[k]←B[i]; i ←i + 1

  else

    A[k]←C[j]; j ←j + 1

  k←k + 1

  if i = p

    copy C[j..q − 1] to A[k..p + q − 1]

else

    copy B[i..p − 1] to A[k..p + q − 1]

Time complexity Analysis of Merge sort

The above recurrence relation can be rewritten as

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

Time complexity Analysis of Merge sort based on Masters theorem

$aT(n/b) + f(n)$

a= 2, b=2, f(n) = n

$f(n) = n^d$, $f(n) = n^1$ thus d=1

According to masters theorem second condition holds good, as $2=2^1$ is $n^d \log n$

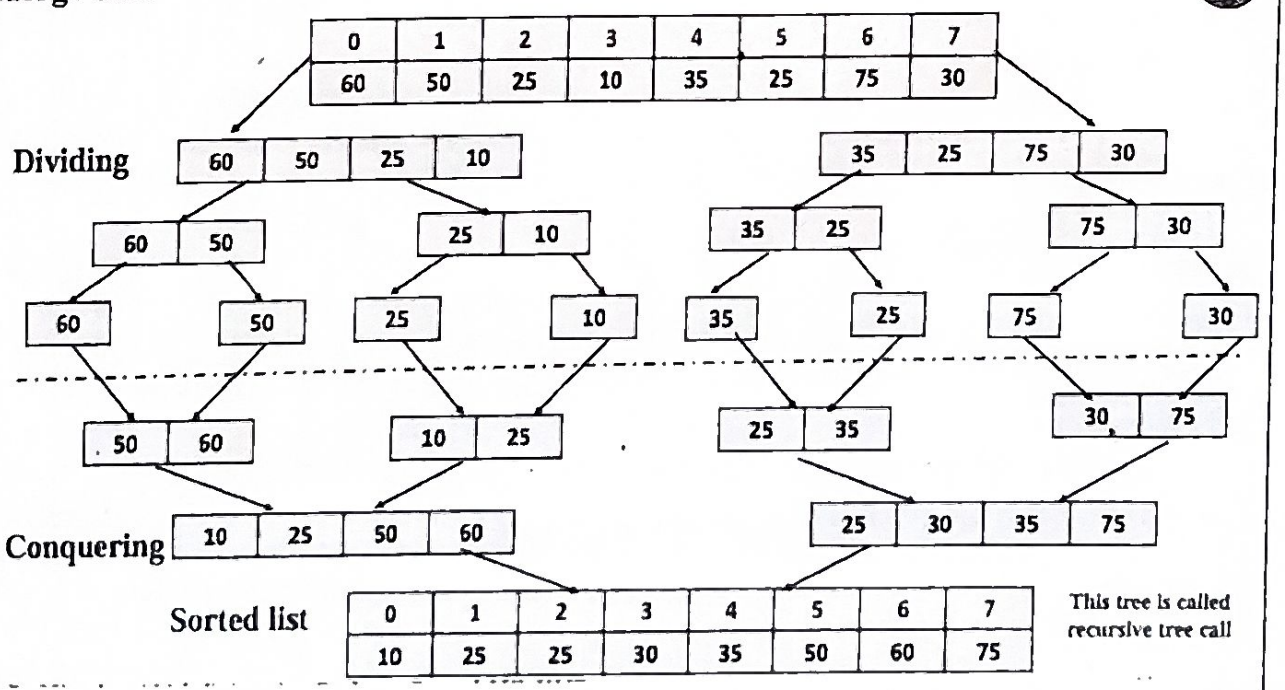
$n^1 \log n$ i e

$$T(n)_{worst} = O(n \log n)$$

$$T(n) \in \begin{cases} \Theta(nd) & \text{if } a < bd \\ \Theta(nd \log n) & \text{if } a = bd \\ \Theta(n^{\log_c b}) & \text{if } a > bd \end{cases}$$

3M+2M

3b. **Merge sort**

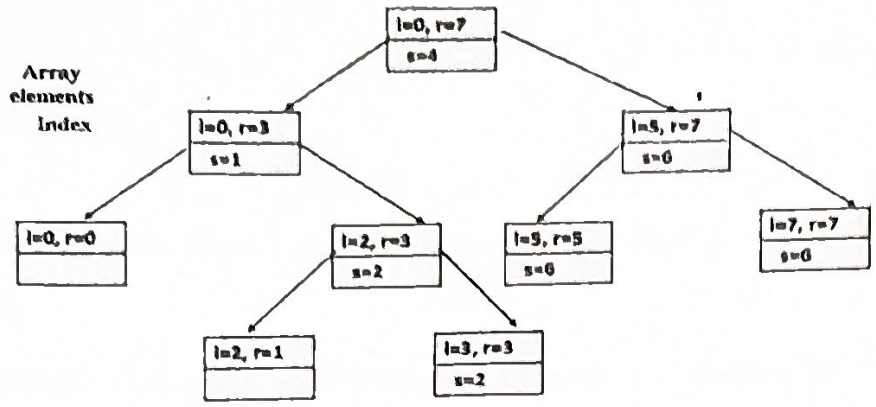


4a. Apply the Quick sort algorithm for following list of elements and also construct the tree of recursive calls

5, 3, 1, 4, 8, 2, 9, 7

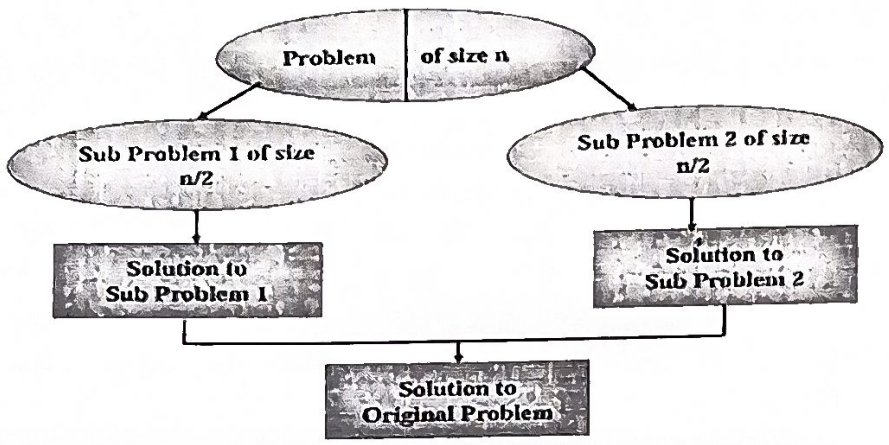
Ans

3M+2M



4b. **Experiment with** the general divide and conquer technique with control abstraction and recurrence relation.

3M+2M



Divide and Conquer is best known algorithm design technique.

Divide and Conquer algorithm works according to the following general plan

- A problem instance is divided into several smaller instances of the same problem (smaller sub problems of same size)
- Smaller instances are solved (recursively)
- Solution obtained from smaller instances are combined to get the solution for the original problem.

Control Abstraction of Divide and Conquer

```
Type DandC (P)
{
  if small (P)
       return S(P);
  else
     {
        Divide P into smaller instances P1, P2, .....Pn,  n≥1
        Apply DandC each of smaller instances
        Return Combine (DandC(P1), DandC(P2), ..... DandC(Pn)),
     }
}
```

Where P is problem,
small (P) Boolean valued function, returns true if P is very small.

Course in charge

HOD

K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109

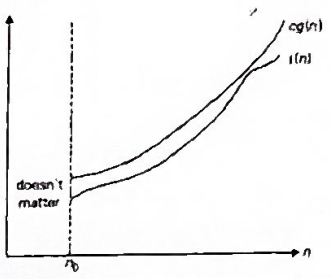
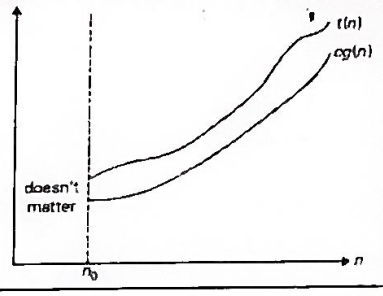
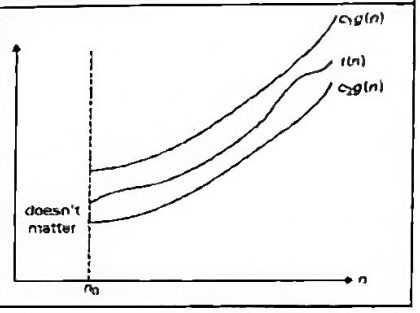
I SESSIONAL TEST QUESTION PAPER 2024 – 25 EVEN SEMESTER

SCHEME AND SOLUTION

Degree : B.E
Branch : CSE/CSD/CCE/CSE(ICB)/AIML
Course Title : Analysis and Design of Algorithms

Semester : IV
Course Code : BCS401
Max Marks : 25

Q.NO.	POINTS	MARKS
1a.	**Experiment with asymptotic notations in detail with examples.** **Ans:**	3M+2M

Time complexity is t(n)=O(n)Big-Oh (O)	Big Omega (Ω)	Big Theta (Θ)
Definition of A function t(n) is said to be in O(g(n)), denoted as t(n) ∈ O(g(n)), if t(n) is bounded above by some constant multiple of g(n) for all large n ie if there exist some positive constant C and some non-negative integer n_0 such that	A function t(n) is said to be in Ω(g(n)), denoted as t(n) ∈ Ω(g(n)), if t(n) is bounded below by some constant multiple of g(n) for all large n ie if there exist some positive constant C and some non negative integer n0 such that	A function t(n) is said to be in Θ(g(n)), denoted as t(n) ∈ Θ(g(n)), if t(n) is bounded above and below by some constant multiple of g(n) for all large n ie if there exist some positive constant C and some non-negative integer n_0 such that
$t(n) \le C.(g(n))$, for all $n \ge n_0$	$t(n) \ge C.(g(n))$, for all $n \ge n_0$	$C_2.(g(n)) \le t(n) \le C_1.(g(n))$, for all $n \ge n_0$
		

1b.	Develop the recursive algorithm to find the number of binary digits in positive decimal integer n and Derive its efficiency. **Ans:**		2M+2M+1M

Algorithm	

Algorithm Binrec(n)
//input positive decimal integer n
// output number of binary digits in binary representation of n
if n=1
return 1;
else
	$t(n) = \begin{cases} 0 & if \ \ n \le 1 \\ 1 + t(n/2) & otherwise \end{cases}$
	Thus time complexity is t(n)=O(log $_2$ n)

	return Binrec (⌊n/2⌋)+1		2M+2M+1M

1c. **Develop the algorithm to check all elements in array are Unique (Element Uniqueness problem)**

Ans:

```
Algorithm UniqueElement (A[0.....n-1])
//input an array A[0.....n-1] of size n
// Output return true if al the elements in
      array are distinct, otherwise
returns false
    for i ← 0 to n-2 do
      for j ← i+1 to n-1 do
        if(A[i] = A[j])
            return false
        else
            return true
```

$C(n) = \sum_{i=0}^{n-2} \sum_{i+1}^{n-1} 1$

$C_{worst}(n) = \sum_{i=0}^{n-2}(n-1)-(i+1)+1$

$C_{worst}(n) = \sum_{i=0}^{n-2} n-i-1$ (replace i by n-2, n-3,...1)

$C_{worst}(n)$ = (n-1)+(n-2)+(n-3)+.....+2+1

$C_{worst}(n) = \sum_{i=0}^{n-2}(n-1)-(i-1)+$

$1=\frac{n(n-1)}{2}=\frac{n2}{2}-\frac{n}{2}=$ $C_{worst}(n)=O(n^2)$

$T_{worst}(n)=O(n^2)$

2a. Apply three asymptotic notations on the following assertions **3M+2M**

a) 100n+5 b) $6*2^n+8$

t(n)=100n+5 express t(n) as Big Omega (Ω)

Solution

replace 5 by 0 in above given equation

We will get

100n let call this as Cg(n), in this C=100 and g(n)=n

100n+5 ≥100n For n≥ n_0 ie n ≥ 0

Thus C=100, g(n)=n, n_0 =0

t(n) ∈ Ω(g(n)), ie t(n) ∈ Ω(n)

Solution

We know that

$C_2.(g(n)) \le t(n) \le C_1.(g(n))$, for all n≥ n_0

$6*2^n \le 6*2^n+8 \le 7*2^n$

Thus C_2=6, g(n)=2^n, C_1= 7 n>0

Thus C_2=10, g(n)= n^3, C_1= 11 n_0=0

t(n) ∈ Θ(g(n)), ie t(n) ∈ Θ(2^n)

2b. **Model the Bubble sort Algorithm and analysis its time complexity. Sort the given list of elements using Bubble sort** **2M+2M+1M**

69, 25, 98, 90, 29, 34, 27

Ans:

Bubble sort (A[0....n])

//input: An array A[0...n-1]

//output: Sorted An array A[0...n-1]

```
for i←0 to n-2
   for j← 0 to n-2-i
      if A[j+1]<A[j] swap A[j] and A[j+1]
```

2c. **Model a general plan for the analyzing time efficiency of non-recursive algorithms**

with an example. Build the Matrix multiplication algorithm and derive its time complexity.

Ans: **2M+2M+1M**

General plan for analysing time efficiency of non-recursive algorithms

1. Decide the parameters (or parameter) indicating the size of input
2. Identify algorithm's basic operation (it is located in innermost loop)
3. Check whether the number of times the basic operation executed is depends only on the size of an input. If it also depends on some additional property, the worst-case, average-case, and, if necessary, best-case efficiencies have to be investigated separately.
4. Set up a sum expressing the number of times the algorithm's basic operation is executed.
5. Using standard formulas and rules of sum manipulation, either find a closed form formula for the count or, at the very least, establish its order of growth.

Algorithm MatrixMultiplication
(A[0…..n-1], B[0…..n-1)

```
//input an Two n*n matrices  A and B
// Output Matrix C=A*B
  for i ← 0 to n-1 do
     for j ← 0 to n-1 do
        C[i, j] ← 0;
            for k ← 0 to n-1 do
            C[i, j] ← C[i, j] + A[i, k]*B[k, j];
  return C;
```

$M(n) = \sum_{i=0}^{n-1} \sum_{j=0}^{n-1} \sum_{k=0}^{n-1} 1$

$M(n) = \sum_{i=0}^{n-1} \sum_{j=0}^{n-1} n = M(n) = \sum_{i=0}^{n-1} n2 = n^3$

3a. Develop a Quick sort algorithm.

Ans: 5M

Quick sort Algorithm

```
ALGORITHM Quicksort(A[l . . . . . r])
//Sorts a subarray by quicksort
//Input: Subarray of array A[0..n − 1], defined by its left indices l and right indices r
//Output: Subarray A[l . . . . . r]  sorted in nondecreasing order
if l < r
      s ←Partition(A[l. . . .r]) //s is a split position
      Quicksort(A[l. . . s − 1])
      Quicksort(A[s + 1. . . . r])
```

```
Quick sort Algorithm
Quicksort(A[s + 1. . . . r])
ALGORITHM Partition(A[l..r])
//Partitions a subarray by Hoare's algorithm, using the first element as a pivot
//Input: Subarray of array A[0..n − 1], defined by its left and right indices l and r (l<r)
//Output: Partition of A[l..r], with the split position returned as this function's value
  p←A[l]
  i ←l;    j ←r + 1
  repeat
        repeat i ←i + 1 until A[i]≥ p
        repeat j ←j − 1 until A[j ]≤ p
        swap(A[i], A[j ])
until i ≥ j
swap(A[l], A[j ]) //undo last swap when i ≥ j
swap(A[l], A[j ])  // swap pivot p with A[j]
return j
```

3b.

5M

Merge sort: sorted list

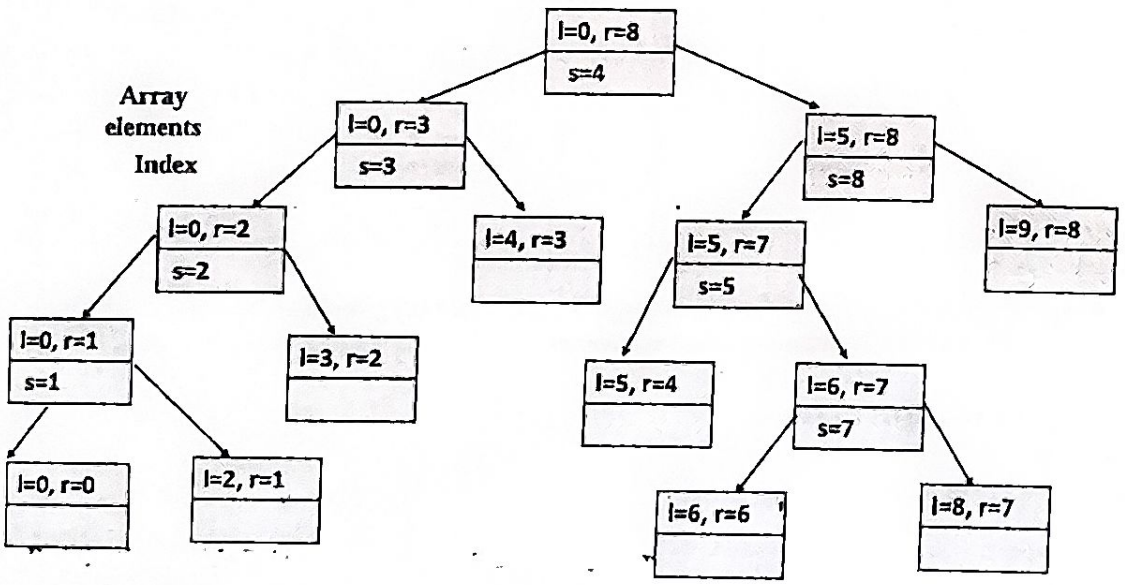
Ans:

4a. **15, 25, 30, 35, 54, 55, 67, 75, 77, 80, 90**

3M+2M

Apply the Quick sort algorithm for following list of elements and also construct the tree of recursive calls

65, 70, 75, 80, 85, 60, 55, 50, 45



4b.

Experiment with how the recurrence relation can be solved using Master's theorem. 3M+2M

Ans

Masters theorem

In divide and conquer technique problem instance of size n is divided into two instances of size n/2.

More generally, an instance of size n can be divided into b instances of size n/b, with a of them needing to be solved. (Here, a and b are constants; $a \geq 1$ and $b > 1$.) Assuming that size n is a power of b to simplify our analysis, we get the following recurrence

The recurrence relation for divide and conquer

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

- This recurrence relation is called general divide and conquer recurrence relation.
- The order of growth of its solution T (n) depends on the values of the constants a and b and the order of growth of the function f (n).

Where,
a and b → known as constants.
T(1) → assume that its value is known,
n → power of b ie $n=b^k$
f(n) → Time to divide the problem and combining the solution.

The efficiency analysis of many divide-and-conquer algorithms is greatly simplified by the following master theorem

Master theorem: If $f(n) \in \Theta(n^d)$ where $d \geq 0$ in the recurrence relation then

$$T(n) \in \begin{cases} \Theta(nd) & \text{if } a < bd \\ \Theta(nd \log n) & \text{if } a = bd \\ \Theta(n^{\log_a b}) & \text{if } a > bd \end{cases}$$

Analogous results hold for the O and Ω notations, too.

Course in charge

HOD

K S INSTITUTE OF TECHNOLOGY

Bangalore – 560109

DEPARTMENT OFCOMPUTER SCIENCE &ENGINEERING

CIE Question paper Scrutiny format

Course Name	**Analysis and Design of Algorithms**
Course Code	**BCS401/BCO402**
Course Incharge	**Dr. Vijayalaxmi Mekali**
Academic year	**2024-2025**
Semester	**4th**
CIE #	**IA - 2**
Set	A☐ B ☐
Scrutiny parameters	
Whether questions are according to assessment plan?	Yes ☐ No☐ ; If No, Suggestions:
Whether questions prepared are within the covered syllabus?	Yes ☐ No ☐ ; If No, Suggestions:
Whether all questions are mapped to CO/PO properly?	Yes ☐ No ☐ ; If No, Suggestions:
Whether questions framed are according to Blooms level?	Yes ☐ No ☐ ; If No, Suggestions:
Whether marks distribution for each question are correct?	Yes ☐ No ☐ ; If No, Suggestions:
Whether questions paper follows the format displayed?	Yes ☐ No ☐ ; If No, Suggestions:
Difficulty level	Very High ☐High ☐ Moderate ☐ Low☐
Percentage of Similarity questions in Set A & B	5%
Final decision	Accepted without corrections☐ Accepted with minor corrections☐ Not accepted☐

9/4/2025

Signature with date
of CIE Question paper setter

Dr. Vijayalaxmi Mekali
9/4/2025

Name and Signature with date
of CIE Question paper Scrutiniser

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
SECOND INTERNAL TEST QUESTION PAPER 2024-25 EVEN SEMESTER

SET: B

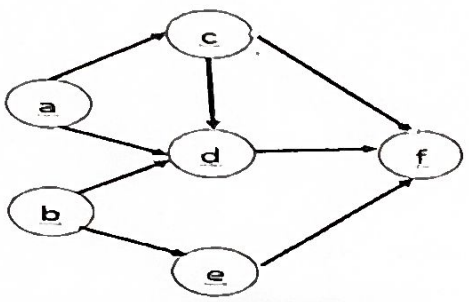
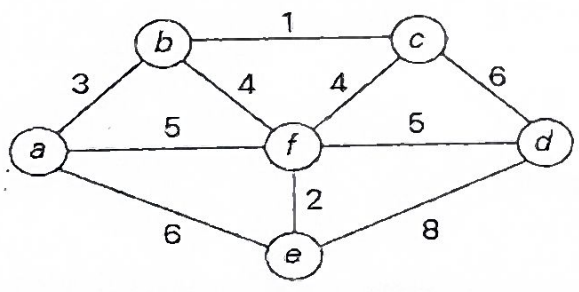
USN | | | | | | | | | | |

Degree : B.E
Branch - Stream : CSE/CSD/CCE/AIML/CSE(ICB)
Course Title : Analysis and Design of Algorithm
Duration : 1 Hr (60 minutes)

Semester : IV
Course Type / Code : BCS401/BCO40
Date : 16/4/2025
Max Marks : 25

Note: Answer **ONE full** question from each Module.

L-Bloom's Level: L1-Remebering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, L6-Creating

Q No.	Questions	Marks	CO	L
	Module-2			
1(a)	**Make use of** a Strassen's Matrix Multiplication method to multiply given matrix $A=\begin{bmatrix}3 & 4\\5 & 6\end{bmatrix}$ and $B=\begin{bmatrix}8 & 6\\2 & 7\end{bmatrix}$	05	CO2	L3
	OR			
2(a)	**Apply** a **Source removal method** to solve Topological sorting problem for the following graph. 	05	CO2	L3
	Module-3			
3(a)	**Apply** a **Distribution Counting Sort** algorithm to sort the given list of elements **13, 11, 12, 13, 12, 12**	05	CO3	L3
(b)	**Develop** a **Comparison Counting sort algorithm** to sort a list of elements	05	CO3	L3
(c)	**Construct** a heap for the given list of elements using a **Bottom-Up approach** **14, 59, 81, 55, 90, 61**	05	CO3	L3
	OR			
(a)	**Apply a** heapsort for the given list of elements. **11, 33, 19, 34, 20, 88, 68, 24**	05	CO3	L3
(b)	**Build** an Algorithm for the **Bottom up construction** of a heap	05	CO3	L3
(c)	**Apply** a Horspool's string matching algorithm for give Text and Pattern string Text = **JIM_SAW_ME_IN_A_BARBERSHOP** Pattern = **BARBER**	05	CO3	L3
	Module-4			
5(a)	**Apply** a **Kruskal's algorithm** for the given graph to find a Minimum Spanning tree 	05	CO4	L3
	OR			
6(a)	**Build** a **Prim's algorithm** to find a Minimum Spanning tree	05	CO4	L3

Dr. Uma Mahesh 9/4/25 — Name & Signature of Course In charge:

Dr. Uma Mahesh 9/4/25 — Name & Signature of Module Coordinator:

HOD

Principal

K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109
II SESSIONAL TEST QUESTION PAPER 2024 – 25 EVEN SEMESTER

SCHEME AND SOLUTION

Degree : B.E
Branch : CSE/CSD/CCE/AIML/CSE(ICB)
Course Title : Analysis and Design of Algorithms

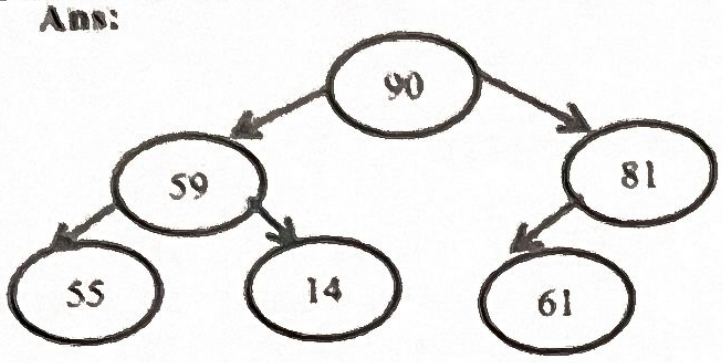
Semester : IV
Course Code : BCS401/BCO402
Max Marks : 25

Q.NO.	POINTS	MARKS
1a	**Ans:** $C=\begin{bmatrix}32 & 46\\ 52 & 72\end{bmatrix}$	5M
2a	**Topological sorting** **Ans:** **a→b→c→d→e→f**	5M
3a	**Ans:** **Sorted list is**	3M+2M
3b	**Comparison Counting Sort** algorithm to sort a list of elements **Ans:**	5M

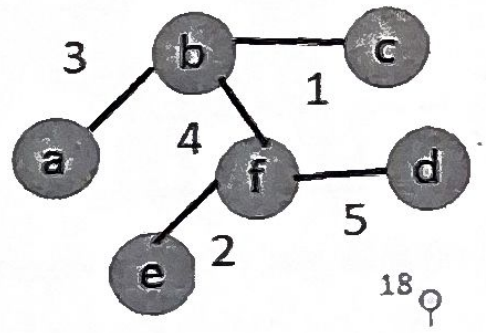
0	1	2	3	4	5
			12		
		12			
					13
	12				
11					
				13	

0	1	2	3	4	5
11	12	12	12	13	13

```
CamparisonCountingSort(A[0...n-1])
for i←0 to n-1 do Count[i]←0
fori←0 to n-2 do
   for j←i+1 to n-1 do
      if A[i] < A[j]
         Count[j]←Count[j]+1
      else
         Count[i]←Count[i]+1
for i←0 to n-1 do
S[Count[i]]←A[i]
return S
```

3c	**Ans:**  	**5M**
4a	**Ans:** Sorted list 11,19, 20, 24, 33, 34, 68, 88	**3M+2M**

4b	HeapBottomUp(H[1…n])
	for i←n/2 downto 1 do
	k← i, v ← H[k]
	heap ← false
	while not heap and 2*k ≤ n do
	j ← 2*k
	if j<n
	if H[j]<H[j+1]
	j←j+1
	if v ≥ H[j]
	heap←true
	else H[k]←H[j];k←j
	H[k]←v
		5M

4c	**Ans:** Pattern match is successful at index 16	**5M**
5a.	**Ans:** Minimum Spanning tree.  **Cost = 15**	**4M+1M**
5b.	Prim's algorithm to find a Minimum Spanning tree. **Ans:**	**5M**

Prim's algorithm

ALGORITHM Prim(G)

//Prim's algorithm for constructing a minimum spanning tree

//Input: A weighted connected graph $G = V, E$

//Output: E_T **, the set of edges composing a minimum spanning tree of** G

$V_T \leftarrow \{v_0\}$ **//the set of tree vertices can be initialized with any vertex**

$E_T \leftarrow \emptyset$

for $i \leftarrow 1$ **to** $|V| - 1$ **do**

find a minimum-weight edge $e* = (v*, u*)$ **among all the edges** (v, u)

such that v **is in** V_T **and** u **is in** $V - V_T$

$V_T \leftarrow V_T \cup \{u*\}$

$E_T \leftarrow E_T \cup \{e*\}$

return E_T

Course in charge **HOD**

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
SECOND INTERNAL TEST QUESTION PAPER 2024-25 EVEN SEMESTER

SET: A

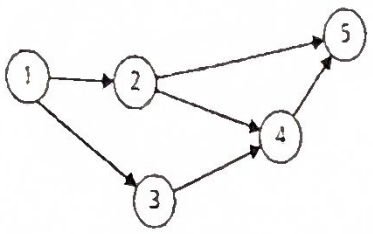
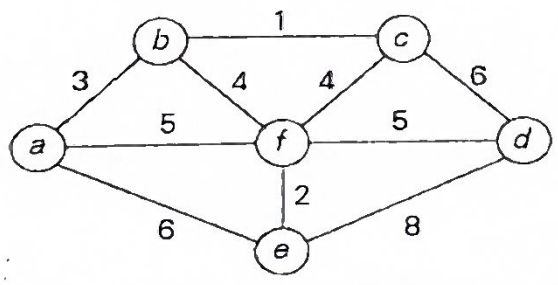
Degree : B.E
Branch - Stream : CSE/CSD/CCE/AIML/CSE(ICB)
Course Title : Analysis and Design of Algorithm
Duration : 1 Hr (60 minutes)

USN | | | | | | | | | | |

Semester : IV
Course Type / Code : BCS401/BCO40
Date : 16/4/2025
Max Marks : 25

Note: Answer **ONE full** question from each Module.

L-Bloom's Level: L1-Remebering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, L6-Creating

Q No.	Questions	Marks	CO	L
	Module-2			
1(a)	**Apply** a **Depth First Search** method to find topological sort of the given graph 	05	CO2	L3
	OR			
2(a)	**Make use of** a Strassen's Matrix Multiplication method to multiply given matrix $A=\begin{bmatrix}2 & 4\\6 & 7\end{bmatrix}$ and $B=\begin{bmatrix}6 & 9\\8 & 4\end{bmatrix}$	05	CO2	L3
	Module-3			
3(a)	**Apply** a **Comparison Counting sort algorithm** to sort the given list of elements **62, 31, 84, 96, 19, 47**	05	CO3	L3
(b)	**Develop** a **Distribution Counting Sort** algorithm to sort a list of elements	05	CO3	L3
(c)	**Construct** a heap for the given list of elements using a **Top-down approach.** **34, 53, 91, 54, 60, 28**	05	CO3	L3
	OR			
4(a)	**Apply** a Heapsort for the given list of elements. **12, 3, 9, 14, 10, 18**	05	CO3	L3
(b)	**Build** a Horspool's string matching algorithm.	05	CO3	L3
(c)	**Apply** a Horspool's string matching algorithm for give text and pattern string. Text = **JIM_SAW_ME_IN_A_BARBERSHOP** Pattern = **BARBER**	05	CO3	L3
	Module-4			
5(a)	**Apply** a **Prim's algorithm** for the given graph to find a Minimum Spanning tree. 	05	CO4	L3
	OR			
6(a)	**Build** the Kruskal's algorithm to find a Minimum Spanning tree.	05	CO4	L3

Dr. Uyyalam Balaji 9/4/25 Dr. Uyyalam Balaji 9/4/25

Name & Signature of Course In charge: **Name & Signature of Module Coordinator:** **HOD** **Principal**

K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109
II SESSIONAL TEST QUESTION PAPER 2024 – 25 EVEN SEMESTER

SCHEME AND SOLUTION

Degree : **B.E** **Semester** : **IV**
Branch : : **CSE/CSD/CCE/AIML/CSE(ICB)** **Course Code** : **BCS401/BCO402**
Course Title : **Analysis and Design of Algorithms** **Max Marks** : **25**

Q.NO. 1a — **MARKS: 5M**

Topological sorting

Ans:

1→2→3→4→5

Q.NO. 2a — **MARKS: 5M**

Ans:

$$C=\begin{bmatrix}44 & 34\\ 92 & 82\end{bmatrix}$$

Q.NO. 3a — **MARKS: 3M+2M**

Ans:

62	31	84	96	19	47
0	0	0	0	0	0
3	0	1	1	0	0
	1	2	2	0	1
		4	3	0	1
			5	0	1
				0	2
3	1	4	5	0	2

Sorted list is

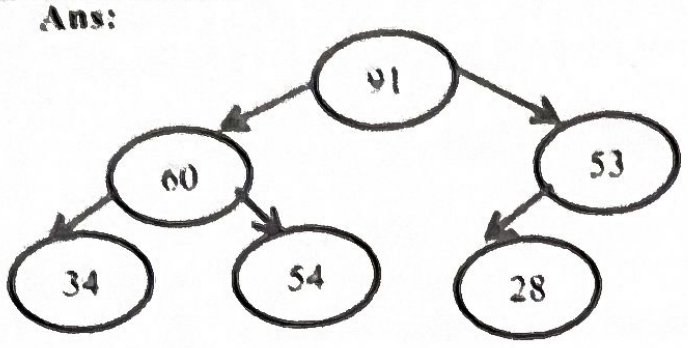
0	1	2	3	4	5
19	31	47	62	84	96

Q.NO. 3b — **MARKS: 5M**

Distribution Counting Sort algorithm to sort a list of elements

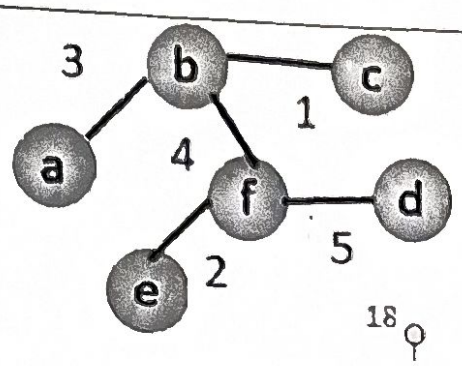
Ans:

```
Algorithm for Distribution Counting(A[0...n-1], l, u)
for j←0 to u-l do D[j]←0
  fori←0 to n-1 do D[A[i]-l]←D[A[i]-l]+1
for j←1 to u-l do D[j]←D[j-1]+D[j]
for i ←n-1 downto 0 do
      j←A[i]-l
        S[D[j]-1←A[i]
        D[j]←D[j]-1
return S
```

3c	**Ans:**  	**5M**
4a	**Ans:** Sorted list 3, 9, 10, 12, 14, 18	**3M+2M** **2M+3M**

4b	Horspool's string matching algorithm.
	Ans:
	
	shiftTable(P[0….m-1])
	//input: patter string P[0….m….1]
	// output Table[0….size-1] indexed by the alphabet's character and filled with shift sizes computed by formula given below
	Intialize all the elements of Table with m
	for j←0 to m-2 do Table[P[j]]←m-1-j
	return Table
	Harspool string matching (P[0….m-1], T[0….n-1]
	// input pattern P[0…m-1] and main string T[0…..n-1]
	//output the index of the left end of the first matching substring or -1
	shiftTable (P[0…m-1])
	j←m-1
	While i<=n-1 do
	k←0
	while k<=m-1 and P[m-1-k]=T[i-k] do
	k=k+1
	if k=m
	return i-m+1
	else i←i+table[T[i]]
	
	return -1	

4c	**Ans:** Pattern match is successful at index 16	**5M** **4M+1M**
5a.	**Ans:** Minimum Spanning tree.	



18

Cost = 15

5b.	Kruskal's algorithm to find a Minimum Spanning tree.
	Ans:
	Kruskal's algorithm
	//Kruskal's algorithm for constructing a minimum spanning tree
	//Input: A weighted connected graph G (V, E)
	//Output: ET , the set of edges composing a minimum spanning tree of G
	sort E in nondecreasing order of the edge weights w(ei1) ≤ . . . ≤ w(ei|E|)
	ET ←Ø ; ecounter ←0 //initialize the set of tree edges and its size
	k←0 //initialize the number of processed edges
	while ecounter < |V| − 1 do
	k←k + 1
	if ET ∪ {eik} is acyclic
	ET ←ETU {eik};
	ecounter ←ecounter + 1
	return ET
		5M

Course in charge

HOD

K S INSTITUTE OF TECHNOLOGY
Bangalore – 560109

DEPARTMENT OFCOMPUTER SCIENCE &ENGINEERING

CIE Question paper Scrutiny format

Course Name	**Analysis and Design of Algorithms**
Course Code	**BCS401/BCO402**
Course Incharge	**Dr.Vijayalaxmi Mekali**
Academic year	**2024-2025**
Semester	**4th**
CIE #	**IA - 3**
Set	A ☑ B ☐
Scrutiny parameters	
Whether questions are according to assessment plan?	Yes ☑ No ☐ ; If No, Suggestions:
Whether questions prepared are within the covered syllabus?	Yes ☑ No ☐ ; If No, Suggestions:
Whether all questions are mapped to CO/PO properly?	Yes ☑ No ☐ ; If No, Suggestions:
Whether questions framed are according to Blooms level?	Yes ☑ No ☐ ; If No, Suggestions:
Whether marks distribution for each question are correct?	Yes ☑ No ☐ ; If No, Suggestions:
Whether questions paper follows the format displayed?	Yes ☑ No ☐ ; If No, Suggestions:
Difficulty level	Very High ☐ High ☐ Moderate ☑ Low ☐
Percentage of Similarity questions in Set A & B	5%
Final decision	Accepted without corrections ☐ Accepted with minor corrections ☐ Not accepted ☐

16/5/25

Signature with date
of CIE Question paper setter

Name and Signature with date
of CIE Question paper Scrutiniser

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
THIRD INTERNAL TEST QUESTION PAPER 2024-25 EVEN SEMESTER

SET: B

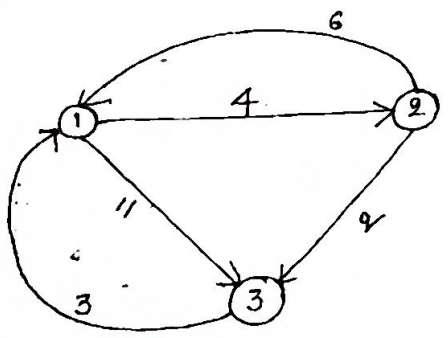
USN | | | | | | | | | |

Degree : B.E
Branch - Stream : CSE/CSD/CCE/AIML/CSE(ICB)
Course Title : Analysis and Design of Algorithms
Duration : 1 Hr (60 minutes)

Semester : IV
Course Type / Code : BCS401/BCO402
Date : 22/5/2025
Max Marks : 25

Note: Answer **ONE full** question from each Module.

L-Bloom's Level: L1-Remebering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, L6-Creating

Q No.	Questions	Marks	CO	L
	Module-4			
1(a)	**Apply** the **Warshall's algorithm** to find transitive closure of given graph 	05	CO4	L3
(b)	i) **Construct** a **Huffman code** for the following data ii) Encode **AD_DAD** using the code of question (i) iii) Decode **10011011011101** using the code of question (i)	05	CO4	L3
	OR			
2(a)	**Build** the all-pair shortest paths for the digraph shown below using **Floyd's algorithm.** 	05	CO4	L3
(b)	**Model Floyd's algorithm** to find all-pair shortest paths in given graphs.	05	CO4	L3
	Module-5			
3(a)	**Find** all possible subsets of set **S** that sum to **m**. Draw the state space tree that it generates. Let **S = { 2, 3, 4, 6, 8} and m = 10.**	05	CO5	L3
(b)	**Experiment with** Backtracking method. Draw state space tree to generate solutions to **4-Queen's problem.**	05	CO5	L3
(c)	**Experiment with** approximation algorithm for the Knapsack problem.	05	CO5	L3

Symbol	A	B	C	D	_
Frequency	0.35	0.1	0.2	0.2	0.15

	OR			
4(a)	**Build** decision trees for performance analysis of **Binary search and selection sort.**	**05**	**CO5**	**L3**
(b)	**Apply Branch and bound algorithm** design technique to obtain optimal solution for the Knapsack instance. Knapsack capacity W = 5 **Item** | **Weight** | **Value/Profit** 1 | 2 | 12 2 | 1 | 10 3 | 3 | 20 4 | 2 | 15	**05**	**CO5**	**L3**
(c)	**Make use of** suitable example to explain Branch and Bound algorithm design technique.	**05**	**CO5**	**L3**

16/5/25

Name & Signature of Module Coordinator

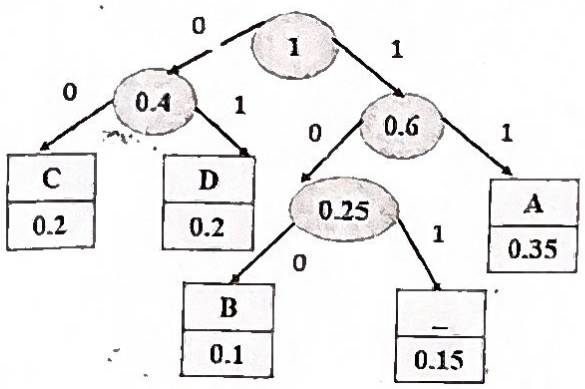
HOD

Principal

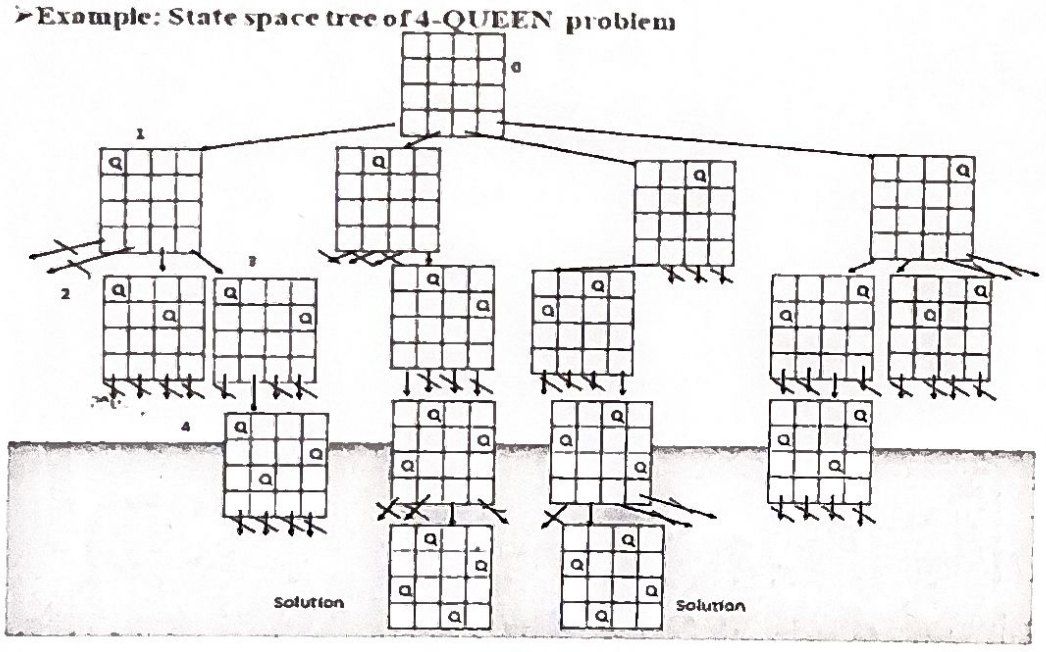
K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109
III SESSIONAL TEST QUESTION PAPER 2024 – 25 EVEN SEMESTER

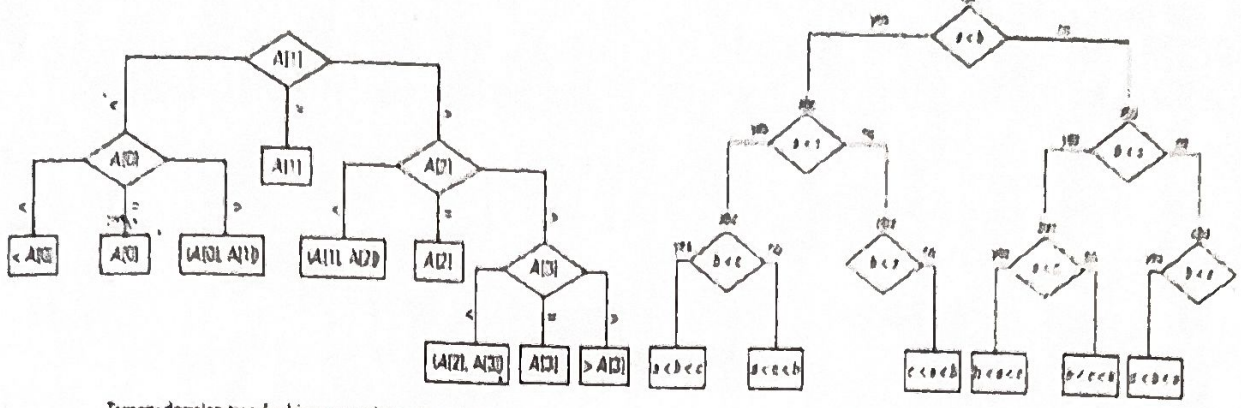
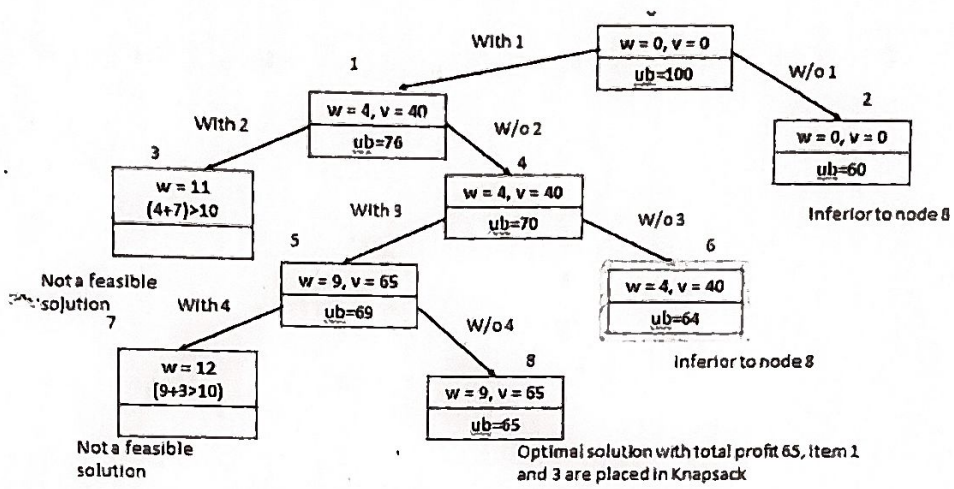
SCHEME AND SOLUTION

Degree	:	B.E	Semester	:	IV
Branch	:	: CSE/CSD/CCE/AIML/CSE(ICB)	Course Code	:	BCS401/BCO402
Course Title	:	Analysis and Design of Algorithms	Max Marks	:	25

Q.NO.	POINTS	MARKS
1a	**Ans: Transitive closure** $Q^{(4)}$ | 1 2 3 4 1 | 0 1 1 1 2 | 0 0 1 1 3 | 0 0 0 1 4 | 0 0 0 0 is the transitive closure	5M
1b	**Ans:**  ii) Encode AD_DAD using the code of question (1101101011101 iii) Decode **10011011011101** using the code of question BAD_AD	3M+2M
2a	**Ans:** All-pair shortest paths Step 4: $D^{(3)} = \begin{array}{c} \\ 1 \\ 2 \\ 3 \end{array} \begin{array}{c} \begin{array}{ccc} 1 & 2 & 3 \end{array} \\ \begin{bmatrix} 0 & 4 & 6 \\ 5 & 0 & 2 \\ 3 & 7 & 0 \end{bmatrix} \end{array}$ is the resultant all pairs shortest path matrix (distance matrix).	5M

b	**Ans:**
	Floyd's algorithm to find all-pair shortest paths in given graphs.
	Floyd's algorithm
	ALGORITHM Floyd(W[1..n, 1..n])
	//Implements Floyd's algorithm for the all-pairs shortest-paths problem
	//Input: The weight matrix W of a graph with no negative-length cycle
	//Output: The distance matrix of the shortest paths' lengths
	D ←W //is not necessary if W can be overwritten
	for k←1 to n do
	for i ←1 to n do
	for j ←1 to n do
	D[i, j]←min{D[i, j], D[i, k]+ D[k, j]}
	return D
		5M

3a	**Find** all possible subsets of set **S** that sum to **m**. Draw the state space tree that it generates. Let **S = { 2, 3, 4, 6, 8} and m = 10.** **Ans:** **Solution subsets are {2, 8}, {4, 6)** **State space tree**	**3M+2M**
3b	**Ans:** State space tree to generate solutions to **4-Queen's problem.** ➢**Example: State space tree of 4-QUEEN problem**  	**5M**
3c	**Ans:** **Experiment with** approximation algorithm for the Knapsack problem. Decision trees for performance analysis of **insertion sort and selection sort**	**3M+2M**

4a	**Ans:**  Ternary decision tree for binary search in a four-element array. Decision tree for the two-element selection sort. A triple above a	**3M+2M**
4b	**Branch and Bound algorithm** design technique to obtain optimal solution for the Knapsack instance. Knapsack capacity W = 10 **Ans:**  	**5M**
4c	**Ans:** Backtracking definition General Backtracking algorithm Suitable example Explanation	**2M+3M**

Course in charge **HOD**

K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109
THIRD INTERNAL TEST QUESTION PAPER 2024-25 EVEN SEMESTER

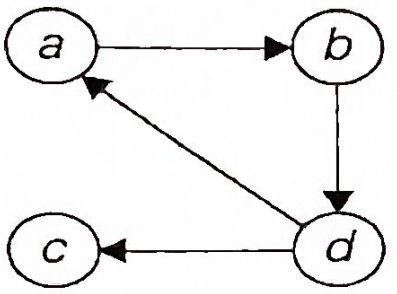
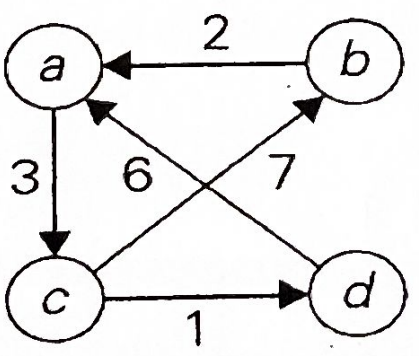
SET: A

USN | | | | | | | | | | |

Degree	:	B.E	Semester	: IV
Branch - Stream	:	CSE/CSD/CCE/AIML/CSE(ICB)	Course Type / Code	: BCS401/BCO402
Course Title	:	Analysis and Design of Algorithms	Date	: 22/5/2025
Duration	:	1 Hr (60 minutes)	Max Marks	: 25

Note: Answer **ONE full** question from each Module.

L-Bloom's Level: L1-Remebering, L2-Understanding, L3-Applying, L4-Analyzing, L5-Evaluating, L6-Creating

<table>
<tr><th>Q No.</th><th>Questions</th><th>Marks</th><th>CO</th><th>L</th></tr>
<tr><td colspan="5">Module-4</td></tr>
<tr><td>1(a)</td><td>Apply the Warshall's algorithm to find transitive closure of given graph
 
</td><td>05</td><td>CO4</td><td>L3</td></tr>
<tr><td>(b)</td><td>i) Construct a Huffman code for the following data
<table><tr><td>Symbol</td><td>A</td><td>B</td><td>C</td><td>D</td><td>_</td></tr><tr><td>Frequency</td><td>0.4</td><td>0.1</td><td>0.2</td><td>0.15</td><td>0.15</td></tr></table>ii)Encode ABACABAD using the code of question (i)
iii) Decode 100010111001010 using the code of question (i)</td><td>05</td><td>CO4</td><td>L3</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td>2(a)</td><td>Build the all-pair shortest paths for the digraph shown below using Floyd's algorithm.
 
</td><td>05</td><td>CO4</td><td>L3</td></tr>
<tr><td>(b)</td><td>Model Warshall's Algorithm to find transitive closure of given graph.</td><td>05</td><td>CO5</td><td>L3</td></tr>
</table>

<table>
<tr><td colspan="5">Module-5</td></tr>
<tr><td>3(a)</td><td>Find all possible subsets of S that sum to m. Draw the state space tree that it generates. Let S = {3, 5, 6, 7} and m = 15.</td><td>05</td><td>CO5</td><td>L3</td></tr>
<tr><td>(b)</td><td>Construct state space tree to generate solutions to 4-Queen's problem.</td><td>05</td><td>CO5</td><td>L3</td></tr>
<tr><td>(c)</td><td>Experiment with P, NP and NP-complete problems.</td><td>05</td><td>CO5</td><td>L3</td></tr>
<tr><td colspan="5">OR</td></tr>
<tr><td>4(a)</td><td>Build decision trees for performance analysis of insertion sort and selection sort</td><td>05</td><td>CO5</td><td>L3</td></tr>
<tr><td>(b)</td><td>Apply Branch and Bound algorithm design technique to obtain optimal solution for the Knapsack instance. Knapsack capacity W = 10
<table>
<tr><th>Item</th><th>Weight</th><th>Value/Profit</th></tr>
<tr><td>1</td><td>4</td><td>40</td></tr>
<tr><td>2</td><td>7</td><td>42</td></tr>
<tr><td>3</td><td>5</td><td>25</td></tr>
<tr><td>4</td><td>3</td><td>12</td></tr>
</table></td><td>05</td><td>CO5</td><td>L3</td></tr>
<tr><td>(c)</td><td>Make use of suitable example to explain Backtracking algorithm design technique.</td><td>05</td><td>CO5</td><td>L3</td></tr>
</table>

Dr. Vijayalakshmi Mekali

16/5/25

Name & Signature of Module Coordinator

HOD

Principal

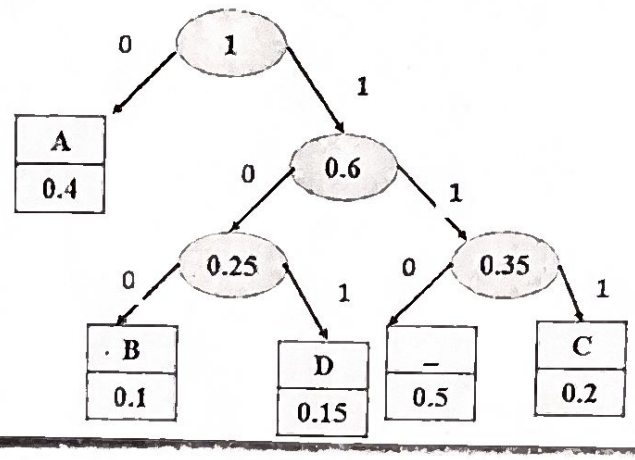
Selected

K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109

III SESSIONAL TEST QUESTION PAPER 2024 – 25 EVEN SEMESTER

SCHEME AND SOLUTION

Degree	:	B.E	Semester	:	IV
Branch	:	: CSE/CSD/CCE/AIML/CSE(ICB)	Course Code	:	BCS401/BCO402
Course Title	:	Analysis and Design of Algorithms	Max Marks	:	25

Q.NO.	POINTS	MARKS
1a	**Ans: Transitive closure** $R^{(4)}$ | a b c d a | 1 1 1 1 b | 1 1 1 1 c | 0 0 0 0 d | 1 1 1 1	5M
1b	**Ans:**  **Encode ABACABAD using the code of question (i)** **0100011101000101** **iii) Decode 100010111001010 using the code of question (i)** **BAD_ADA**	3M+2M
2a	**Ans:** All-pair shortest paths **Resultatnt D(4) is $D^{(4)}$ gives all pair shortest path** $D^{(4)} = \begin{matrix} \\ a \\ b \\ c \\ d \end{matrix} \begin{matrix} a & b & c & d \\ \end{matrix} \begin{bmatrix} 0 & 10 & 3 & 4 \\ 2 & 0 & 5 & 6 \\ 7 & 7 & 0 & 1 \\ 6 & 16 & 9 & 0 \end{bmatrix}$ Shortest path from vertex a: a→b = 10; a→c = 3; a→d = 4 Shortest path from vertex b: b→a = 2; b→c = 5; b→d = 6 Shortest path from vertex c: c→a = 7; c→b = 7; c→d = 1 Shortest path from vertex d: d→a = 6; d→b = 16; d→c = 9	5M

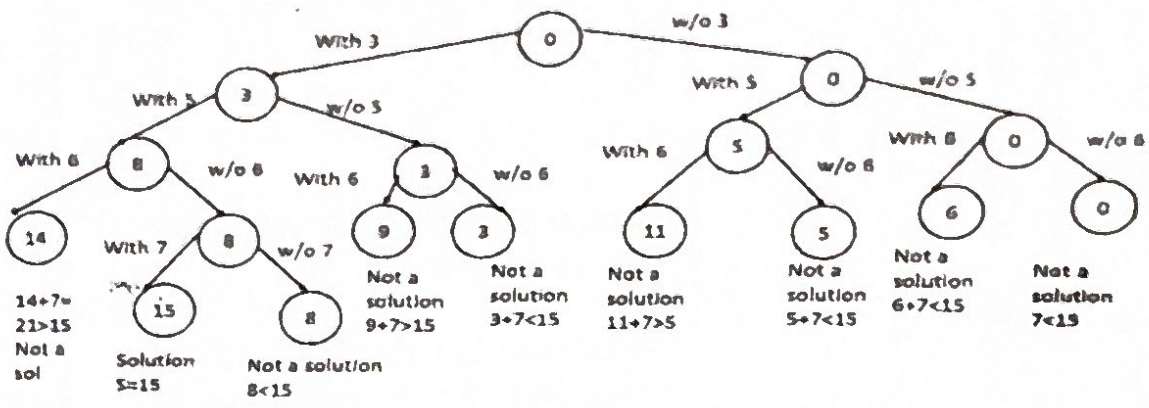
b — **5M**

Ans:
Warshall's algorithm to compute the transitive closure

ALGORITHM Warshall(A[1..n, 1..n])
//Implements Warshall's algorithm for computing the transitive closure
//Input: The adjacency matrix A of a digraph with n vertices
//Output: The transitive closure of the digraph
$R^{(0)} \leftarrow A$
for k←1 to n do
  for i ←1 to n do
    for j ←1 to n do
      $R^{(k)}[i, j] \leftarrow R^{(k-1)}[i, j]$ or $(R^{(k-1)}[i, k]$ and $R^{(k-1)}[k, j])$
return $R^{(n)}$

3a — **3M+2M**

Subsets of **S** that sum to **m=15**. And state space tree that it generates.
S = {3, 5, 6, 7}
Ans:

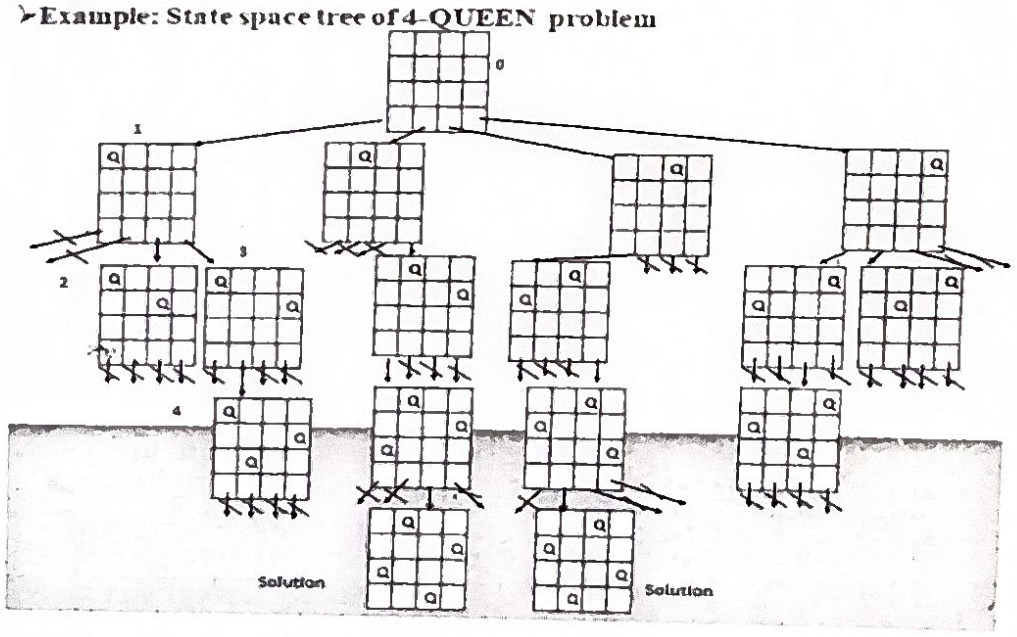


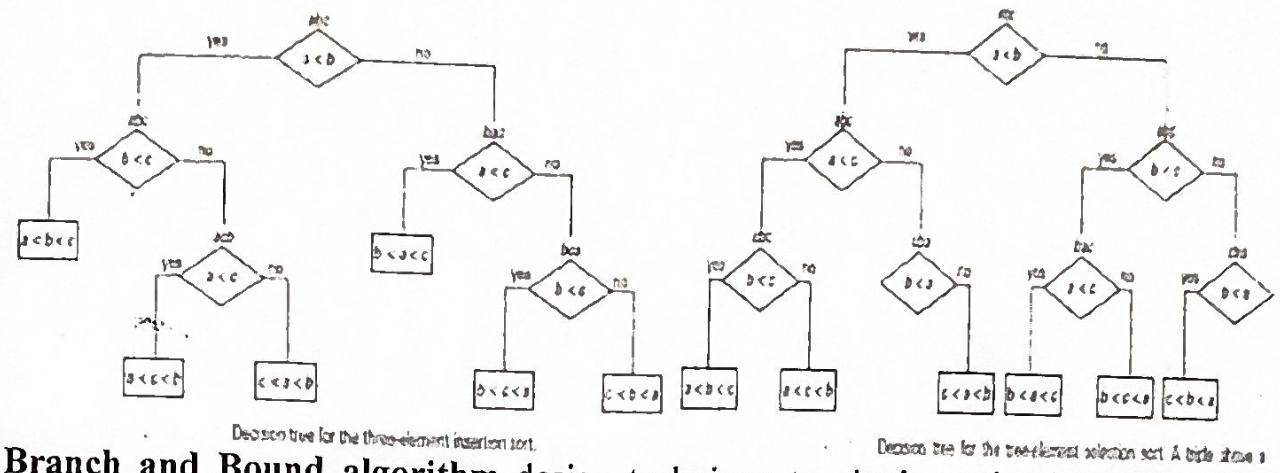
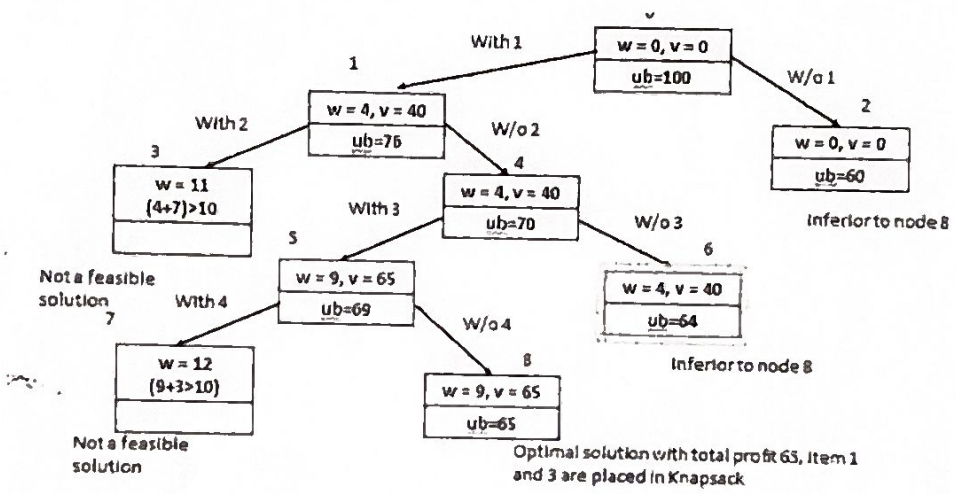
Solution subset is {3,5,7}

3b — **5M**

Ans:
State space tree to generate solutions to **4-Queen's problem.**

➢**Example: State space tree of 4-QUEEN problem**



3c	**Ans:** **Definition of P, NP and NP-complete** problems Explanation	**3M+2M**
4a	Decision trees for performance analysis of **insertion sort and selection sort** **Ans:**  Decision tree for the three-element insertion sort. Decision tree for the three-element selection sort. A circle stands for a	**3M+2M**
4b	**Branch and Bound algorithm** design technique to obtain optimal solution for the Knapsack instance. Knapsack capacity W = 10 **Ans:**  	
4c	**Ans:** Backtracking definition General Backtracking algorithm Suitable example Explanation	

Course in charge

HOD

K.S. INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE & ENGG.

IV A SEC ADA (BCS401) FINAL MARKS LIST 2024-2025

SL. NO	USN	NAME OF THE STUDENT	IA1	IA2	IA3	Imp	AVG IA	ASS1	ASS2	AVG ASS	Activity	Avg ASS+Activity	FINAL IA	SIGN
1	1KS23CS001	ABHIMANYU N SHETTIGAR	18	21	24		21	15	15	15	10	25	46	
2	1KS23CS002	ADITI S H	18	25	23		22	15	15	15	10	25	47	
3	1KS23CS003	ADITYA A	10	20	19		17	15	15	15	10	25	42	
4	1KS23CS004	AISHWARYA B C	21	25	24		24	15	15	15	10	25	49	
5	1KS23CS005	AISHWARYA N	9	24	15		16	10	10	10	8	18	34	
6	1KS23CS006	AKASH R	9	22	22		18	15	15	15	10	25	43	
7	1KS23CS007	AKASH S	8	14	17		13	15	15	15	10	25	38	
8	1KS23CS008	AKSHAYA BALAKUMAR	3	11	17		11	15	15	15	10	25	36	
9	1KS23CS009	AMEENA FATHIMA	23	25	24		24	15	15	15	10	25	49	
10	1KS23CS010	AMRUTH C K	15	22	17		18	15	15	15	10	25	43	
11	1KS23CS011	AMRUTHA J	25	25	24		25	15	15	15	10	25	50	
12	1KS23CS012	AMULYA V	24	24	11		20	15	15	15	10	25	45	
13	1KS23CS013	ANGELINA SHAR0N ROBERT	18	22	17		19	15	15	15	10	25	44	
14	1KS23CS014	ANUJA V M	25	25	25		25	15	15	15	10	25	50	
15	1KS23CS015	ANUSHA V	24	25	23		24	15	15	15	10	25	49	

SL. NO	USN	NAME OF THE STUDENT	IA1	IA2	IA3	Imp	AVG IA	ASS1	ASS2	AVG ASS	Activity	Avg ASS+Activity	FINAL IA	SIGN
16	1KS23CS016	ANVITHA T A	21	24	21		22	15	15	15	10	25	47	
17	1KS23CS017	APOORVA R NAVDA	24	25	22		24	15	15	15	10	25	49	
18	1KS23CS018	ARPITA RATHOD	10	9	11		10	15	15	15	10	25	35	
19	1KS23CS019	ARUN CHAVAN	13	7	14		12	15	15	15	10	25	37	
20	1KS23CS020	ARYAMAN TIWARI	6	17	20		15	10	10	10	8	18	33	
21	1KS23CS021	ASIYA NAAZ	25	25	22		24	15	15	15	10	25	49	
22	1KS23CS022	BHAGYASHREE	18	17	22		19	15	15	15	10	25	44	
23	1KS23CS023	BHAVANI S	25	22	24		24	15	15	15	10	25	49	
24	1KS23CS024	BHOOMIKA M H	10	20	23		18	15	15	15	10	25	43	
25	1KS23CS025	BHUVAN B	16	10	13		13	8	8	8	6	14	27	
26	1KS23CS026	BRINDA G	25	24	22		24	15	15	15	10	25	49	
27	1KS23CS027	C SINDHU	25	25	21		24	15	15	15	10	25	49	
28	1KS23CS028	CHAITRA N KIRANAGI	20	25	22		23	15	15	15	10	25	48	
29	1KS23CS029	CHARAN SAI TEJ K V	22	23	16		21	15	15	15	10	25	46	
30	1KS23CS030	CHARAN TEJA G S	6	18	14		13	10	10	10	10	20	33	
31	1KS23CS031	CHETAN C DESAI	10	17	4		11	10	10	10	8	18	29	
32	1KS23CS032	CHIMPARA NAGENDRA REDDY	6	17	18		14	15	15	15	10	25	39	
33	1KS23CS033	CHINMAY B H	4	17	19		14	10	10	10	6	16	30	

SL. NO	USN	NAME OF THE STUDENT	IA1	IA2	IA3	Imp	AVG IA	ASS1	ASS2	AVG ASS	Activity	Avg ASS+Activity	FINAL IA	SIGN
34	1KS23CS034	CHIRAG T	13	18	12		15	15	15	15	10	25	40	
35	1KS23CS035	CHIRANTH G	15	22	18		19	10	10	10	10	20	39	
36	1KS23CS036	CHIRANTH GOWDA S	25	25	19		23	15	15	15	10	25	48	
37	1KS23CS037	DARSHAN G	12	19	4		12	15	15	15	10	25	37	
38	1KS23CS038	DEEKSHA J	20	24	16		20	10	10	10	7	17	37	
39	1KS23CS039	DEEPIKA K A	8	8	14		10	8	8	8	6	14	24	
40	1KS23CS040	DHANUSH J	9	15	5		10	15	15	15	10	25	35	
41	1KS23CS041	DHEERAJ A	7	19	12		13	15	15	15	10	25	38	Dheeraj A
42	1KS23CS042	DHEERAJ M S	7	19	11		13	10	10	10	6	16	29	Dheeraj M.S
43	1KS23CS043	DURGASHREE M	10	25	22		19	10	10	10	10	20	39	
44	1KS23CS044	G AKASH	11	14	18		15	15	15	15	10	25	40	
45	1KS23CS045	G C LIKITH CHOWDARY	25	21	23		23	15	15	15	10	25	48	
46	1KS23CS046	GAGANA POOJARI	25	25	23		25	15	15	15	10	25	50	Gagana
47	1KS23CS047	GANESH M	4	7	5	17	10	8	8	8	5	13	23	Ganesh
48	1KS23CS048	GARV B JAIN	9	19	17		15	13	13	13	8	21	36	
49	1KS23CS049	GAYANA V	24	25	23		24	15	15	15	10	25	49	Gayana
50	1KS23CS050	GOPALAKRISHNAN MADHU PRATHIKA	19	13	23		19	15	15	15	10	25	44	Madhu
51	1KS23CS051	H K HEMANTH RAJE URS	18	24	23		22	15	15	15	10	25	47	Hemanth

A-66
B-68
C-

SL. NO	USN	NAME OF THE STUDENT	IA1	IA2	IA3	Imp	AVG IA	ASS1	ASS2	AVG ASS	Activity	Avg ASS+Activity	FINAL IA	SIGN
52	1KS23CS052	H L DARSHAN	16	20	19		19	10	10	10	8	18	37	
53	1KS23CS053	HARISH DEEKSHITH	18	25	20		21	15	15	15	10	25	46	
54	1KS23CS054	HARSH MISHRA	AB	20	18	19	19	13	13	13	10	23	42	
55	1KS23CS055	HARSHAVARDHAN B K	6	16	15		13	10	10	10	8	18	31	
56	1KS23CS056	HARSHITH K	20	25	22		23	15	15	15	10	25	48	
57	1KS23CS057	J M HARSHITHA REDDY	12	18	13		15	15	15	15	10	25	40	
58	1KS23CS058	JANHAVI M	5	25	AB	19	17	15	15	15	10	25	42	
59	1KS23CS059	JAYADITYA DEV	20	20	24		22	13	13	13	10	23	45	
60	1KS23CS060	JEEVAN M	25	25	25		25	15	15	15	10	25	50	
61	1KS23CS061	JEEVITHA A P	7	16	14		13	15	15	15	10	25	38	
62	1KS23CS062	K HARINI	22	25	24		24	15	15	15	10	25	49	
63	1KS24CS406	NAVYA K	15	15	12		14	15	15	15	8	23	37	
64	1KS24CS407	PAVAN KUMAR M	8	AB	0	21	10	6	6	6	6	12	22	
65	1KS24CS417	YASHASWINI B	12	15	9		12	12	12	12	6	18	30	
66	1KS24CS411	RAKESH J	2	AB	5	22	10	6	6	6	6	12	22	

C 8
B 8

COURSE INCHARGE

HOD
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K.S.INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CSE

4th Sem-B Continuous Internal Evalution(CIE) Marks Statement 2024-25(EVEN)

Faculty Incharge:Dr.Sowbhagya M P **Subject/Code:Analysis & Design of Algorithms /BCS401**

SEM-IV	AY:2024-2025	SEC:'B'	A	B	C	D	E	G	H	
SL NO.	USN	NAME OF THE STUDENT	IA-1	IA-2	IA-3	AVG IA	ASSIGNMENT	Activity/seminar	TOTAL (D+E+G)	Student Signature
			25 Marks	25 Marks	25Marks	25Marks	15 Marks	10 Marks	50 Marks	
1	1KS23CS063	KAVYASHREE	18	17	22	19	15	10	44	
2	1KS23CS064	KEERTHANA	19	24	24	23	15	8	46	
3	1KS23CS065	KHUSHI	20	23	25	23	15	9	47	
4	1KS23CS066	KRITHIKA	24	25	24	25	15	10	50	
5	1KS23CS067	KRUTHIKA B	24	24	23	24	15	9	48	
6	1KS23CS068	LAVANYA B R	15	22	18	19	15	10	44	
7	1KS23CS069	LAVANYA R	23	24	25	24	15	10	49	
8	1KS23CS070	LAYAA R	13	4	12	10	15	7	32	
9	1KS23CS071	LEKHANA K	24	25	25	23	15	9	47	
10	1KS23CS072	LIKHITHA H	19	24	24	23	15	10	48	
11	1KS23CS073	LIKITHA N	22	24	19	22	15	8	45	
12	1KS23CS074	LOHITH P C	11	9	11	11	15	10	36	
13	1KS23CS075	BHOOMIKA M	21	25	23	23	12	9	44	
14	1KS23CS076	MAGHAM	24	24	22	24	15	9	48	
15	1KS23CS077	MAHADEVBASAVARAJ	12	15	10	13	10	6	29	
16	1KS23CS078	MANAS	13	19	17	17	14	9	40	
17	1KS23CS079	MANASWINIANAND	22	22	14	20	15	10	45	
18	1KS23CS080	MANISH	5	10	15	10	13	6	29	
19	1KS23CS081	MANISH RAY	9	16	18	15	15	9	39	
20	1KS23CS082	MANNALA	22	15	21	20	15	5	40	
21	1KS23CS083	MANYA	16	19	20	19	15	10	44	

22	1KS23CS084	MOHAMMAD	22	20	25	23	15	9	47	
23	1KS23CS085	MOHAMMED	24	24	23	24	15	9	48	
24	1KS23CS086	MOHANGOWDA	15	19	19	18	15	10	43	
25	1KS23CS087	MOKSHA K S	24	25	20	23	15	9	48	
26	1KS23CS088	MUHAMMED	13	14	16	15	12	8	35	
27	1KS23CS089	MYTHRI	23	21	19	21	14	9	44	
28	1KS23CS090	NAMRATHA	13	19	13	15	15	8	38	
29	1KS23CS091	NANDITHA	24	24	24	24	15	10	49	
30	1KS23CS092	NAVYA P	16	23	17	19	15	10	44	
31	1KS23CS093	N CHANDANA	24	22	18	22	15	8	45	
32	1KS23CS094	NIKHILKUMAR	9	16	22	16	15	8	39	
33	1KS23CS095	NIKHILNARAYAN	13	14	12	13	15	10	38	
34	1KS23CS096	NISARGA N	15	8	18	14	15	7	36	
35	1KS23CS097	NISHANTH C P	24	21	21	22	15	10	47	
36	1KS23CS098	NISHANTH P	11	12	11	12	15	10	37	
37	1KS23CS099	NIVEDITHA NAGN	19	21	21	21	15	10	46	
38	1KS23CS100	SRIKANTH	18	25	23	22	15	10	47	
39	1KS23CS101	P GOWTHAM	9	21	8	13	15	9	37	
40	1KS23CS102	PAVAN GOWDAS	23	24	25	24	15	10	49	
41	1KS23CS103	PAVAN SAI P	11	13	13	13	15	8	36	
42	1KS23CS104	PINKEY	21	18	23	21	14	9	44	
43	1KS23CS105	POOJA	23	24	24	24	15	89	486	
44	1KS23CS106	POONAMLAL	13	23	17	18	15	8	41	
45	1KS23CS107	PRAGNA M	17	22	13	18	15	10	43	
46	1KS23CS108	PRAJWAL B	11	7	12	10	15	9	34	
47	1KS23CS109	PRAJWAL N	23	24	24	24	15	10	49	
48	1KS23CS110	PRANAV C M	7	11	10	10	10	5	25	
49	1KS23CS111	PRANAV	24	25	21	24	15	10	49	
50	1KS23CS112	PRANAVIKA M	17	19	22	20	15	10	45	
51	1KS23CS114	PRIYADHARSHINI E P	17	18	15	17	15	10	42	
52	1KS23CS115	PRIYANKA M	15	23	16	18	15	10	43	
53	1KS23CS116	PUNITH P	9	11	10	10	10	5	25	

54	1KS23CS117	PUNYASHREE B	23	25	24	24	15	10	49	Punyashree B
55	1KS23CS118	NITISH R	17	18	16	17	9	6	32	
56	1KS23CS119	RAGHU J	17	22	~~21~~ 19	~~20~~ 20	14	6	40	Raghu.J
57	1KS23CS120	RAJATH KUMARY	24	25	21	24	15	10	49	
58	1KS23CS121	RASHMI SONI	13	19	20	18	15	10	43	
59	1KS23CS122	RAVICHANDRA K	24	25	25	25	15	8	48	K.Ravi
60	1KS23CS123	RAZIYA	21	17	18	19	15	10	44	
61	1KS23CS124	REEMA J	22	24	21	23	15	10	48	Reema
62	1KS23CS125	RITIKA SINGH	12	0	20	11	12	8	31	
63	1KS24CS400	ANIL KUMAR N	10	16	16	14	10	6	30	Anil
64	1KS24CS401	BHAVITHA E G	9	17	16	14	12	8	34	Bhavitha.E.G
65	1KS24CS405	NAGASHREE S	7	15	9	11	15	9	35	Nagashree.S
66	1KS24CS408	PUNEETH S V	17	14	23	16	15	7	38	
67	1KS24CS410	RAJEEV B S	11	10	13	12	13	10	35	Rajeev B S
68	1KS24CS414	SWATHI G A	20	18	13	17	15	9	41	Swathi.G.A

Head of the Department
Dept. of Computer Science & Engg.
K.S Institute of Technology
Bengaluru-560 109

K.S.INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CSE

4th Sem-C Continuous Internal Evalution(CIE) Marks Statement 2024-25(EVEN)

Faculty Incharge: Sheba Jebakani **Subject/Code:Analysis and Design of Algorithms /BCS401**

SEM-IV		SEC:'C'	A	B	C	D	E	F	G	
SL NO.	USN	NAME OF THE STUDENT	IA-1	IA-2	IA-3	AVG IA	Assignment	Activity	TOTAL (D+E+F)	Student Signature
			25 Marks	25 Marks	25Marks	25Marks	15 Marks	10 Marks	50 Marks	
1	1KS23CS126	RUBY KUMARI R	21	25	24	23	15	8	46	
2	1KS23CS127	RUDRESH S C	13	19	25	19	15	10	44	
3	1KS23CS128	RUSHITHA K	AB	21	13	11	14	10	35	
4	1KS23CS129	S AVINASH	7	15	11	11	12	7	30	
5	1KS23CS130	S HARSHA	9	10	8	9	14	7	30	
6	1KS23CS131	S SUMANTH	5	16	19	13	12	10	35	
7	1KS23CS132	S V NAVYA	9	11	12	11	11	8	30	
8	1KS23CS133	SACHIN R	11	12	13	12	14	9	35	
9	1KS23CS134	SADHANA M	18	24	21	21	15	10	46	
10	1KS23CS135	SAGARIKA B PATIL	19	23	19	20	13	5	38	
11	1KS23CS136	SAHANA D	25	25	22	24	15	10	49	
12	1KS23CS137	SAKSHI RAMESH	25	25	25	25	15	10	50	
13	1KS23CS138	SANDHYA	24	22	22	23	14	9	46	
14	1KS23CS139	SANJANA JAGANNATHA	18	21	18	19	14	10	43	
15	1KS23CS140	SANJANA N	6	10	4	7	10	7	24	
16	1KS23CS141	SANJAY T	15	24	21	20	14	9	43	
17	1KS23CS142	SANKETH KUMAR K R	10	14	14	13	14	9	36	
18	1KS23CS143	SARVAGNA S RAO	13	21	20	18	15	9	42	
19	1KS23CS144	SHAMA SHIVARAJ SHETTY	25	25	25	25	15	10	50	
20	1KS23CS145	SHAMITH GOWDA A G	7	12	11	10	12	7	29	
21	1KS23CS146	SHASHANK GOWDA U	14	15	21	17	13	10	40	
22	1KS23CS147	SHIVA M	13	20	20	18	14	10	42	
23	1KS23CS148	SHIVAMANI N	6	10	7	8	7	6	21	
24	1KS23CS149	SHRAVYA PRAKASH	18	25	25	23	15	9	47	
25	1KS23CS150	SHREYA S	11	23	24	19	15	9	43	
26	1KS23CS151	SHREYA S UPADHYA	10	9	22	14	14	9	37	
28	1KS23CS152	SHREYAS S	9	21	18	16	14	10	40	
29	1KS23CS153	SHRIHARI I B	19	24	24	22	15	9	46	
30	1KS23CS154	SHRISHA C M	11	22	20	18	15	9	42	
31	1KS23CS155	SHRUSTI L	12	24	24	20	15	9	44	
32	1KS23CS156	SHRUSTI L	10	8	8	9	14	7	30	
33	1KS23CS157	SOMESH K N	11	16	11	13	14	4	31	

SEM-IV		SEC:'C'	A	B	C	D	E	F	G	
SL NO.	USN	NAME OF THE STUDENT	IA-1	IA-2	IA-3	AVG IA	Assignment	Activity	TOTAL (D+E+F)	Student Signature
			25 Marks	25 Marks	25Marks	25Marks	15 Marks	10 Marks	50 Marks	
34	1KS23CS158	SRAVYA ILLURI	24	25	25	25	15	9	49	
35	1KS23CS159	SRIGOWRI S KULKARNI	15	24	24	21	15	10	46	
36	1KS23CS160	SUDARSHAN V G	9	17	22	16	14	7	37	
37	1KS23CS161	SUDHANVA K JOSHI	16	20	22	19	15	9	43	
38	1KS23CS162	SUREKHA T S	18	19	20	19	15	10	44	
39	1KS23CS163	T S R SRIRAGA	16	22	20	19	15	10	44	
40	1KS23CS164	TALLURU SAHITHYA	22	25	23	23	15	10	48	
41	1KS23CS166	TARUN R	7	17	18	14	13	9	36	
42	1KS23CS167	THANUSHREE V S	17	24	22	21	15	10	46	
(43)	1KS23CS168	UJWAL G NAIK	4	15	12	10	13	4	27	
44	1KS23CS169	VARNIKA G	6	13	20	13	15	8	36	
45	1KS23CS170	VARSHA D R	9	14	14	12	15	8	35	
45	1KS23CS171	VARSHA DATTATREYA BHAT	22	23	23	23	15	9	47	
46	1KS23CS172	VARSHA S K	4	17	10	10	14	8	32	
47	1KS23CS173	VARSHITHA	10	10	18	13	15	9	37	
48	1KS23CS175	VATSAL VIGNESH B C	3	8	23	11	15	10	36	
49	1KS23CS176	VEERENDRA R	22	24	23	23	15	10	48	
50	1KS23CS177	VENKAT S S	12	18	25	18	15	9	42	
51	1KS23CS178	VIGASINI S	24	25	25	25	15	10	50	
52	1KS23CS179	VIJAYALAKSHMI C	15	18	25	19	15	9	43	
53	1KS23CS180	VIKAS K B	22	25	21	23	15	10	48	
54	1KS23CS181	VINITH M R	3	5	9	6	8	9	23	
55	1KS23CS182	VISHAL R	6	12	17	12	13	10	35	
56	1KS23CS183	VISHAL T K	2	14	21	12	14	10	36	
57	1KS23CS184	VISHAL VASS S	2	2	7	4	11	5	20	
58	1KS23CS185	VUNNAM THANUJA	18	25	25	23	15	10	48	
59	1KS23CS186	YASHASWI R	14	19	20	18	14	9	41	
60	1KS23CS187	YASHASWINI K T	21	25	25	24	15	10	49	
61	1KS23CS188	YASHASWINI S	15	23	22	20	15	9	44	
62	1KS24CS402	DARSHAN K R	4	15	19	13	15	10	38	
63	1KS24CS409	RACHANA	11	15	19	15	15	9	39	
64	1KS24CS403	GAGAN GOWDA D	9	10	10	10	15	7	32	
65	1KS24CS415	VARSHINI J	4	17	21	14	15	10	39	
66	1KS24CS404	KEERTHAN A	AB	AB	AB	0	AB	0	0	
67	1KS23CS412	RAKESH R	10	15	18	14	14	9	37	

Course Incharge

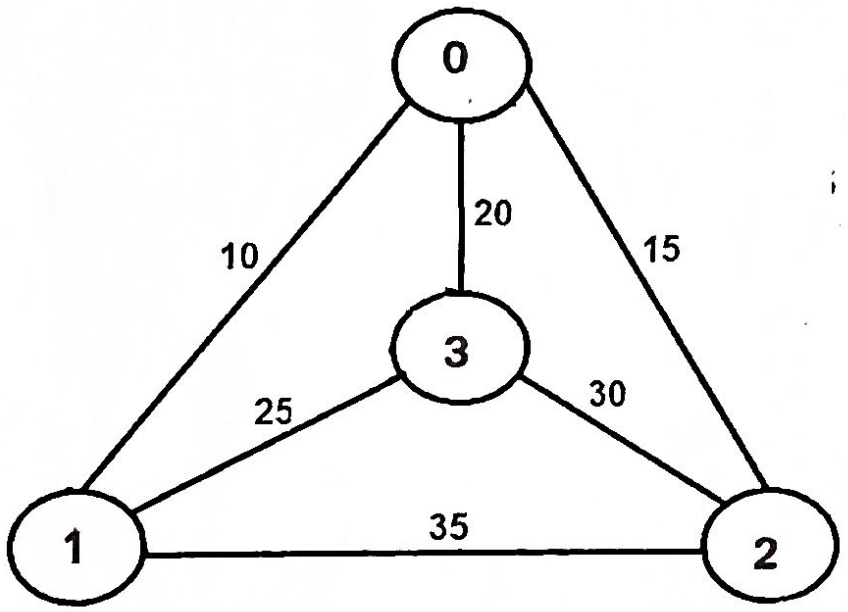
HOD
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

KSINSTITUTEOFTECHNOLOGY,BANGALORE-109
DEPARTMENTCOMPUETRSCIENCE ANDENGINEERING

Course name: Analysis and Design of Algorithms **Course code:BCS401**
Faculty name: Dr. Vijayalaxmi Mekali **Sec:A, B and C**

Challenging questions for toppers with reference

1. Write a C program to implement binary search using divide and conquer technique .
2. Write a C program to implement DFS and BFS using decrease and conquer technique
3. Write a C program to implement Horspool's string matching algorithm.
4. Write a C program to implement Boyer-Moore algorithm.
5. Solve the TSP problem for the given graph using Branch and Bound and Dynamic programming



6. Solve the Knapsack problem with the data Input: N = 3, W = 50, values[] = {100,60,120}, weight[] = {20,10,30}.

1.

Signature of faculty incharge

Signature of HOD

Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

Code No: R1632053 **R16** SET - 1

III B. Tech II Semester Regular/Supplementary Examinations, October/November - 2020

DESIGN AND ANALYSIS OF ALGORITHMS

(Computer Science and Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

PART –A (14 Marks)

1. a) Define the terms: i) Time Complexity ii) Space Complexity. [2M]
   b) Define the Divide and Conquer Strategy. [2M]
   c) Write Control Abstraction of Greedy method. [2M]
   d) Give the statement of the Reliability design problem. [3M]
   e) Define: i) State-Space tree ii) E – Node and iii) Dead Node. [3M]
   f) Define: i) LC – Search ii) Branch and Bound (BB). [2M]

PART –B (56 Marks)

2. a) What are the different mathematical notations used for algorithm analysis? Explain them. [7M]
   b) Give the algorithm for transpose of a matrix of size *mxn* and determine the time complexity of the algorithm by frequency – count method. [7M]

3. a) Explain the Recursive Binary search algorithm with suitable examples. [7M]
   b) Derive the time complexity of the Quicksort algorithm for the worst case. [7M]

4. a) Find an optimal solution to the knapsack instance n=7 objects and the capacity of knapsack m=15. The profits and weights of the objects are (P1,P2,P3,P4,P5,P6, P7)=(10,5,15,7,6,18,3), (W1,W2,W3,W4,W5,W6,W7)=(2,3,5,7,1,4,1) respectively. [7M]
   b) Discuss the single-source shortest paths algorithm with a suitable example. [7M]

5. a) Construct an optimal travelling sales person tour using Dynamic Programming for the given data: [7M]

$$\begin{bmatrix} 0 & 10 & 9 & 3 \\ 5 & 0 & 6 & 2 \\ 9 & 6 & 0 & 7 \\ 7 & 3 & 5 & 0 \end{bmatrix}$$

   b) Discuss the time and space complexity of Dynamic Programming traveling sales person algorithm. [7M]

6. a) Write control abstraction for backtracking. [7M]
   b) Explain the Graph–coloring problem. And draw the state space tree for m= 3 colors n=4 vertices graph. Discuss the time and space complexity. [7M]

7. a) Write Control Abstraction of Least–Cost(LC) Search. [7M]
   b) Explain the FIFO BB 0/1 Knapsack problem procedure with the knapsack instance for n=4, m=15, (p1,p2,p3,p4)=(10,10,12,18), (w1,w2,w3,w4) =(2, 4, 6, 9). Draw the portion of the state space tree and find optimal solution. [7M]

*****

Code No: R1632053 **R16** SET - 1

III B. Tech II Semester Supplementary Examinations, November - 2019

DESIGN AND ANALYSIS OF ALGORITHMS

(Computer Science and Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

PART –A

(14 Marks)

1. a) What is an Algorithm? [2M]
   b) Describe the Algorithm Analysis of Binary Search. [2M]
   c) State the Job – Sequencing with Deadline Problem. [2M]
   d) Define i) Principles of optimality, ii) Feasible solution, iii) Optimal solution. [3M]
   e) Define Chromatic number and give the state space tree for 4 – coloring problem. [3M]
   f) Distinguish between fixed–tuple sized and variable tuple sized state space tree organization. [2M]

PART –B

(56 Marks)

2. a) Give the algorithm for addition of two matrices and determine the time complexity of this algorithm by frequency – count method. [7M]
   b) Discuss the Pseudo code conventions for expressing algorithms. [7M]

3. a) Write Divide – And – Conquer recursive Merge sort algorithm and derive the time complexity of this algorithm. [7M]
   b) Write the general method of Divide – And – Conquer approach. [7M]

4. a) Explain the general principle of Greedy method and also list the applications of Greedy method. [7M]
   b) What is a Spanning tree? Explain Prim's Minimum cost spanning tree algorithm with suitable example. [7M]

5. a) Explain Reliability Design problem with suitable example. [7M]
   b) Describe the Dynamic 0/1 Knapsack problem. Find an optimal solution for the dynamic programming 0/1 knapsack instance for n=3, m=6, profits are (p1, p2, p3) = (1, 2, 5), weights are (w1, w2, w3)=(2, 3, 4). [7M]

6. a) What is a Hamiltonian Cycle? Explain how to find Hamiltonian path and cycle using backtracking algorithm? [7M]
   b) Discuss the 4 – queen's problem. Draw the portion of the state space tree for n = 4 queens using backtracking algorithm. [7M]

7. a) Give the 0/1 Knapsack LCBB algorithm. Explain how to find optimal solution using variable – tuple sized approach? [7M]
   b) Distinguish between backtracking and branch – and bound techniques. [7M]

*****

Code No: RT32054 **R13** SET - 1

III B. Tech II Semester Supplementary Examinations, November -2019

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to Computer Science and Engineering, Information Technology)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

*****

PART –A (22 Marks)

1 a) Describe the characteristics of algorithm with an example. [3M]
b) Derive the time worst case complexity of merge sort. [3M]
c) Write the differences between divide and conquer and greedy method. [4M]
d) Estimate expected cost of optimal binary search tree using internal and external nodes. [4M]
e) Define state space tree, solution state, answer state and E-node. [4M]
f) Write the control abstraction for least cost search. [4M]

PART –B (48 Marks)

2 a) Differentiate performance measurement and performance estimation of algorithms. [8M]
b) Write the recursive and iterative algorithms for finding the reverse of a given string and analyze time and space complexities. [8M]

3 a) T(n)=aT(n/b)+f(n). Simplify this recurrence relation in terms h(n) and u(n) functions to find out the time complexities. [8M]
b) Write the algorithm for finding pivot element in quick sort algorithm and analyze its time complexity. [8M]

4 a) How to insert more number of jobs in feasible solution set J={ } to maximize the profit using greedy method? Explain algorithm. [8M]
b) What is the role of 'min' cost edge in the graph to find minimum cost spanning tree using Krushkal algorithm? Give the implementation. [8M]

5 Apply dynamic programming to obtain optimal binary search tree for the identifier set (a1, a2, a3, a4)=(cin, for, int, while) with (p1, p2, p3, p4)=(1, 4, 2, 1), (q0, q1, q2, q3, q4)=(4, 2, 4, 1, 1) and also write algorithm for its construction. [16M]

6 a) Write the algorithm for general iterative backtracking method and explain various factors that define the efficiency of backtracking. [8M]
b) Find all m-colors of a graph with undirected connections v1→v2, v1→v3, v1→v4, v2→v3, v2→v4, v2→v5, v3→v4, v4→v5 using backtracking technique. [8M]

7 a) Explain the importance of bounding function in generating the solutions. And also write about different types of bounding functions with an example each. [8M]
b) Give the formulation of modified knapsack problem using branch and bound and find the optimal solution using least cost branch and bound with n=4, m=15, (p1...p4) = (15 15 17 23), (w1...w4) = (3 5 6 9). [8M]

*****

K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TEACHING AND LEARNING
PEDAGOGY REPORT

Academic Year	**2024-2025 (Even)**
Name of the Faculty	**Dr. Vijayalaxmi Mekali**
Course Name /Code	**Analysis and Design of Algorithms (BCS401)**
Semester/Section	**4th A**
Activity Name	**Program Implementation, Problem solving on Online platform Hacker Rank and Course Certification**
Topic Covered	**Arrays, Stack, Queue, Linked list, Trees**
Date	**20-11-2024**
No. of Participants	**A and C**
Objectives/Goals	• **To understand the topic more precisely** • **To improve the self-learning skills of students** • **To improve the communication skills of students.** • **To improve the ICT usage skills of students** • **To understand the usage of programming Tools**
ICT Used	**LCD**
Appropriate Method/Instructional Materials/Exam Questions Students were asked to demonstrate the execution of given set of programs to understand the Algorithm implementation and its applications, problem solving.	
Relevant PO's:	**PO: P01, PO2,PO3,PO5**
Significance of Results/Outcomes	• Students were able to understand the Concepts of Algorithms and its applications. • 67 (A sec) students demonstrated the program execution and problem solving. • 62 (A sec) completed the Infosys Springboard "Data Structures in C".
Reflective Critique	• The activity improved the learning and communication skills of students. • The activity provided a platform for students to improve programming skill.
Content of course	**List of programs given for execution** • **Develop** a C program to implement Bubble sort algorithm • **Build** a C program for sequential search algorithm • **ii. Build** a C program to create 2D dynamic integer array, read and display the created array • **Build** a C program to find Unique element in the list of elements • **Develop** a C program to implement Exhaustive solution for Knapsack problem **Build** a C program to implement insertion sort algorithm • **Build** a C program to implement multiplication of large integers • **Develop** a C program to implement Comparison counting sort algorithm • **Develop** a C program to implement heap sort • **Build** a C program to implement Kanpsack problem using Branch and Bound. • **Build** a C program to implement Binary search and display decision tree for the same. • **Develop** a C program to generate State space tree for Sum of subset problem (With proper input)

	Problem solving on • Basic concepts • Algorithms • Time complexity **Online Certificate Course Outline** • Arrays in C • Linked List • Stack • Queue • Binary Tree and Binary Search Tree • Heap • Hashing

Proofs (Photographs/Videos/Reports/Charts/Models)

Infosys
Navigate your next

COURSE COMPLETION CERTIFICATE

The certificate is awarded to

Darshan g

for successfully completing the course

Beginning Java Data Structures and Algorithms

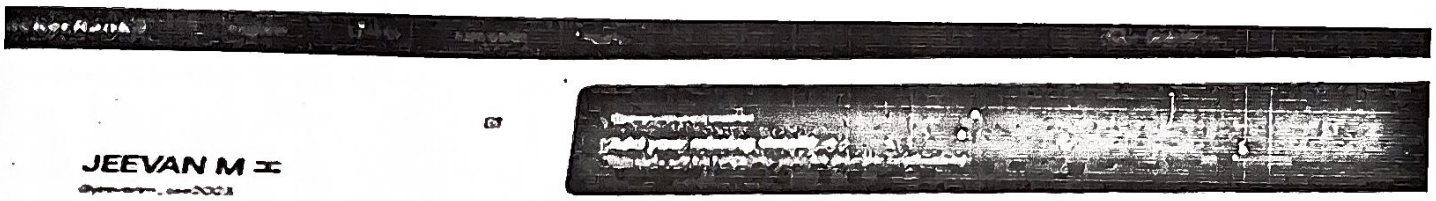
on May 27, 2025

Infosys | Springboard

Congratulations! You make us proud!

Issued on: Friday, May 30, 2025
To verify, scan the QR code at https://verify.onwingspan.com

Thirumala Arohi
Executive Vice President and Global Head
Education, Training & Assessment (ETA)
Infosys Limited



Drive link of certificate –
A sec:

Signature of Course In charge

Signature of HOD
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K. S. Institute of Technology, BANGLORE

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ONLINE COURSE-Infosys Springboard-certifications completed by students

ACADEMIC YEAR 2024-25 ODD SEM

Year/Semester/Section: IV/A

Platform : Infosys spring board

Details of Certification :Beginning Java Data Structures and Algorithms

https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01329471493613158425462_shared/overview#iss=https:/infyspringboard.onwingspan.com/auth/realms/infyspringboard&iss=https://infyspringboard.onwingspan.com/auth/realms/infyspringboard

SL. No	USN	Students name	Duration/Date 3h 55m • 6 Modules •
1	1KS23CS001	ABHIMANYU N SHETTIGAR	May 28, 2025
2	1KS23CS002	ADITI S H	May 30, 2025
3	1KS23CS003	ADITYA A	May 28, 2025
4	1KS23CS004	AISHWARYA B C	May 27, 2025
5	1KS23CS005	AISHWARYA N	May 31, 2025
6	1KS23CS006	AKASH R	May 27, 2025
7	1KS23CS008	AKSHAYA BALAKUMAR	May 21, 2025
8	1KS23CS009	AMEENA FATHIMA	May 21, 2025
9	1KS23CS011	AMRUTHA J	May 18, 2025
10	1KS23CS012	AMULYA V	May 26, 2025
11	1KS23CS013	ANGELINA SHARON ROBERT	May 29, 2025
12	1KS23CS014	ANUJA V M	May 25, 2025
13	1KS23CS015	ANUSHA V	May 26, 2025
14	1KS23CS016	ANVITHA T A	May 26, 2025
15	1KS23CS017	APOORVA R NAVDA	May 19, 2025
16	1KS23CS018	ARPITA RATHOD	May 27, 2025
17	1KS23CS019	ARUN CHAVAN	May 28, 2025
18	1KS23CS021	ASIYA NAAZ	May 26, 2025
19	1KS23CS022	BHAGYASHREE	May 19, 2025
20	1KS23CS023	BHAVANI S	May 19, 2025
21	1KS23CS024	BHOOMIKA M H	May 29, 2025
22	1KS23CS025	BHUVAN B	June 2, 2025
23	1KS23CS026	BRINDA G	May 28, 2025
24	1KS23CS027	C SINDHU	May 24, 2025
25	1KS23CS028	CHAITRA N KIRANAGI	May 27, 2025
26	1KS23CS029	CHARAN SAI TEJ K V	May 28, 2025
27	1KS23CS030	CHARAN TEJA G S	May 28

28	1KS23CS031	CHETAN C DESAI	May 28
29	1KS23CS032	CHIMPARA NAGENDRA REDDY	May 23, 2025
30	1KS23CS033	CHINMAY B H	May 31, 2025
31	1KS23CS036	CHIRANTH GOWDA S	May 26, 2025
32	1KS23CS037	DARSHAN G	May 28, 2025
33	1KS23CS040	DHANUSH J	May 28
34	1KS23CS041	DHEERAJ A	May 28
35	1KS23CS045	G C LIKITH CHOWDARY	May 26, 2025
36	1KS23CS046	GAGANA POOJARI	May 19, 2025
37	1KS23CS049	GAYANA V	May 19, 2025
38	1KS23CS050	GOPALAKRISHNAN MADHU PRATHIKA	May 27, 2025
39	1KS23CS051	H K HEMANTH RAJE URS	May 19, 2025
40	1KS23CS053	HARISH DEEKSHITH	May 24, 2025
41	1KS23CS054	HARSH MISHRA	May 26, 2025
42	1KS23CS056	HARSHITH K	May 26, 2025
43	1KS23CS057	J M HARSHITHA REDDY	May 27, 2025
44	1KS23CS058	JANHAVI M	May 30, 2025
45	1KS23CS059	JAYADITYA DEV	May 27, 2025
46	1KS23CS060	JEEVAN M	May 26, 2025
47	1KS23CS061	JEEVITHA A P	May 28, 2025
48	1KS23CS062	K HARINI	May 29, 2025
49	1KS24CS406	NAVYA K	

Faculty incharge

HOD-CSE

K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TEACHING AND LEARNING
PEDAGOGY REPORT

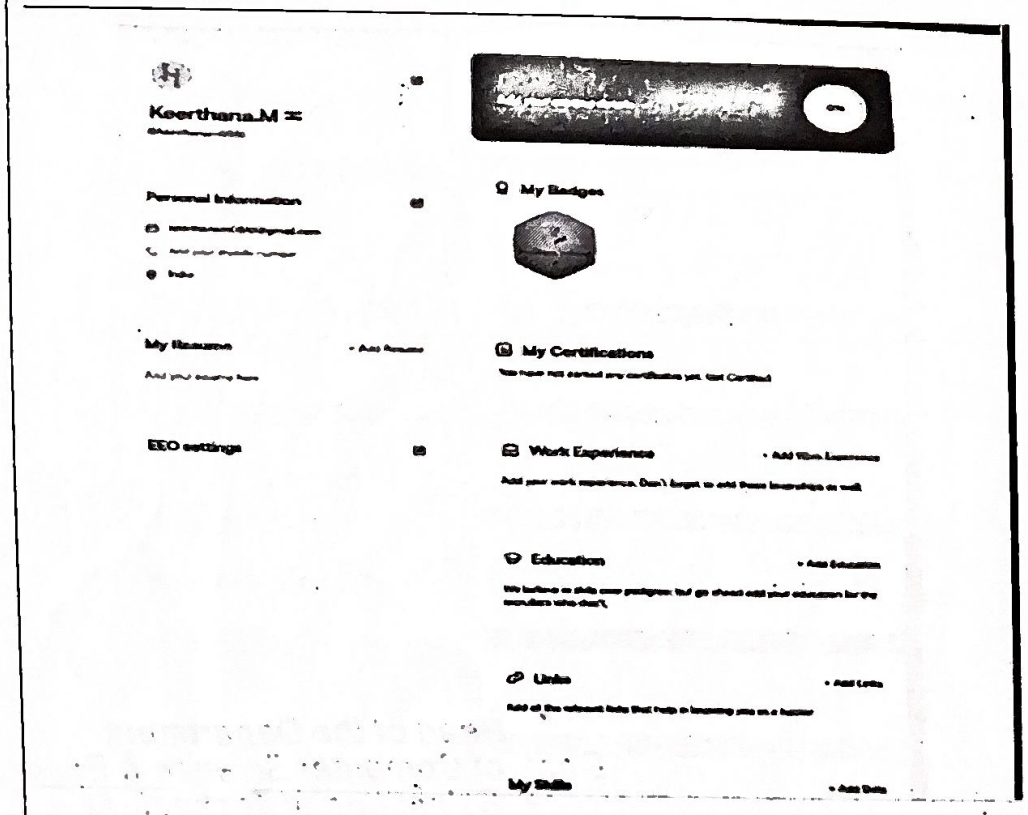
Academic Year	**2024-2025(even)**
Name of the Faculty	**Dr. Sowbhagya M P**
Course Name /Code	**Analysis and Design of Algorithms(BCS401)**
Semester/Section	**4th "B"**
Activity Name	**Problem Solving Assignments(Hacker Rank)**
Topic Covered	**Problem solving**
Date	**30-05-2025**
No. of Participants	**62**
Objectives/Goals	• **To understand the topic more precisely** • **To improve the self-learning skills of students** • **To improve the communication skills of students.** • **To improve the ICT usage skills of students**
ICT Used	**Google class**

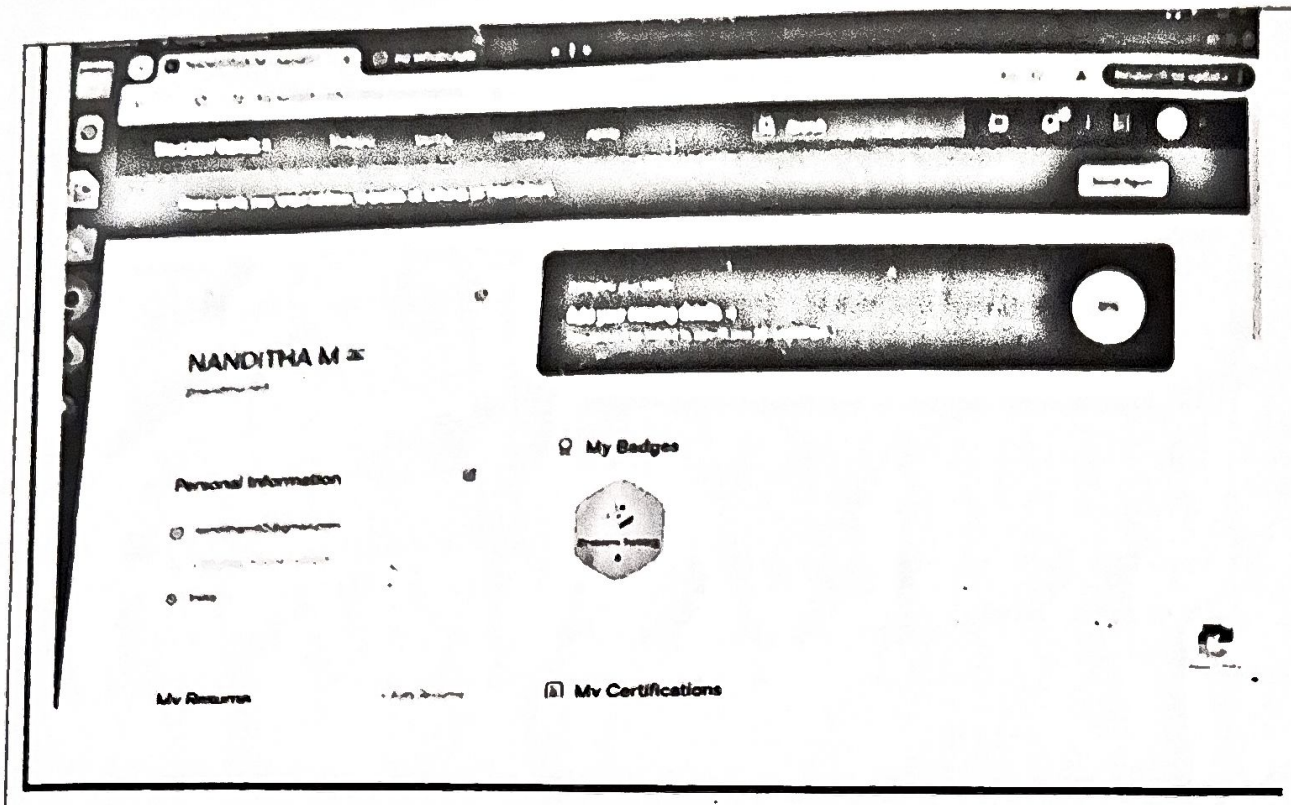
Appropriate Method/Instructional Materials/Exam Questions

1. Students were asked to solve problem through Hacker rank platform.

Relevant PO's:	**PO: PO2,PO3,PO5,PO9,PO10,PO11,12**
Significance of Results/Outcomes	• Students were able to understand the Concepts of Analysis and Design of Algorithms.
Reflective Critique	• The activity improved the learning and communication skills of students. • The activity provided a platform for students to develop programs.

Proofs (Photographs/Videos/Reports/Charts/Models)





VISVESVARAYA TECHNOLOGICAL UNIVERSITY
"Jnana Sangama", Belagavi-590018

PEDAGOGY REPORTON
ANALYSIS AND DESIGN OF ALGORITHMS
(BCS401)

Submitted in partial fulfillment of the requirements for the award of the degree of

BACHELOR OF ENGINEERING
IN
COMPUTER SCIENCE AND ENGINEERING

Submitted by

Student name: MONISHA K S USN:1KS23CS057

Under the guidance of
Dr. Sambhavi MP
Associate Professor
Department of Computer Science and Engineering
K.S.I.T, Bengaluru-560109

Department of Computer Science and Engineering
K.S. INSTITUTE OF TECHNOLOGY
#14, Raghuvanahalli, Kanakapura Road, Bengaluru- 560109
K. S. INSTITUTE OF TECHNOLOGY
#14, Raghuvanahalli, Kanakapura Road, Bengaluru- 560109

COMPUTER SCIENCE AND ENGINEERING

Signature of Course In charge

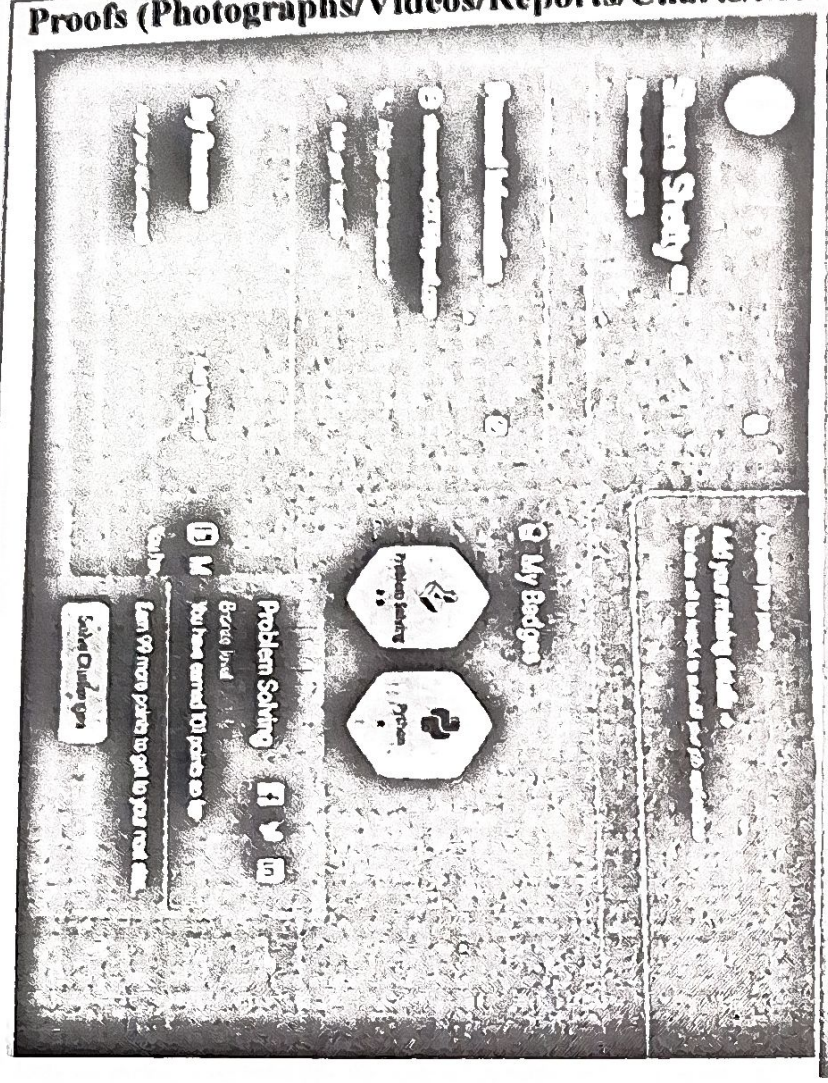
Signature of HOD

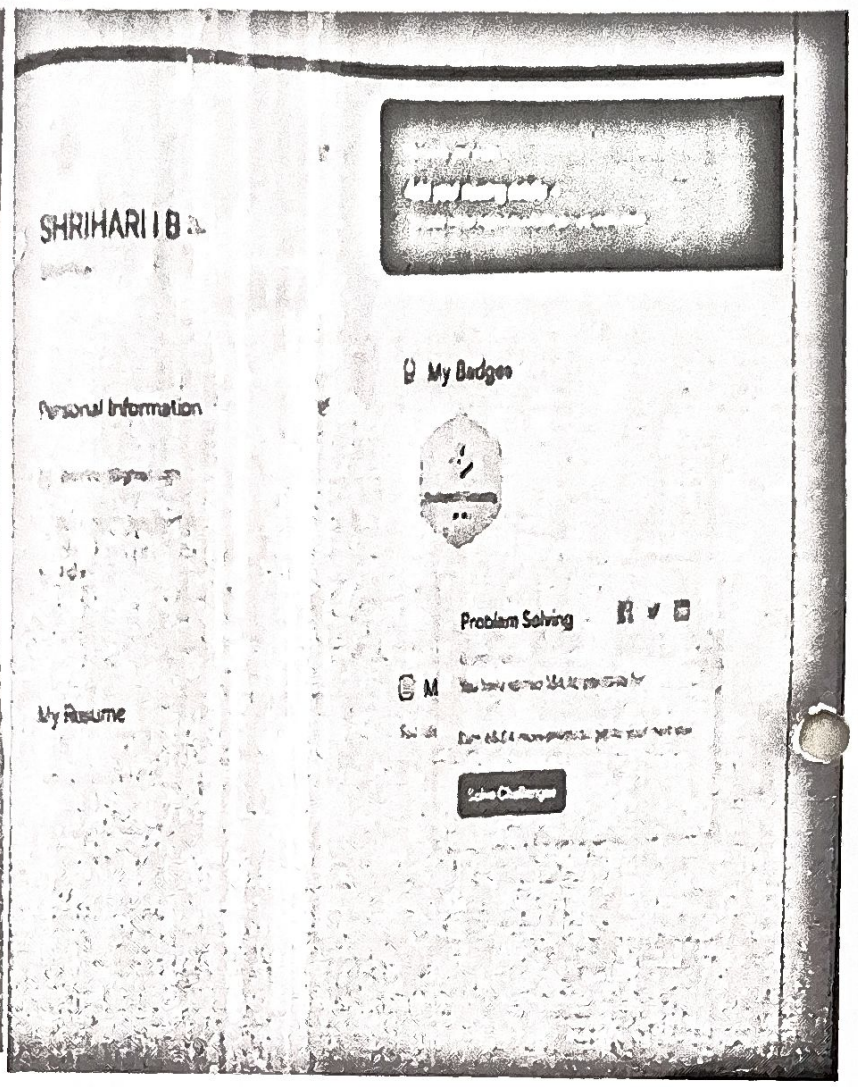
Head of the Department
Dept. of Computer Science & Engg.
K.S. Institute of Technology
Bengaluru -560 109

K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TEACHING AND LEARNING
PEDAGOGY REPORT

Academic Year	**2024-25 (EVEN)**
Name of the Faculty	**Mrs. Sheba Jebakani**
Course Name /Code	**ADA / BCS401**
Semester/Section	**IV C**
Activity Name	**Programming**
Topic Covered	**Practical Activity and Problem Solving Activity(Hacker Rank)**
Date	**20-4-2025 to 26-5-2025**
No. of Participants	**66**
Objectives/Goals	• **To gain exposure to a public coding platform** • **To understand the need for analysis of algorithm to improve efficiency.**
ICT Used	**Hacker rank platform and Codeblocks**
Appropriate Method/Instructional Materials/Exam Questions Hacker Rank portal, Program execution.	
Relevant PO's:	**PO1,PO2,PO3,PO5,P10,P12**
Relevant CO's:	**CO1,CO2.CO3.CO4,CO5**
Significance of Results/Outcomes	• Students learnt to program and execute on a public platform(Hacker Rank) • Students learnt the difficulty of understanding programming problems given during placements • Students learnt the need to analyze the efficiency of algorithm used to write optimized programs with best efficiency.
Reflective Critique	• Obtained minimum two star badges on hacker rank platform • Exposure to public platform

Proofs (Photographs/Videos/Reports/Charts/Models)





Signature of Course-In-charge

Signature of HOD
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

Note: one softcopy of the report to be attached with this document

Important dates:

Sl.No	Details	Date
1.	Date of issue of instruction for activity	Date: 20-04-25
2.	Lastdate for the submission of theActivity report	Date: 26-05-25
3	Date of announcement of evaluation details for oral presentation	31-05-25

K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TEACHING AND LEARNING

CONTENT BEYOND SYLLABUS REPORT

Academic Year	2024-2025(Even)
Name of the Faculty	Dr. Vijayalaxmi Mekali
Course Name /Code	Analysis and Design of Algorithms (BCS401)
Semester/Section	4th A
Activity Name	Study of Advanced Algorithms: Bellman Ford Algorithm
Topic Covered	Bellman Ford Algorithm
No. of Participants	60/67
Objectives/Goals	• To understand the Single source shortest path problem using Bellman Ford Algorithm. • To improve the thinking capability of students
ICT Used	Projector
Appropriate Method/Instructional Materials/Exam Questions: PPT	
Relevant CO's	CO1, C02, CO3, CO4, CO5
Relevant PO's:	PO3, PO4, PO5
Significance of Results/Outcomes	Students were able to understand the Concepts of Single source shortest path problem using Bellman Ford Algorithm.
Reflective Critique	• Learning of Different methods to solve Single source shortest path problem. • Analysing the algorithm's Time complexity helps the students to improve their self-capability thinking • Advanced algorithms concepts teaching aim to help students sharpen their skill sets and prepare for the workplace. • The activity provided a platform for students to apply their knowledge of Algorithms.

Proofs :

Sample copy of the PPT is attached

Bellman Ford Algorithm

65

- Given an weighted graph with V vertices numbered from 0 to V-1 and E edges, represented by a 2d array edges[][], where edges[i] = [u, v, w] represents a direct edge from node u to v having w edge weight. You are also given a source vertex src.
- Your task is to compute the shortest distances from the source to all other vertices. If a vertex is unreachable from the source, its distance should be marked as 108. Additionally, if the graph contains a negative weight cycle, return [-1] to indicate that shortest paths cannot be reliably computed.
- Examples:
- Input: V = 5, edges[][] = [[1, 3, 2], [4, 3, -1], [2, 4, 1], [1, 2, 1], [0, 1, 5]], src = 0
  Output: [0, 5, 6, 6, 7]

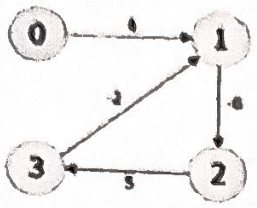
- Explanation:ShortestPaths:

For 0 to 1 minimum distance will be 5. By following path 0 → 1

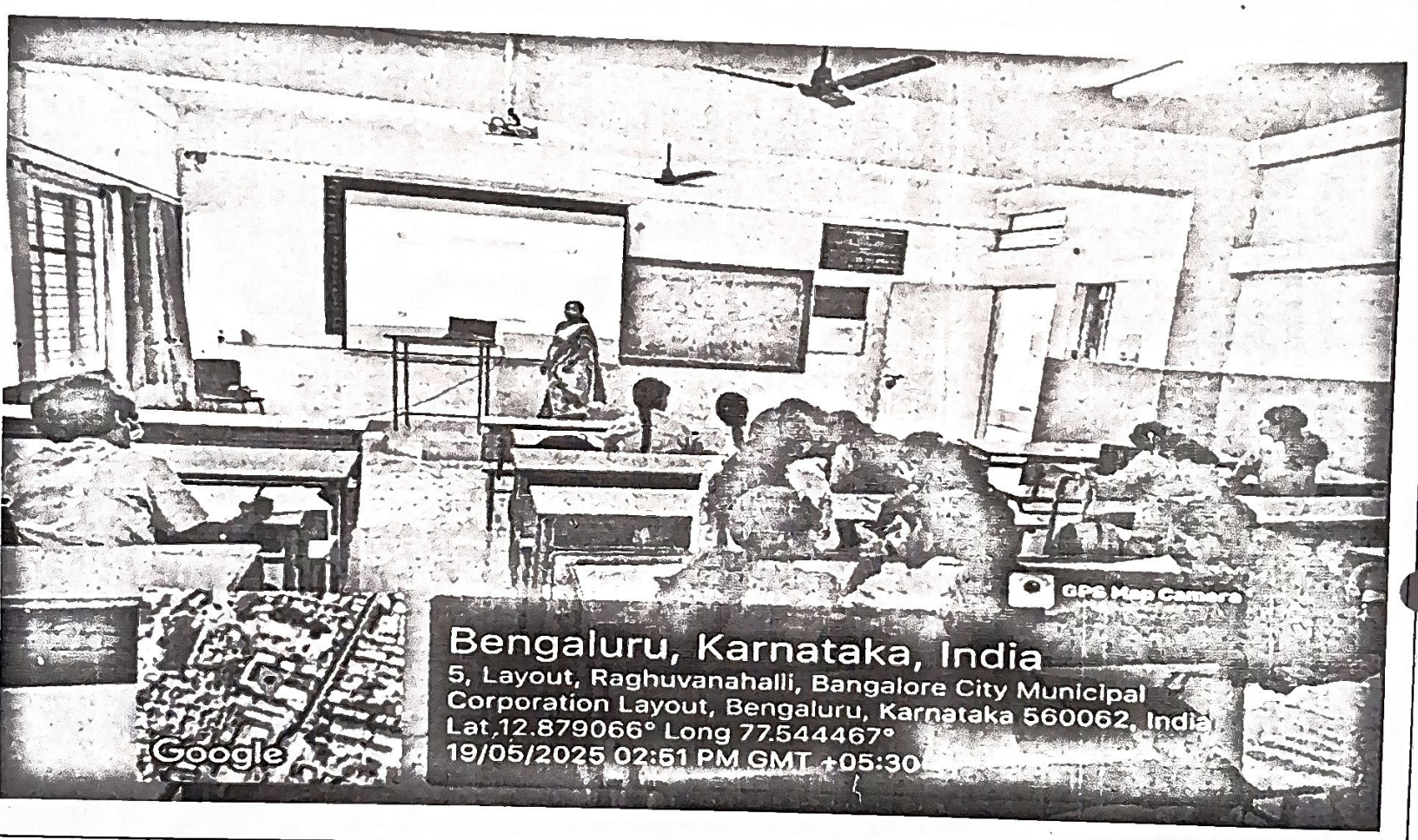
- For 0 to 2 minimum distance will be 6. By following path 0 → 1 → 2
- For 0 to 3 minimum distance will be 6. By following path 0 → 1 → 2 → 4 → 3
- For 0 to 4 minimum distance will be 7. By following path 0 → 1 → 2 → 4

Bellman Ford Algorithm

- **Input: V = 4, edges[][] = {{0, 1, 4}, {1, 2, -6}, {2, 3, 5}, {3, 1, -2}}, src = 0**



Output: [-1] Explanation: The graph contains a negative weight cycle formed by the path 1 → 2 → 3 → 1, where the total weight of the cycle is negative.



Signature of Course In charge

Signature of HOD
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TEACHING AND LEARNING

CONTENT BEYOND SYLLABUS REPORT

Academic Year	**2024-2025(Even)**
Name of the Faculty	**Dr. Sowbhagya M P**
Course Name /Code	**Analysis and Design of Algorithms(BCS401)**
Semester/Section	**4th**
Activity Name	**Online Certification**
Topic Covered	**Algorithmic solutions: Design, Problem solving**
No. of Participants	**28/35**
Objectives/Goals	• **To understand the topic more precisely** • **To improve the self-learning skills of students**
ICT Used	**E-Learning**
Appropriate Method/Instructional Materials/Exam Questions: **Coursera: Algorithmic solutions: Design, Problem solving**	
Relevant CO's	**CO1,CO2,CO3,CO4,CO5**
Relevant PO's:	**PO9, PO10 ,PO12**
Significance of Results/Outcomes	• Students were able to understand the Concepts of Design and analysis of algorithms.
Reflective Critique	• Certification courses help students show and build their expertise in C*ourses selected* • Certification courses aim to help students sharpen their skill sets and prepare for the workplace. • The activity provided a platform for students to apply their knowledge of Design and analysis of algorithms.
Proofs : **Sample copy of the certificate attached**	

Infosys
Navigate your next

COURSE COMPLETION CERTIFICATE

The certificate is awarded to

RAVI CHANDRA K

for successfully completing the course

Beginning Java Data Structures and Algorithms

on June 2, 2025

Infosys | Springboard

Congratulations! You make us proud!

Issued on: Wednesday, June 4, 2025
To verify, scan the QR code at https://verify.onwingspan.com

Thirumala Arohi
Executive Vice President and Global Head
Education, Training & Assessments (ETA)
Infosys Limited

coursera
instructor network

COURSE CERTIFICATE

Sufiyaan Meccai

Algorithmic Solutions: Design, Problem Solving, Reporting

Karlis Zars

coursera
EDUCATION FOR EVERYONE
COURSE CERTIFICATE

Verify at

Signature of Course In charge

Signature of HOD

Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K.S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
TEACHING AND LEARNING

CONTENT BEYOND SYLLABUS REPORT

Academic Year	**2024-25(EVEN)**
Name of the Faculty	**Mrs. Sheba Jebakani**
Course Name /Code	**Analysis and Design of Algorithms / BCS401**
Semester/Section	**IV C**
Activity Name	**Online Certification (NPTEL, udemy, Coursera Instructor Network)**
Topic Covered	**Design and Analysis of Algorithm MasterClass, Algorithmic Solutions: Design, Problem Solving,Reporting, Infosys springboard**
No. of Participants	**65**
Objectives/Goals	• **To understand the topic more precisely** • **To improve the self-learning skills of students**
ICT Used	**E-Learning**
Appropriate Method/Instructional Materials/Exam Questions: **NPTEL: Design and Analysis of Algorithms** **Udemy: Design and Analysis of Algorithms** **Coursera Instructor Network : Design and Analysis of AlgorithmMasterClass, Algorithmic Solutions: Design, Problem Solving,Reporting,** **Infosys Springboard: Beginning Java Data Structures and Algorithms**	
Relevant CO's	**CO1,CO2,CO3,CO4,CO5**
Relevant PO's:	**PO9, PO10 ,PO12**
Significance of Results/Outcomes	• Students were able to understand the Concepts of ADA and its applications. • Students got exposed to NPTEL certification process.
Reflective Critique	• Certification courses help studentsshow and build their expertise in C*ourses selected* • Certification courses aim to help students sharpen their skill sets and prepare for the workplace.

Proofs

Elite

NPTEL ONLINE CERTIFICATION

(Funded by the MoE, Govt. of India)

Skill India

This certificate is awarded to

SAHANA D

for successfully completing the course

Design and analysis of algorithms

with a consolidated score of 60 %

Online Assignments	21.88/25	Proctored Exam	38.25/75

Total number of candidates certified in this course: 1696

Prof. Andrew Thangaraj
Chair
Centre for Outreach and Digital Education, IITM

Jan-Mar 2025
(8 week course)

Prof. Vignesh Muthuvijayan
NPTEL Coordinator
IIT Madras

Indian Institute of Technology Madras

swayam

Roll No: NPTEL25CS23S436404063 To verify the certificate No. of credits recommended: 2 or 3

1KS23CS135

Infosys
Navigate your next

COURSE COMPLETION CERTIFICATE

The certificate is awarded to

Sagarika Patil

for successfully completing the course

Beginning Java Data Structures and Algorithms

on June 4, 2025

Infosys | Springboard

Congratulations! You make us proud!

Thirumala Arohi
Executive Vice President and Global Head
Education, Training & Assessment (ETA)
Infosys Limited

Issued on: Thursday, June 5, 2025

1KS23CS153

coursera
instructor network

COURSE CERTIFICATE

May 01 2023

SHRIHARI I B

has successfully completed

Algorithmic Solutions: Design, Problem Solving, Reporting

an online non-credit course authorized by Coursera Instructor Network and offered through Coursera

Karlis Zars

Coursera Instructor Team

EDUCATION FOR EVERYONE · coursera · COURSE CERTIFICATE

Verify at:
https://coursera.org/verify/XXXXXXXXXXXX
Coursera has confirmed the identity of this individual and their participation in the course.

Signature of Course In charge

Signature of HOD
Head of the Department
Dept of Computer Science & Engg.
K.S. Institute of Technology
Bengaluru -560 109

K. S. Institute of Technology, BANGLORE

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ONLINE COURSEcertifications completed by students

ACADEMIC YEAR 2024-25 EVEN SEM

Year/Semester/Section: II/IV/C

SL. No	USN	Students name	Platform	Details of Certification	Duration/ Date
1	1KS23CS126	RUBY KUMARI R	Udemy	The Design and Analysis of Algorithm MasterClass	27-05-2025
2	1KS23CS127	RUDRESH S C	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	27-05-2025
3	1KS23CS128	RUSHITHA K	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	03-06-2025
4	1KS23CS129	S AVINASH	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	27-05-2025
5	1KS23CS130	S HARSHA	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	06-06-2025
6	1KS23CS131	S SUMANTH	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	27-05-2025
7	1KS23CS132	S V NAVYA	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	01-06-2025
8	1KS23CS133	SACHIN R	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	26-05-2025
9	1KS23CS134	SADHANA M	NPTEL	Design and Analysis of Algorithms	Jan – Mar 2025
10	1KS23CS135	SAGARIKA B PATIL	Infosys Springboard	Beginning of Java DataStructures and Algorithms	04-06-2025
11	1KS23CS136	SAHANA D	NPTEL	Design and Analysis of Algorithms	Jan – Mar 2025
12	1KS23CS137	SAKSHI RAMESH	NPTEL	Design and Analysis of Algorithms	Jan – Mar 2025
13	1KS23CS138	SANDHYA	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	15-05-2025
14	1KS23CS139	SANJANA JAGANNATHA	NPTEL	Design and Analysis of Algorithms	Jan – Mar 2025
15	1KS23CS140	SANJANA N	Infosys Springboard	Beginning of Java DataStructures and Algorithms	08-06-2025
16	1KS23CS141	SANJAY T	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	26-05-2025

SL. No	USN	Students name	Platform	Details of Certification	Duration/ Date
17	1KS23CS142	SANKETH KUMAR K R	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	25-05-2025
18	1KS23CS143	SARVAGNA S RAO	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	20-05-2025
19	1KS23CS144	SHAMA SHIVARAJ SHETTY	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	17-05-2025
20	1KS23CS145	SHAMITH GOWDA A G	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	10-06-2025
21	1KS23CS146	SHASHANK GOWDA U	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	27-05-2025
22	1KS23CS147	SHIVA M	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	31-05-2025
23	1KS23CS148	SHIVAMANI N	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	10-06-2025
24	1KS23CS149	SHRAVYA PRAKASH	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	16-05-2025
25	1KS23CS150	SHREYA S	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	18-05-2025
26	1KS23CS151	SHREYA S UPADHYA	Infosys Springboard	Beginning of Java DataStructures and Algorithms	20-05-2025
27	1KS23CS152	SHREYAS S	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	04-06-2025
28	1KS23CS153	SHRIHARI I B	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	21-05-2025
29	1KS23CS154	SHRISHA C M	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	21-05-2025
30	1KS23CS155	SHRUSTI L	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	31-05-2025
31	1KS23CS156	SHRUSTI L	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	01-06-2025
32	1KS23CS158	SRAVYA ILLURI	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	08-04-2025
33	1KS23CS159	SRIGOWRI S KULKARNI	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	19-05-2025
34	1KS23CS160	SUDARSHAN V G	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	04-06-2025
35	1KS23CS161	SUDHANVA K JOSHI	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	20-05-2025

SL. No	USN	Students name	Platform	Details of Certification	Duration/ Date
36	1KS23CS162	SUREKHA T S	Udemy	The Design and Analysis of Algorithm MasterClass	05-03-2025
37	1KS23CS163	T S R SRIRAGA	Udemy	The Design and Analysis of Algorithm MasterClass	05-04-2025
38	1KS23CS164	TALLURU SAHITHYA	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	09-04-2025
39	1KS23CS166	TARUN R	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	30-05-2025
40	1KS23CS167	THANUSHREE V S	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	16-05-2025
41	1KS23CS169	VARNIKA G	Infosys Springboard	Beginning of Java DataStructures and Algorithms	26-05-2025
42	1KS23CS170	VARSHA D R	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	07-04-2025
43	1KS23CS171	VARSHA DATTATREYA BHAT	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	02-03-2025
44	1KS23CS172	VARSHA S K	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	07-04-2025
45	1KS23CS173	VARSHITHA	Udemy	The Design and Analysis of Algorithm MasterClass	07-04-2025
46	1KS23CS175	VATSAL VIGNESH B C	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	19-05-2025
47	1KS23CS176	VEERENDRA R	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	31-05-2025
48	1KS23CS177	VENKAT S S	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	02-06-2025
49	1KS23CS178	VIGASINI S	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	07-04-2025
50	1KS23CS179	VIJAYALAKSHMI C	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	19-05-2025
51	1KS23CS180	VIKAS K B	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	19-05-2025
52	1KS23CS181	VINITH M R	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	04-06-2025
53	1KS23CS182	VISHAL R	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	27-05-2025
54	1KS23CS183	VISHAL T K	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	26-05-2025
55	1KS23CS185	VUNNAM THANUJA	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	07-05-2025

SL. No	USN	Students name	Platform	Details of Certification	Duration/ Date
56	1KS23CS186	YASHASWI R	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	26-05-2025
57	1KS23CS187	YASHASWINI K T	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	24-02-2025
58	1KS23CS188	YASHASWINI S	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	16-05-2025
59	1KS24CS402	DARSHAN K R	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	25-05-2025
60	1KS24CS409	RACHANA	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	21-03-2025
61	1KS24CS403	GAGAN GOWDA D	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	06-06-2025
62	1KS24CS415	VARSHINI J	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	15-05-2025
63	1KS24CS412	RAKESH R	Coursera instructor network	Algorithmic Solutions: Design, Problem Solving,Reporting,	25-05-2025

Course In Charge

HOD

Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K. S. INSTITUTE OF TECHNOLOGY, BANGALORE - 560109

Analysis and Design of Algorithms **BCS401**

Question Bank

1. What is an algorithm? Explain fundamentals of algorithm solving or Write a block diagram of algorithm design and analysis process.
2. List the important points to be considered in designing of algorithms
3. Explain asymptotic notations in detail with examples.
4. Write general plan for the analyzing time efficiency of recursive algorithms. Develop the recursive algorithm to find the factorial of a number and derive its time efficiency.
5. Design an algorithm to solve Tower of Hanoi. Calculate its efficiency.
6. Write the algorithm to find the maximum element in the list of **n numbers**. Identify the following
   a) Algorithm's basic operation
   b) Number of times the basic operation executes
   c) Derive its efficiency.
7. Write the algorithm to check all elements in array are Unique (Element Uniqueness problem) Identify the following
   a) Algorithm basic operation
      a. Number of times the basic operation executes
      b. Derive its efficiency.
8. **Show that**
   If $t1(n) \in O(g1(n))$ and $t2(n) \in O(g2(n))$
   then $t1(n)+t2(n) \in O(\max\{g1(n), g2(n)\})$
9. Write the recursive algorithm to find the number of binary digits in positive **decimal integer n** and Derive its efficiency.
10. Apply three asymptotic notations on the following assertions
    a) $100n+5$ b) $6*2n+8$ c) $10n^3+8$
11. For each of the following functions, indicates how much the functions value will change if its Argument is increased fourfold.
    1) $\log_2 n$ 2) $\sqrt{n}$ 3) n 4) n^2 5) n^3 6) 2^n
12. Design the Bubble sort Algorithm and analysis its efficiency. Sort the given list of elements using Bubble sort 69, 25, 98, 90, 29, 34, 27
13. Explain a general plan for the analyzing time efficiency of non-recursive algorithms with an example.
14. Design the Matrix multiplication algorithm and derive its time complexity.
15. Build Sequential search algorithm and analysis its best case, worst case and average case efficiency. Apply sequential search algorithm for a given list of elements 23, 45, 12, 67, 44, 17, 34, 68 and a key 34
16. Write the Selection sort Algorithm and calculate the efficiency of algorithm. Sort the given list of elements using Selection sort 89, 45, 68, 90, 29, 34, 17
17. Write BruteForce StringMatch algorithm and derive its efficiency.
18. Apply BruteForce StringMatch algorithm for the given text t = Analysis and Design of Algorithms and pattern p = Algo.
19. Experiment with the general divide and conquer technique with control abstraction and recurrence relation.
20. Write a Merge sort algorithm and derive its efficiency.

21. Apply the Merge sort algorithm for following list of elements
    a. 62, 57, 15, 25, 35, 56, 76, 34, 45, 77, 23
    b. 30, 52, 25, 50, 35, 25, 74, 32, 67, 41, 79
    c. MERGESORT

22. Apply the Quick sort algorithm for following list of elements and also construct the tree of recursive calls
    a. 8, 4, 3, 4, 7, 2, 6, 3, 5, 8
    b. 55, 20, 35, 60, 85, 60, 35, 50, 46
    c. EXAMPLE
    d. SORTING

23. Write Quick sort algorithm and derive its best case, average case and worst case time complexity.

24. Explain with example how the recurrence relation can be solved using Master's theorem.

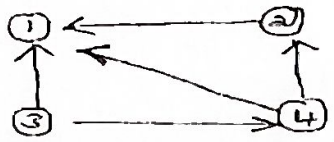
K.S. INSTITUTE OF TECHNOLOGY, BENGALURU - 560109

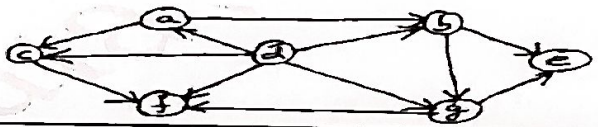
Department of Computer Science and Engineering

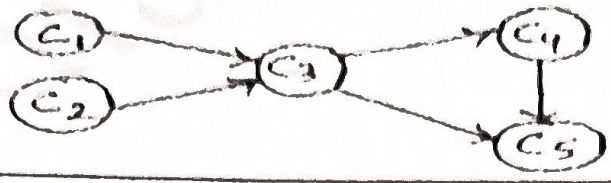
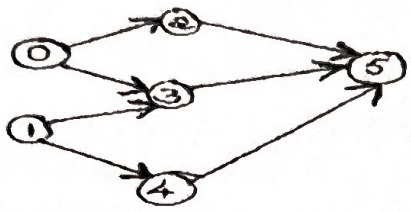
Subject: Design and Analysis of Algorithms (BCS401)

Question Bank

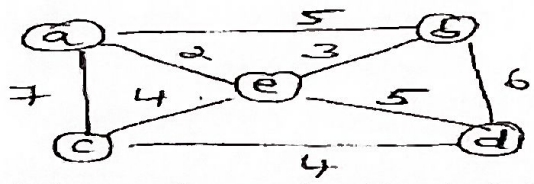
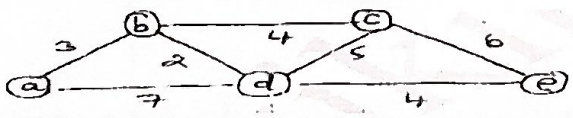
Faculty In charge : Mrs. Vijayalaxmi Mekali, Professor, Dept of CSE, KSIT,
Dr.Sowbhagya M P, Mrs.Sheba Jebakani

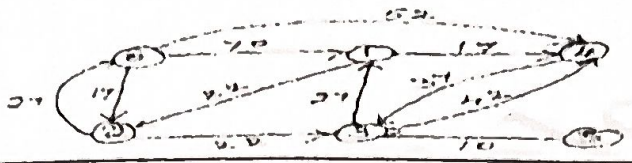
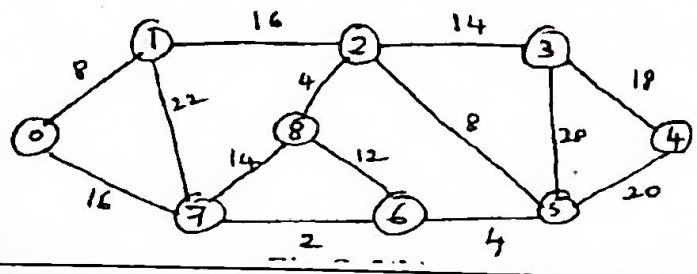
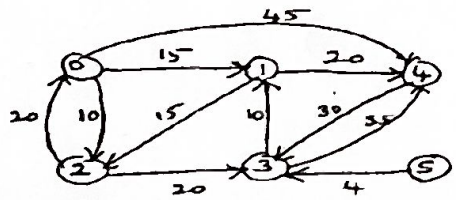
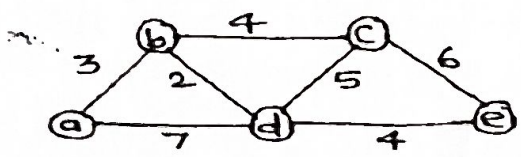
Sl. No	Questions	Marks	Year
	Module-II		
1	Write a algorithm to sort 'n' numbers using quick sort and derive its time complexity.Trace the algorithm to sort the following list in ascending order 80, 60, 70, 40, 10, 30, 50, 20	8 M	June/July-2019 (17CS33) Dec-19/Jan-2020(17CS33)
2	Discuss general divide and conquer technique with control abstraction and recurrence relation.	6 Marks	June/July-2019 (17CS33) Aug/Sept 2020 (17CS43)
3	Apply DFS based algorithm and source removal method to find the topological order for the graph shown in following figure 	6 Marks	June/July-2019 (17CS33)
4	Apply Strassen's matrix multiplication to multipy following matrices. Discuss how this method is better that direct matrix multiplication method. $\begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix} \times \begin{bmatrix} 2 & 5 \\ 1 & 6 \end{bmatrix}$	8 Marks	June/July-2019 (17CS33)
5	(a) Explain the divide and conquer technique. (b) Write a recursive algorithm for finding the maximum and minimum element in an array.	6 Marks	June/July-2019 (17CS43) Dec-17/Jan-2018(15CS43) (only a part)June/July 2016 (10CS43) (4 marks)
6	Write a algorithm to sort 'n' numbers using merge sort.	6 Marks	June/July-2019 (17CS33)
7	Discuss how to find the maximum and minimum element in an array OR Write a algorithm to find the maximum and minimum element in an array recursively. Trace the same for the following data set 65, 70, 75, 80, 85, 60, 55, 50, 45. And also derive the worst case complexity.	6 Marks	June/July-2019 (15CS33)
8	What is stable algorithm? Is quick sort stable explain with an example	4 Marks	June/July-2019 (15CS33)
9	Define decrease and conquer technique and mention all the variations with an example.	6 Marks	June/July-2019 (15CS33) Dec 2018-Jan-2019(15CS33)

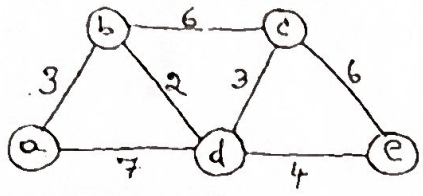
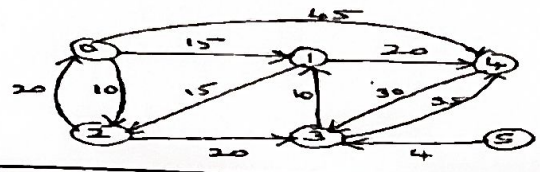
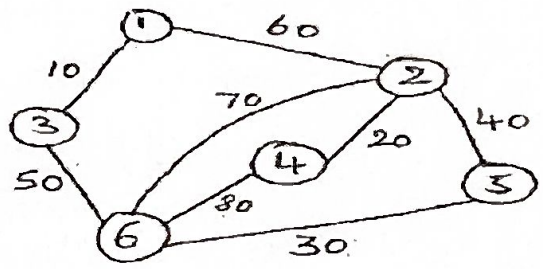
10	Explain the concept of divide and conquer. Design recursive algorithm for mergesort and derive its best, worst and average case complexity.	6 Marks	June/July-2019 (15CS43) Dec-17/Jan-2018(15CS43) Dec 2018-Jan-2019(15CS33) June/July 2016(10CS43) June/July . 2017(15CS43) June-July-2018(15CS43)
11	How would you demonstrate the steps used in Strassen's matrix multiplication and drive its time complexity.	4 Marks	June/July-2019 (15CS43) Dec-17/Jan-2018(15CS43) Dec 2018-Jan-2019(15CS33)
12	What actions would to take to perform topological sort using source removal method. Explain with an example	6 Marks	June/July-2019 (15CS33)
13	Design the algorithm for binary search and calculates its worst case time complexity.	10 Marks	Dec-19/Jan-2020(17CS33) June/July 2017(15CS43)
14	Write a algorithm for merge sort and trace . 60, 50, 25, 10, 35, 25, 75, 30 OR Develop an algorithm for sorting elements using simple merge. Apply the same for the sorting list of eleemnts given below 67, 90, 12, 56, 23, 34, 45	10 Marks	Dec-19/Jan-2020(17CS33) Aug/Sept 2020 (17CS43)
15	What is topological sorting. Apply DFS for below graph to solve topological sorting. 	10 Marks	Dec-19/Jan-2020(17CS33)
16	Apply quick sort to sort the list E, X, A, M, P, L, E in alphabetical order. Draw the tree of recursive calls made.	8 Marks	Dec-17/Jan-2018(15CS43)
17	Give a general form of divide and conquer recurrence relation and explain how you can solve it using Master's theorem	6 Marks	Dec-16/Jan-2017(10CS43)
18	Give a suitable sorting algorithm that uses divide and conquer techniques which divides problem size by considering values in the list. Analyze it for best and worst case efficiencies	8 Marks	Dec-16/Jan-2017(10CS43)
19	Discuss how the quick sort works to sort an array and trace for the following data set. Draw the tree of the recursive call. 65, 70, 75, 80, 85, 60, 65, 50, 45 And also drive the best complexity of algorithm	8 Marks	Dec 2018-Jan-2019(15CS43) June-July-2018(15CS43)
20	Write a algorithm for quick sort. And sort the folowing list elements 10, 8, 5, 15, 25, 75, 12. And also obtain its time complexity	4 Marks	June-July-2017(15CS43) June/July 2016 (10CS43)
21	Explain with example sorting algorithm that uses divide and conquer techniques which divides problem size by considering position. Give the corresponding algorithm and Analyze its worst case efficiency.	10 Marks	June/July-2017(10CS43)
22	Illustrate the tracing of quick sort algorithm for the following set of numbers 25, 10, 72, 18, 40, 11, 64, 58, 32, 9	8 Marks	June/July-2017(15CS43)

23	List out the advantages and disadvantages of divide and conquer technique. And illustrate the topological sorting for the following graph. 	8 Marks	June/July-2017(15CS43) Aug/Sept 2020 (17CS43)
24	Write a function to find the maximum and minimum elements in an array of n elements by applying divide and conquer technique.	6 Marks	June/July-2018(15CS43)
25	Exaplin the divide and conquer technique. Give a general algorithm DA and C(P) [where P is problem to be solved] to illustarte the technique.	4 Marks	June-July-2018(15CS43)
26	Apply source removal method for below graph to solve topological sorting. 	6 Marks	June-July-2018(15CS43)
27	Discuss how the quick sort algorithm works to sort a list of eleemnts. Draw the tree of recusive calls made 25, 91, 46, 35, 11, 82, 14, 55. Derive the best case time complexity of quick sort.	10 Marks	Aug/Sept 2020 (17CS43)
28	Obtain the topological sorting for the digraph using source removal method 	6 Marks	Aug/Sept 2020 (17CS43)
29	Apply Strassen's matrix multiplication algorithm to multipy following matrices. Discuss how this method is better that direct matrix multiplication method. $\begin{bmatrix} 0 & 2 & 1 \\ 4 & 1 & 1 & 0 \\ 0 & 1 & 3 & 0 \\ 5 & 0 & 2 & 1 \end{bmatrix} * \begin{bmatrix} 0 & 1 & 0 & 1 \\ 2 & 1 & 0 & 4 \\ 2 & 0 & 1 & 1 \\ 1 & 3 & 5 & 0 \end{bmatrix}$	8 Marks	Aug/Sept 2020 (17CS43)

Module-III

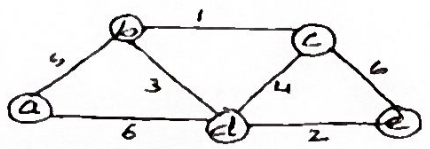
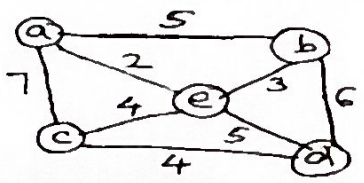
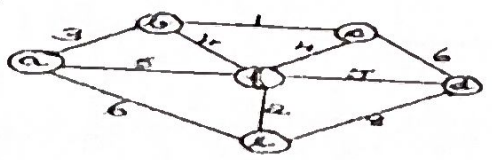
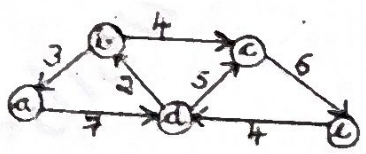
1	Write a algorithm to solve Knapsack problem using Greedy technique. Find the optimal solution to check the knapsack instance n=7, m=15 (P1, P2…….P7) = (10, 5, 15, 7, 6 18, 3) (W1, W2…….W7) = (2, 3, 5, 7, 1, 4, 1)	10 Marks	June/July-2019 (17CS33)
2	Apply Prim's algorithm and Krushkal's method to find the minimum cost spanning tree to the graph shown in figure 	10 Marks	June/July-2019 (17CS33)
3	Write a algorithm to solve single source shortest path problem. Apply the algorithm to the graph shown in figure by considering **'a'** as source. 	10 Marks	June/July-2019 (17CS33)
4	Define heap. Write bottom up heap construction algorithm. Construct heap for the list 1, 8, 6, 5, 3, 7, 4 using bottom up algorithm and successive key insertion method.	10 Marks	June/July-2019 (17CS33)
5	Recall the concept of Greedy technique.	3 Marks	June/July-2019 (15CS33)

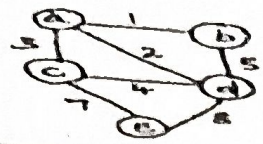
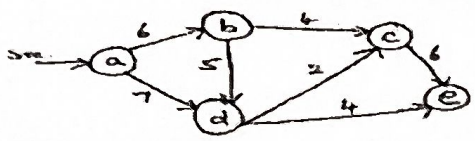
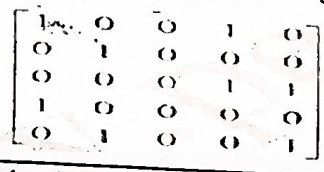
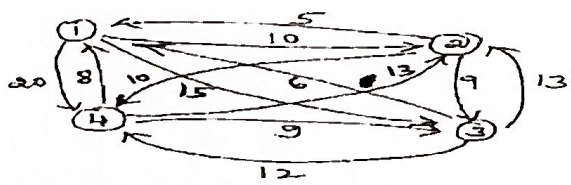
6	In weighted digraph given above, determine the shortest path from vertex '0' to all other vertices 	7 Marks	June/July-2019 (15CS43)
7	How would you solve the following instance of Knapsack problem using Greedy method Knapsack capacity M=10 Item 1 2 3 4 Weight 4 7 5 3 Profit 40 42 25 12	7 Marks	June/July-2019 (15CS43)
8	Explain the job sequencing with deadlines problem.Exaplin algorithm for job sequencing with deadlines problem.	8 Marks	June/July-2019 (15CS43)
9	Find the optimal solution to the Knapsack instances n=7, m=15 using greedy method Object 1 2 3 4 5 6 7 Weight 02 03 05 07 01 04 01 Profit 10 05 15 07 06 18 03	10 Marks	Dec-19/Jan-2020 (17CS33)
10	Find minimum spanning tree using Krushkal algorithm 	10 Marks	Dec-19/Jan-2020 (17CS33)
11	Construct a Huffman code for the following data: Characters A B C D - Probability 0.4 0.1 0.2 0.15 0.15 Encode the text ABACABAD and decode 100010111001010	10 Marks	Dec-19/Jan-2020 (17CS33) Dec-17/Jan-2018(15CS43)
12	Calculate shortest distance and shortest path from vertex 0 using Dijkstra's algorithm 	10 Marks	Dec-19/Jan-2020(17CS33)
13	Solve Greedy Knapsack problem. Find the optimal solution to check the knapsack where n=4, m=10 P = 40, 42, 25, 12 W=4, 7, 5, 3	6 Marks	Dec-17/Jan-2018(15CS43)
14	What is job sequencing with deadlines problem? Let n=5, profit [10, 3, 33, 11, 40] and deadlines [3,1,1, 2, 2] respectively. Find the optimal solutions using greedy algorithm.	5 Marks	Dec-17/Jan-2018(15CS43)
15	Define Mimimum cost Spanning Tree (MST). Write a Prim's algorithm to construct minimum vost spanning tree	5 Marks	Dec-17/Jan-2018(15CS43)
16	Design the Dijkstra's algorithm and apply the same to find single source shortest path for graph taking vertex 'a' as source 	8 Marks	Dec-17/Jan-2018(15CS43)
17	Construct heap for the following data 2, 9, 7, 6, 5, 8 by the bottom up algorithm.	4 Marks	Dec-17/Jan-2018(15CS43)

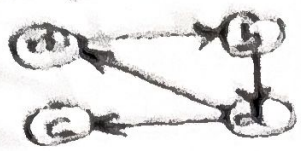
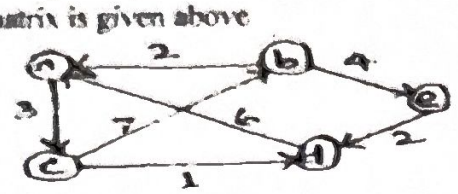
18	Solve job sequencing with deadlines problem uisng Greedy method for the given data N=7, P={3, 5, 20, 18, 1, 6, 30} are profits and D= {1, 3, 4, 3, 5, 1, 2} are deadlines respectively.	6 Marks	Dec-16/Jan-2017(10CS43) Aug/Sept 2020 (17CS43)
19	Find the minimum cost spanning treefor the graph G(6, 10) with a vertices named as a, b, c, d, e, f and edges ab=6, bc=1, af=5, ae=6,cd=8, fe=2, fd=5, cd=6, cf=4, and bf=4 using prim's algorithm and justify our answer by solving the problem using Kruskal's algorithm showing result in each stage,	8 Marks	Dec-16/Jan-2017(10CS43)
20	Find the shortest path from a source a to all other vertices in a graph shown below using greedy method. Given the greedy criterion used. 	8 Marks	Dec-16/Jan-2017(10CS43)
21	Sove the below instance of single source shortest path problem with vertex 6 as source with a hepl of suitable algorithm. 	8 Marks	Dec 2018-Jan-2019(15CS43)
22	Explain the concept of Greedy technique for the Prim's algorithm. Obtain a minimum cost spanning tree for the graph shown below 	8 Marks	Dec 2018-Jan-2019(15CS43) June/July-2019 (15CS43)
23	What are Huffman trees? Explain. Construct the Huffman code for the following data Encode DAD CBE using Huffman encoding.	8 Marks	Dec 2018-Jan-2019(15CS43)
24	Explain Transform and Conquer technique? Sort the below list using Heap sort 3, 2, 4, 1, 6, 5	8 Marks	Dec-18/Jan-2019(15CS43)
25	Obtain the optimal solution for the job sequencing problem with deadlines where n=4, profit (p1, p2, p3, p4)=(100, 10, 15, 27) and deadlines (d1, d2, d3, d4)=(2, 1, 2, 1)	4 Marks	June/July-2017(10CS43)
26	Exaplin the concept of Greedy technique for Prim's algorithm. Obtain the minimum cost spanning tree for the graph whose weight matrix is given below OR	8 Marks	June/July-2017(10CS43)

Character	A	B	C	D	E	-
Probability	0.5	0.35	0.5	0.1	0.4	0.2

$$\begin{bmatrix} 0 & 3 & \infty & 7 & \infty \\ 3 & 0 & 4 & 2 & 5 \\ \infty & 4 & 0 & 5 & 6 \\ 7 & 2 & 5 & 0 & 4 \\ \infty & \infty & 6 & 4 & 0 \end{bmatrix}$$

27	Write a Kruskal algorithm to minimum cost spanning tree and obtain minimum cost spanning tree for the graph 	8 Marks	June/July-2017(10CS43)
28	Explain the Greedy method. What is Knapsack problem? Write a algorithm to obtain optimal solution for the Knapsack problem using Greedy method. Apply the algorithm for n=3, capacity m=20, values: 25, 24, 15 and weights: 18, 15, 10 respectively	10 Marks	June-July-2017(10CS43)
29	What is job sequencing with deadlines problem? Obtain the solution generated by job sequencing with deadlines problem for 7 jobs given profits: 3, 5, 20, 18, 1, 6, 30 and deadlines: 1, 3, 4, 3, 2, 1, 2 respectively.	6 Marks	June-July-2017(10CS43)
30	Write a Kruskal algorithm to minimum cost spanning tree and obtain minimum cost spanning tree for the graph	4 Marks	June-July-2017(10CS43)
31	Explain the Greedy criterion. Write a Prim's algorithm to minimum cost spanning tree 	8 Marks	June/July-2017(15CS43)
32	Sort the below list using Heap sort 2, 9 7, 6, 5, 8 OR Sort the below list using Heap sort 2, 7, 1, 6, 5, 4, 3	8 Marks	June/July-2017(15CS43) Aug/ Sept 2020 (17CS43)
33	Write a algorithm to find single source shortest path.	8 Marks	June/July-2017(15CS43)
34	Construct the Huffman code for the following data. Encode the words DAD and ADD Character | A | B | C | D | - Probability | 0.35 | 0.1 | 0.2 | 0.2 | 0.15	8 Marks	June/July-2017(15CS43)
35	Apply the Greedy Method to obtain optimal solution to the Knapsack problem given M=60, (W1, W2,W3, W4, W5)= (5, 10, 20, 30, 40) (P1, P2, P3, P4, P5)=(30, 20, 100, 90, 160). Find the total profit	4 Marks	June/July-2018(15CS43)
36	Exapln the Huffman's algorithm. With an example show the construction of Huffman's tree and generate the Huffman code using this tree	6 Marks	June/July-2018(15CS43)
37	Apply a Prim's algorithm to obtain a minimum cost spanning tree for the given weighted connected graph 	6 Marks	June/July-2018(15CS43)
38	Explain the bottom up heap construction algorithm with example. Give the worst case efficiency of this algorithm.	8 Marks	June/July-2018(15CS43)
39	Apply a single source shortest path algorithm assuming vertex **a** as source vertex 	8 Marks	June/July-2018(15CS43)

40	Exaplin the concept of Greedy technique for Prim's algorithm. Obtain the minimum cost spanning tree for the graph whose weight matrix is given below 	8 Marks	Aug/Sept 2020 (17CS43)
41	Explain the Greedy criterion. Apply Greedy method for the following instances of Knapsack problem. Capacity of Knapsack (M) = 5. Item | Weight | Value 1 | 2 | $12 2 | 1 | $10 3 | 3 | $20 4 | 2 | $15	8 Marks	Aug/Sept 2020 (17CS43)
42	Construct the Huffman code for the following data. Encode the text BADEC Character: A, B, C, D, E Probability: 0.4, 0.1, 0.2, 0.15, 0.15	6 Marks	Aug/Sept 2020 (17CS43).
43	Apply a single source shortest path algorithm assuming vertex a as source vertex 	6 Marks	Aug/Sept 2020 (17CS43)
	Module-IV		
1	Define transitive closure of a directed graph. Find the transitive closure matrix for the graph whose adjacency matrix is given 	10 Marks	June/July-2019 (17CS33)
2	Find optimal tour for salesperson using dynamic programming technique. The directed graph is shown in figure 	10 Marks	June/July-2019 (17CS33)
3	Apply bottom-up dynamic programming algorithm to the following instance of Knapsack problem. Knapsack capacity W=10 Item | Weight | Value 1 | 7 | 42 2 | 3 | 12 3 | 4 | 40 4 | 5 | 25	10 Marks	June/July-2019 (17CS33)
4	Using the floyds algorithm solve the all pair shortest path problem for the graph whose weight matrix is given above $\begin{bmatrix} 0 & 10 & \infty & 40 \\ \infty & 0 & \infty & 20 \\ 50 & \infty & 0 & \infty \\ \infty & \infty & 60 & 0 \end{bmatrix}$	6 Marks	June/July-2019 (15CS33)
5	Using the dynamic programming solve following Knapsack problem n=4, M=5, (w1,w2,w3,w4)=(2, 1, 3, 2). Profit(p1,p2, p3, p4)=(8, 6, 16, 11)	6 Marks	June/July-2019 (15CS33)
6	Write Warshall's algorithm	4 Marks	June/July-2019 (15CS33)

7	Design the floyd's algorithm to find shortest distances from all nodes to all other nodes	10 Marks	Dec-19/Jan-2020(15CS33)
8	Apply Warshall's algorithm to compute transitive closure for the graph below 	10 Marks	Dec-19/Jan-2020(15CS33)
9	Define transitive closure. Write a Warshall's algorithm to compute transitive closure and find it efficiency.	8 Marks	Dec-17/Jan-2018(15CS43)
10	Using the floyds algorithm solve the all pair shortest path problem for the graph whose weight matrix is given above 	8 Marks	Dec-17/Jan-2018(15CS43)

Module-V

1	Exaplin Backtracking method. Draw state space tree to generate solutions to 4-Queen's problem.	5 Marks	June-July-2019(15CS33)
2	What is branch and bound algorithm? How it is different from backtracking.	8 Marks	June-July-2019(15CS33)
3	Define the following 1. Class P 2. Class NP, 3. NP Complete problem	6 Marks	June-July-2019(15CS33)
4	Apply backtracking technique to solve instance of sum of subset problem S={3, 5, 6, 7} and d=15.	8 Marks	June-July-2019(15CS33)
5	Exaplin the class NP hard and NP Complete	10 Marks	Dec-19/Jan-2020(15CS43) Dec-17/Jan-2018(15CS43)
6	Write a pseudocode for Backtracking algorithm. Let **w={3, 5, 6, 7}** and **m=15**. Find all possible subsets of **w** that sum to **m**. Draw the state space tree that it generates.	10 Marks	Dec-17/Jan-2018(15CS43)
7	With a help of state space tree, solve the knapsack problem for the graph using branch and bound method Item 1 2 3 4 Weight 4 7 5 3 Profit 40 42 25 12	8 Marks	Dec-17/Jan-2018(15CS43)

Model Question Paper with effect from 2023-24 (CBCS Scheme)

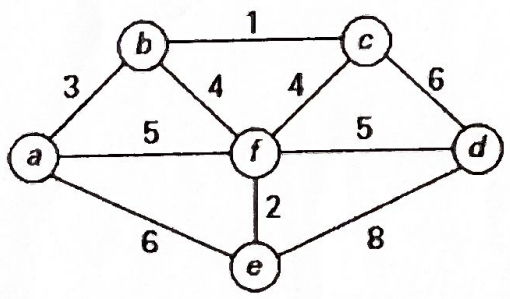
USN | | | | | | | | | | |

Fourth Semester B.E. Degree Examination

Analysis and Designs of Algorithms

TIME: 03 Hours **Max. Marks: 100**

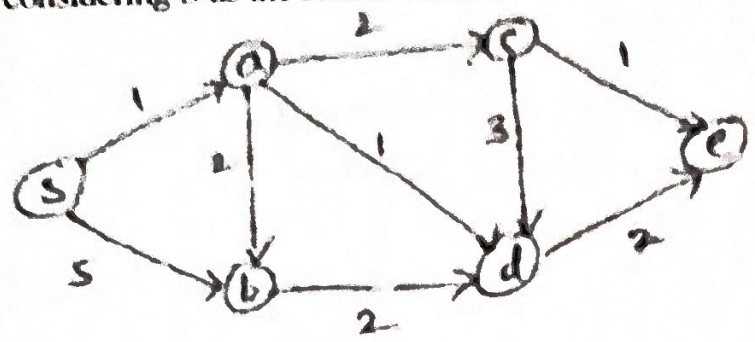
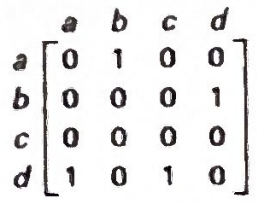
Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

			BL		Marks
		Module -1			
Q.01	a	Define algorithm. Explain asymptotic notations Big Oh, Big Omega and Big Theta notations	L2		08
	b	Explain the general plan for analyzing the efficiency of a recursive algorithm. Suggest a recursive algorithm to find factorial of number. Derive its efficiency	L2		08
	c	If $t1(n) \in O(g1(n))$ and $t2(n) \in O(g2(n))$, then show that $t1(n) + t2(n) \in O(\max\{g1(n), g2(n)\})$.	L2		04
		OR			
Q.02	a	With neat diagram explain different steps in designing and analyzing an algorithm	L2		08
	b	Explain the general plan for analyzing the efficiency of a non-recursive algorithm. Suggest a non-recursive algorithm to find maximum element in the list of n numbers. Derive its efficiency	L2		08
	c	With the algorithm derive the worst case efficiency for Bubble sort	L2		04
		Module-2			
Q. 03	a	Explain the concept of divide and conquer. Design an algorithm for merge sort and derive its time complexity	L2		10
	b	Design an insertion sort algorithm and obtain its time complexity. Apply insertion sort on these elements. 25,75,40,10,20,	L3		10
		OR			
Q.04	a	Explain Strassen's matrix multiplication and derive its time complexity	L2		10
	b	Design an algorithm for quick sort algorithm. Apply quick sort on these elements. 25,75,40,10,20,05,15	L3		10
		Module-3			
Q. 05	a	Define AVL Trees. Explain its four rotation types	L2		10
	b	Construct bottom up heap for the list 2,9,7,6,5,8. Obtain its time complexity	L3		10
		OR			
Q. 06	a	Define heap. Explain the properties of heap along with its representation.	L2		10
	b	Design Horspools algorithm for string matching. Apply Horspools algorithm to find the pattern BARBER in the text: JIM_SAW_ME_IN_A_BARBERSHOP	L3		10
		Module-4			
Q. 07	a	Construct minimum cost spanning tree using Kruskals algorithm for the following graph. 	L3		10
	b	What are Huffman Trees? Construct the Huffman tree for the following data.	L3		10

Character	A	B	C	D	E	-
Probability	0.5	0.35	0.5	0.1	0.4	0.2

Encode DAD-CBE using Huffman Encoding.

OR

Q. 08	a	Apply Dijkstra's algorithm to find single source shortest path for the given graph by considering S as the source vertex. 	L3		10
	b	Define transitive closure of a graph. Apply Warshalls algorithm to compute transitive closure of a directed graph 	L3		10
		Module-5			
Q. 09	a	Explain the following with examples i) P problem ii) NP Problem iii) NP- Complete problem iv) NP – Hard Problems	L2		10
	b	What is backtracking? Apply backtracking to solve the below instance of sum of subset problem S={5,10,12,13,15,18} d=30	L3		10
		OR			
Q. 10	a	Illustrate N queen's problem using backtracking to solve 4-Queens problem	L2		10
	b	Using Branch and Bound technique solve the below instance of knapsack problem. Capacity 5	L3		10

Item	Weight	Value
1	2	12
2	1	10
3	3	20
4	2	5

18 IV Sem CS

CBCS SCHEME

USN | | | | | | | | | | |

18CS42

Fourth Semester B.E. Degree Examination, July/August 2022
Design and Analysis of Algorithms

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Give the definition of an Algorithm and also discuss the characteristics of an Algorithm. **(05 Marks)**

b. Define Space Complexity and Time Complexity of an algorithm and compute the time complexity of Fibbonocci Numbers algorithm. **(05 Marks)**

c. What are the various basic Asymptotic efficiency classes? Explain Big – O , Big - Ω , Big - θ notations with examples. **(10 Marks)**

OR

2 a. Give the Mathematical Analysis of Non recursive Matrix Multiplication Algorithm. **(05 Marks)**

b. Give the general plan for analyzing Time efficiency of Recursive algorithms and also Analyze the Tower of Hanoi Recursive algorithm. **(10 Marks)**

c. Mention the important problem types considered for design and analysis. Explain any two problem types. **(05 Marks)**

Module-2

3 a. Give the Recursive algorithm to find maximum and minimum element from the list and apply the algorithm to find maximum and minimum to the list
[31 , 22 , 12 , -7 , 75 , -6 , 17 , 47 , 60]. **(10 Marks)**

b. Apply both mergesort and quicksort algorithm to sort the characters VTUBELAGAVI. **(10 Marks)**

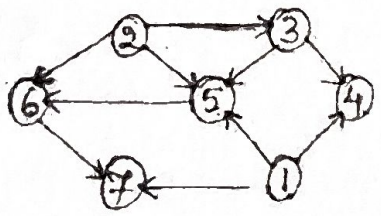
OR

4 a. Apply Strassen's algorithm for matrix multiplication to multiply the following matrices and justify how the Strassen's algorithm is better.

$$\begin{bmatrix} 4 & 3 \\ 1 & 2 \end{bmatrix} \times \begin{bmatrix} 1 & 2 \\ 6 & 5 \end{bmatrix}.$$ **(10 Marks)**

b. Obtain the topological sort for the graph , Fig. Q4(b) using i) Source Removal method ii) DFS method. **(10 Marks)**

Fig. Q4(b)



Module-3

5 a. Solve the Greedy Knapsack problem, Fig. Q5(a) of capacity 5kgs. **(05 Marks)**

Fig. Q5(a)

Items	1	2	3	4
Profit	5	9	4	8
Weight	1	3	2	2

b. Find the Optimal solution for the Greedy Job sequencing problem given n = 4 , profits [10 , 30 , 60 , 40] , deadlines [2 , 3 , 1 , 3]. **(05 Marks)**

c. Apply Prims and Kruskal's algorithm to find the minimal cost spanning tree for the graph given in Fig. Q5(c). **(10 Marks)**

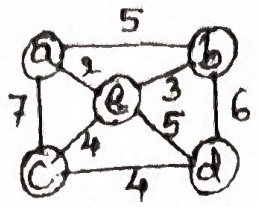


Fig. Q5(c)

OR

6 a. A document contains the letters "A" through "E" with frequencies is follows :
A : 22 , B : 13 , C : 18 , D : 16 , E : 31.
Construct a Huffman Tree and codes and
Encode : CAB , ADD , BAD , ACE
Decode : 110011 and 1000110001. **(10 Marks)**

b. Apply Heapsort for the list [9 , 7 , 1 , 8 , 3 , 6 , 2 , 4 , 10 , 5] using Bottom up approach. **(10 Marks)**

Module-4

7 a. Apply Floyd's algorithm to find the all pairs shortest path for the given adjacency matrix. Fig. Q7(a).

$$W = \begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \end{array} \begin{array}{c} \begin{array}{ccccc} 1 & 2 & 3 & 4 & 5 \end{array} \\ \begin{bmatrix} 0 & 1 & \infty & 1 & 5 \\ 9 & 0 & 3 & 2 & \infty \\ \infty & \infty & 0 & 4 & \infty \\ \infty & \infty & 2 & 0 & 3 \\ 3 & \infty & \infty & \infty & 0 \end{bmatrix} \end{array}$$

Fig. Q7(a) **(10 Marks)**

b. Solve the instance of 0/1 Knapsack problem Fig. Q7(b), using Dynamic Programming approach. **(10 Marks)**

Item	Weight	Value
1	2	$ 12
2	1	$ 10
3	3	$ 20
4	2	$ 15

Capacity W = 5

Fig. Q7(b)

OR

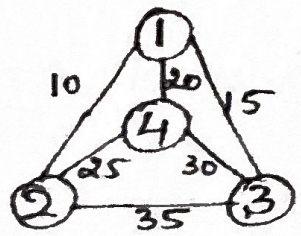
8 a. Construct an Optimal Binary search tree for the set of keys given in Fig. Q8(a). **(10 Marks)**

Keys	A	B	C	D
Probability	0.1	0.2	0.4	0.3

Fig. Q8(a)

b Apply Dynamic programming approach to solve the given Travelling Salesman problem. **(10 Marks)**

Fig. Q8(b)



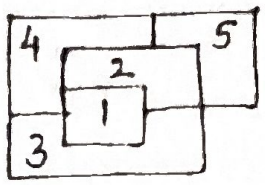
18CS42

Module-5

9 a. With the help of State Space tree, solve the 4 – queens problem by using Backtracking approach. **(10 Marks)**

b. Color the regions in the Map given in Fig. Q9(b) , by applying backtracking graph color algorithm. Color = (R G B & Y). **(10 Marks)**

Fig. Q9(b)



OR

10 a. Apply LC – Branch and Bound approach to the assignment problem Fig. Q10(a). **(10 Marks)**

Fig. Q10(a)

$$C = \begin{array}{c} \begin{matrix} 1 & 2 & 3 & 4 \end{matrix} \\ \begin{bmatrix} 9 & 2 & 7 & 8 \\ 6 & 4 & 3 & 7 \\ 5 & 8 & 1 & 8 \\ 7 & 6 & 9 & 4 \end{bmatrix} \end{array} \begin{matrix} \text{Person a} \\ \text{Person b} \\ \text{Person c} \\ \text{Person d} \end{matrix}$$

b. Apply Branch and Bound approach to solve the instance of 0/1 Knapsack problem.

KnapSack Capacity W = 10

Items	1	2	3	4
Weight	4	7	5	3
Value	$ 40	$ 42	$ 25	$ 12

Fig. Q10(b)

(10 Marks)

* * * * *

Department of Computer Science and Engineering
COURSE END SURVEY
ACADEMIC YEAR 2024-2025 (EVEN SEMESTER)

Sub Analysis and Design of Algorithms(BCS401)

Sem:IV C

Faculty Name: Mrs. Sheba Jebakani

Q1. Grade your ability to analyze the performance of algorithms and compute time complexity.
Q2. Grade your ability to apply the knowledge of Divide and conquer , Decrease and Conquer in solving the problems.
Q3. To what extent are you Able to apply the knowledge of Transform and Conquer Approach in solving the problems.
Q4. Grade your ability to apply the knowledge of Dynamic Programming and Greedy Method in solving the problems.
Q5. Rate your ability to apply the knowledge of Backtracking and Branch and Bound in solving the problems.

SL. No	TIME STAMP	USN	Email	Q1	Q2	Q3	Q4	Q5
1	5/21/2025 20:27:44	1KS23CS163	tsrsniraga_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
2	5/21/2025 20:28:25	1KS23CS134	sadhanam_cse2023@ksit.edu.in	Very Good	Very Good	Very Good	Very Good	Very Good
3	5/21/2025 20:28:25	1KS23CS141	sanjayt_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
4	5/21/2025 20:28:26	1KS23CS178	vigasinis_cse2023@ksit.edu.in	Very Good	Very Good	Excellent	Very Good	Very Good
5	5/21/2025 20:28:34	1KS23CS144	shamashivarajshetty_cse2023@ksit.edu.in	Very Good	Excellent	Excellent	Excellent	Excellent
6	5/21/2025 20:36:28	1KS23CS173	varshitha_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
7	5/21/2025 20:40:33	1KS23CS151	shreyasupadhya_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
8	5/21/2025 20:44:41	1KS24CS415	varshinij_cse2023@ksit.edu.in	Good	Good	Good	Good	Good
9	5/21/2025 20:46:54	1KS23CS167	thanushreevs_cse2023@ksit.edu.in	Very Good	Very Good	Good	Very Good	Very Good
10	5/21/2025 20:47:09	1KS23CS127	rudreshsiddappa_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
11	5/21/2025 20:47:58	1KS23CS137	sakshiramesh_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
12	5/21/2025 20:59:59	1KS23CS155	shrustil_cse2023@ksit.edu.in	Good	Good	Very Good	Very Good	Very Good
13	5/21/2025 22:51:16	1KS23CS135	sagarikabpatil_cse2023@ksit.edu.in	Very Good	Very Good	Very Good	Very Good	Very Good
14	5/21/2025 23:14:25	1KS23CS185	vunnamthanuja_cse2023@ksit.edu.in	Very Good	Very Good	Very Good	Very Good	Very Good
15	5/22/2025 10:50:47	1KS24CS409	rachanar_cse2023@ksit.edu.in	Good	Good	Good	Good	Good
16	5/22/2025 10:55:52	1KS23CS170	varshadr_cse2023@ksit.edu.in	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory
17	5/22/2025 12:06:10	1KS24CS412	rakeshr_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
18	5/22/2025 14:55:50	1KS23CS162	surekhats_cse2023@ksit.edu.in	Very Good	Very Good	Very Good	Very Good	Very Good
19	5/22/2025 17:04:46	1KS23CS180	vikaskb_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
20	5/23/2025 19:42:54	1KS23CS187	yashaswinikt_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
21	5/24/2025 2:11:44	1KS23CS164	tallurusahithya_cse2023@ksit.edu.in	Very Good	Very Good	Very Good	Very Good	Very Good
22	5/24/2025 4:03:52	1KS23CS158	sravyailluri_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
23	5/24/2025 4:42:12	1ks23cs177	venkatss_cse2023@ksit.edu.in	Good	Good	Good	Good	Good
24	5/24/2025 6:25:40	1KS23CS133	sachinr_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
25	5/24/2025 6:46:48	1KS23CS147	shivam_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
26	5/24/2025 7:15:14	1KS23CS146	shashankgowdau_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
27	5/24/2025 10:54:19	1KS23CS171	varshadattatreyabhat_cse2023@ksit.edu.in	Good	Good	Good	Very Good	Very Good
28	5/24/2025 13:58:30	1KS24CS402	darshankr_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
29	5/24/2025 14:02:39	1KS23CS142	sankethkumarkr_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
30	5/24/2025 16:07:25	1KS23CS138	sandhya_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent

31	5/24/2025 23:05:12	1KS23CS143	sarvagnasrao_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
32	5/24/2025 23:28:54	1KS23CS161	sudhanvakjoshi_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
33	5/24/2025 23:55:29	1KS23CS150	shreyas_cse2023@ksit.edu.in	Very Good	Excellent	Excellent	Excellent	Excellent
34	5/25/2025 6:02:47	1KS23CS176	veerendrar_cse2023@ksit.edu.in	Very Good	Excellent	Excellent	Excellent	Excellent
35	5/25/2025 8:02:54	1KS23CS188	syashaswini52@gmail.com	Good	Good	Good	Good	Good
36	5/25/2025 8:35:41	1KS23CS179	vijayalakshmic_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
37	5/25/2025 8:45:58	1KS23CS152	shreyass_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
38	5/25/2025 8:55:49	1KS23CS136	sahanad_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
39	5/25/2025 9:51:32	1KS23CS153	shrihariib_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
40	5/25/2025 17:10:38	1KS23CS149	shravyprakash_cse2023@ksit.edu.in	Very Good	Very Good	Very Good	Very Good	Very Good
41	5/25/2025 19:47:13	1KS23CS169	varnikag_cse2023@ksit.edu.in	Good	Good	Good	Good	Good
42	5/26/2025 12:03:24	1KS23CS156	srustishrusti@gmail.com	Excellent	Excellent	Excellent	Excellent	Excellent
43	5/26/2025 12:21:51	1KS23CS131	ssumanth_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
44	5/26/2025 19:35:56	1KS23CS175	vatsalvignesh@gmail.com	Very Good	Very Good	Very Good	Very Good	Very Good
45	5/26/2025 19:36:24	1KS23CS154	shrishacm_cse2023@ksit.edu.in	Very Good	Very Good	Very Good	Very Good	Very Good
46	5/26/2025 19:37:10	1ks23cs148	shivamanin_cse2023@ksit.edu.in	Very Good	Very Good	Very Good	Very Good	Very Good
47	5/26/2025 19:37:27	1KS23CS186	yashaswir_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
48	5/26/2025 19:56:45	1KS24CS403	gagangowdad_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
49	5/26/2025 22:11:09	1KS23CS166	tarunr_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
50	5/27/2025 10:23:10	1KS23CS160	sudarshanvg_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
51	5/27/2025 12:51:10	1KS23CS159	srigowriskulkarni_cse2023@ksit.edu.in	Very Good	Very Good	Very Good	Very Good	Very Good
52	5/27/2025 16:11:10	1KS23CS139	sanjanaj250605@gmail.com	Good	Very Good	Very Good	Good	Good
53	5/28/2025 6:39:35	1KS23CS126	rubykumarir772@gmail.com	Excellent	Excellent	Excellent	Excellent	Excellent
54	5/28/2025 19:18:05	1KS23CS172	varshask_cse2023@ksit.edu.in	Good	Good	Good	Good	Good
55	5/28/2025 19:18:22	1KS23CS145	shamithgowdag_cse2023@ksit.edu.in	Excellent	Very Good	Very Good	Excellent	Excellent
56	5/28/2025 19:18:25	1KS23CS182	vishalr_cse2023@ksit.edu.in	Very Good	Very Good	Very Good	Very Good	Very Good
57	5/28/2025 19:46:31	1KS23CS132	svnavya_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
58	5/28/2025 21:28:09	1KS23CS128	rushithakola@gmail.com	Very Good	Very Good	Good	Very Good	Very Good
59	5/28/2025 21:29:58	1KS23CS129	savinash_cse2023@ksit.edu.in	Excellent	Very Good	Very Good	Very Good	Excellent
60	5/28/2025 22:04:31	1KS23CS157	someshkori07@gmail.com	Excellent	Excellent	Excellent	Excellent	Excellent
61	5/28/2025 22:24:49	1KS23CS130	sharsha_cse2023@ksit.edu.in	Good	Good	Good	Good	Satisfactory
62	5/29/2025 6:26:44	1ks23cs181	vinith.mraju@gmail.com	Excellent	Excellent	Very Good	Excellent	Excellent
63	5/29/2025 18:21:47	1KS23CS183	vishaltk_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Satisfactory	Excellent
64	5/29/2025 18:23:28	1KS23CS168	ujwalgnaik_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
65	5/30/2025 19:40:57	1KS23CS184	vishalvasss_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
66	10/6/2025 13:54	1KS23CS140	sanjanan_cse2023@ksit.edu.in	Excellent	Excellent	Excellent	Excellent	Excellent
			Excellent	38	39	39	39	41
			Very Good	17	17	16	17	16
			Good	10	9	10	8	7
			Satisfactory	1	1	1	2	2
				98.48	98.48	98.48	96.97	96.97

COURSE IN-CHARGE

K.S.INSTITUTEOFTECHNOLOGY,BANGALORE

DEPARTMENTOFCOMPUTERSCIENCE&ENGINEERING

INDIRECTATTAINMENTCOURSEENDSURVEY

YEAR/SEMESTER	III/IVC
COURSETITLE	ADA- C SECTION
COURSE CODE	BCS401
ACADEMICYEAR	2024-25(EVEN)

	Q1	Q2	Q3	Q4	Q5	
EXCELLENT	38	39	39	39	41	
VERYGOOD	17	17	16	17	16	
GOOD	10	9	10	8	7	97.88
SATISFACTORY	1	1	1	2	2	
STUDENTSRESPONSE (Good and above)	98.48	98.48	98.48	96.97	96.97	

STAFFSIGNATURE

HOD
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K. S. Institute of Technology, Bangalore – 109
Department of Computer Science and Engineering
COURSE END SURVEY
ACADEMIC YEAR 2024-2025 (EVEN SEMESTER)

Course/Code: Analysis and Dsesign of Algorithms/ BCS401 **Faculty Name: Dr.Sowbhagya M P**

Sem: IV B

Q1. Grade your ability to analyze the performance of algorithms and compute time complexity.
Q2. Grade your ability to apply the knowledge of Divide and conquer , Decrease and Conquer in solving the problems.
Q3. To what extent are you Able to apply the knowledge of Transform and Conquer Approach in solving the problems.
Q4. Grade your ability to apply the knowledge of Dynamic Programming and Greedy Method in solving the problems.
Q5. Rate your ability to apply the knowledge of Backtracking and Branch and Bound in solving the problems.

Slno	Timestamp	USN	Q1	Q2	Q3	Q4	Q5
1	2025/06/02 3:28:25	1KS23CS084	Excellent	Excellent	Excellent	Excellent	Excellent
2	2025/06/02 3:28:25	PUNYASHREE B	Excellent	Very good	Very good	Excellent	Very good
3	2025/06/02 3:30:55	1KS23CS070	Good	Good	Good	Good	Good
4	2025/06/02 3:32:22	1KS23CS121	Excellent	Excellent	Excellent	Excellent	Excellent
5	2025/06/02 3:36:15	1KS23CS078	Excellent	Excellent	Excellent	Excellent	Excellent
6	2025/06/02 3:36:15	1KS24CS405	Very Good	Very good	Good	Very good	Very good
7	2025/06/02 3:36:24	1KS23CS065	Excellent	Excellent	Very good	Very good	Very good
8	2025/06/02 3:37:18	1KS23CS080	Very Good	Very good	Very good	Very good	Very good
9	2025/06/02 3:38:39	1KS24CS414	Excellent	Excellent	Very good	Very good	Excellent
10	2025/06/02 3:39:29	Mohammed Shazan	Very Good	Good	Good	Good	Good
11	2025/06/02 3:39:45	1KS23CS081	Excellent	Excellent	Excellent	Excellent	Excellent
12	2025/06/02 3:40:07	1KS23CS124	Very Good	Very good	Very good	Very good	Very good
13	2025/06/02 3:43:58	1KS23CS115	Excellent	Very good	Very good	Very good	Very good
14	2025/06/02 3:44:00	1KS23CS105	Excellent	Excellent	Excellent	Excellent	Excellent
15	2025/06/02 3:44:58	1KS23CS076	Excellent	Very good	Excellent	Very good	Excellent
16	2025/06/02 3:45:44	1KS23CS068	Excellent	Excellent	Excellent	Excellent	Excellent
17	2025/06/02 3:45:54	1KS23CS122	Excellent	Excellent	Excellent	Excellent	Excellent
18	2025/06/02 3:47:35	1KS23CS101	Excellent	Excellent	Excellent	Excellent	Excellent
19	2025/06/02 3:53:39	1KS23CS123	Excellent	Excellent	Excellent	Excellent	Excellent
20	2025/06/02 3:58:49	1ks23cs088	Excellent	Excellent	Excellent	Excellent	Excellent
21	2025/06/02 4:05:38	1KS23CS074	Excellent	Excellent	Excellent	Excellent	Excellent
22	2025/06/02 4:14:46	1ks23cs106	Very Good	Very good	Very good	Very good	Very good
23	2025/06/02 4:18:46	1KS23CS072	Very Good	Very good	Very good	Very good	Very good
24	2025/06/02 4:24:50	1KS23CS112	Excellent	Very good	Very good	Very good	Very good
25	2025/06/02 4:24:52	1KS23CS064	Excellent	Excellent	Excellent	Excellent	Excellent
26	2025/06/02 4:25:11	1KS24CS401	Very Good	Very good	Very good	Very good	Very good
27	2025/06/02 4:27:10	1ks24cs410	Good	Good	Good	Good	Good

28	2025/06/02 4:33:05	1KS23CS095	Excellent	Very good	Excellent	Very good	Very good
29	2025/06/02 4:43:12	1KS23CS075	Excellent	Excellent	Excellent	Very good	Very good
30	2025/06/02 4:52:34	1KS24CS400	Very Good	Very good	Very good	Very good	Very good
31	2025/06/02 4:54:00	1KS23CS092	Excellent	Excellent	Excellent	Excellent	Excellent
32	2025/06/02 5:23:21	1KS23CS071	Very Good	Very good	Very good	Very good	Very good
33	2025/06/02 5:45:46	1KS23CS066	Excellent	Excellent	Excellent	Excellent	Excellent
34	2025/06/02 5:50:30	1KS23CS120	Excellent	Excellent	Excellent	Excellent	Excellent
35	2025/06/02 6:21:57	1KS23CS063	Excellent	Excellent	Excellent	Very good	Very good
36	2025/06/02 8:23:37	1KS23CS109	Excellent	Excellent	Excellent	Excellent	Excellent
37	2025/06/02 9:22:12	1ks23cs090	Excellent	Excellent	Excellent	Excellent	Excellent
38	2025/06/03 7:21:19	1KS23CS097	Excellent	Excellent	Excellent	Excellent	Excellent
39	2025/06/03 9:50:45	1KS23CS101	Excellent	Excellent	Excellent	Excellent	Excellent
40	2025/06/03 12:06:11	1KS23CS082	Excellent	Excellent	Excellent	Excellent	Excellent
41	2025/06/03 1:29:42	1KS23CS103	Excellent	Excellent	Excellent	Excellent	Excellent
42	2025/06/03 3:21:55	1ks23cs102	Excellent	Excellent	Excellent	Excellent	Excellent
43	2025/06/03 3:48:04	1KS23CS093	Excellent	Very good	Very good	Excellent	Very good
44	2025/06/05 3:48:38	1ks23cs094	Excellent	Excellent	Excellent	Excellent	Excellent
45	2025/06/09 7:54:56	1KS23CS118	Excellent	Excellent	Excellent	Excellent	Excellent
46	2025/06/10 2:31:04	1KS23CS079	Very Good	Very good	Very good	Very good	Very good
47	2025/06/10 2:46:15	1KS23CS111	Good	Good	Good	Good	Good
48	2025/06/11 1:17:43	Raghu j	Excellent	Excellent	Excellent	Excellent	Excellent
49	2025/06/11 1:17:56	1KS23CS080	Very Good	Very good	Very good	Very good	Very good
50	2025/06/11 1:18:06	1KS23CS11O	Excellent	Excellent	Excellent	Excellent	Excellent
51	2025/06/11 1:19:56	1KS23CS067	Very Good	Very good	Very good	Very good	Very good
52	2025/06/11 1:22:13	1KS23CS077	Satisfactory	Good	Very good	Very good	Very good
53	2025/06/11 1:23:54	1KS23CS091	Very Good	Excellent	Very good	Excellent	Excellent
54	2025/06/11 1:25:16	1KS23CS083	Good	Very good	Very good	Very good	Excellent
55	2025/06/11 1:25:27	1KS23CS096	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory
56	2025/06/11 1:38:22	1KS23CS114	Excellent	Excellent	Excellent	Excellent	Excellent
57	2025/06/11 1:43:20	1KS23CS087	Excellent	Excellent	Excellent	Excellent	Excellent
58	2025/06/11 1:49:15	1KS23CS107	Very Good	Very good	Very good	Very good	Very good
59	2025/06/11 2:14:21	1KS23CS069	Very Good	Very good	Very good	Very good	Very good
60	2025/06/11 2:15:09	1KS23CS073	Excellent	Excellent	Excellent	Excellent	Very good
61	2025/06/11 2:26:11	1KS23CS099	Excellent	Excellent	Excellent	Excellent	Excellent
62	2025/06/11 2:59:13	1KS24CS408	Excellent	Excellent	Excellent	Excellent	Excellent
63	2025/06/11 3:48:52	1KS23CS108	Excellent	Excellent	Excellent	Excellent	Excellent
64	2025/06/12 8:29:09	1KS23CS089	Very Good	Very good	Very good	Very good	Very good
65	2025/06/12 8:17:37	1KS23CS098	Excellent	Excellent	Excellent	Excellent	Excellent
			43	38	37	36	36
			16	21	22	24	24
			4	5	5	4	4
			2	1	1	1	1
			100.00	**100.00**	**100.00**	**100.00**	**100.00**

K.S.INSTITUTE OF TECHNOLOGY, BANGALORE
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
INDIRECT ATTAINMENT COURSE END SURVEY

YEAR / SEMESTER	II / IV - B
COURSE TITLE	Analysis And Design of Algorithms
COURSE CODE	BCS401
ACADEMIC YEAR	2024-25(EVEN)

	Q1	Q2	Q3	Q4	Q5	
EXCELLENT	43	38	37	36	36	
VERY GOOD	16	21	22	24	24	
GOOD	4	5	5	4	4	100.00
SATISFACORY	2	1	1	1	1	
STUDENTS RESPONSE (GOOD AND ABOVE)	100.00	100.00	100.00	100.00	100.00	

STAFF SIGNATURE

SIGNATURE OF HOD

Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K. S. Institute of Technology, Bangalore – 109
Department of Computer Science and Engineering
Course End Survey
Academic Year 2024-2025 A sec (Even Semester)
Sub: Analysis and Design of Algorithms (BCS401)
Faculty Name:Dr. Vijayalaxmi Mekali
Questions

Q1: Rate your understanding about asymptotic notations (Big Oh, Big theta, Big Omega)
Q2: How efficient you are in implementing algorithms using divide and conquer design techniques
Q3: Can you able to understand algorithms based on Transform and Conquer, Space Time Tradeoff
Q4: To what extent you have understood the otimizing the problems using dynamic programming and greedy technique
Q5: To what level you have able tp solve the problems using conept of backtracking, branch and bound, NP and NP hard

Sl.No	Timestamp	Student name	USN	Semester and Sec	Q1	Q2	Q3	Q4	Q5
1	2024/12/19 1:	ANUJA V M	1KS23CS014	3rd sem, A sec	Good	Excellent	Good	Excellent	Good
2	2024/12/19 1:	Angelina	1KS23CS013	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
3	2024/12/19 1:	Yashaswini	1KS24CS417	3rd sem, A sec	Good	Good	Good	Excellent	Good
4	2024/12/19 1:	Akash S	1KS23CS007	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Good
5	2024/12/19 2:	C Nagendra Reddy	1KS23CS032	3rd sem, A sec	Good	Good	Good	Good	Good
6	2024/12/19 2:	Anusha	1KS23CS015	3rd sem, A sec	Good	Good	Good	Good	Good
7	2024/12/19 2:	Harish deekshit	1KS23CS053	3rd sem, A sec	Excellent	Excellent	Excellent	Good	Good
8	2024/12/19 2:	AMULYA V	1KS23CS012	3rd sem, A sec	Excellent	Excellent	Excellent	Good	Good
9	2024/12/19 2:	Chinmay B H	1KS23CS033	3rd sem, A sec	Excellent	Excellent	Good	Excellent	Good
10	2024/12/19 2:	Asiya Naaz	1KS23CS021	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
11	2024/12/19 2:	Amrutha J	1KS23CS011	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
12	2024/12/19 2:	Anvitha T.A	1KS23CS016	3rd sem, A sec	Good	Good	Good	Excellent	Excellent

13	2024/12/19 2:	Apoorva R Navda	1KS23CS017	3rd	em, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
14	2024/12/19 2:	Abhimanyu	1KS23CS001	3rd	em, A sec	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory
15	2024/12/19 2:	Deeksha J	1KS23CS038	3rd	em, A sec	Good	Good	Good	Good	Good
16	2024/12/19 2:	BHAGYASHREE	1KS23CS022	3rd	em, A sec	Excellent	Excellent	Excellent	Good	Good
17	2024/12/19 2:	Bhuvan B	1KS23CS025	3rd	em, A sec	Good	Good	Good	Good	Good
18	2024/12/19 3:	Charan Teja GS	1ks23cs030	3rd	em, A sec	Excellent	Good	Good	Excellent	Excellent
19	2024/12/19 3:	JAYADITYA DEV	1KS23CS059	3rd	em, A sec	Good	Excellent	Good	Excellent	Excellent
20	2024/12/19 3:	Durgashree M	1KS23CS043	3rd	em, A sec	Good	Good	Good	Excellent	Excellent
21	2024/12/19 3:	Navya.K	1KS24CS406	3rd	em, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
22	2024/12/19 3:	ADITYA A	1KS23CS003	3rd	em, A sec	Excellent	Good	Excellent	Excellent	Good
23	2024/12/19 3:	DHEERAJ A	1KS23CS041	3rd	em, A sec	Good	Good	Good	Good	Good
24	2024/12/19 3:	DEEPIKA K A	1KS23CS039	3rd	em, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
25	2024/12/19 4:	Aishwarya N	1KS23CS005	3rd	em, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
26	2024/12/19 4:	G Sindhu	1KS23CS027	3rd	em, A sec	Good	Excellent	Excellent	Good	Good
27	2024/12/19 5:	Chirag T	1ks23cs034	3rd	em, A sec	Satisfactory	Good	Satisfactory	Satisfactory	Good
28	2024/12/19 5:	Bhavani S	1KS23CS023	3rd	em, A sec	Good	Good	Good	Good	Good
29	2024/12/19 5:	Janhavi M	1KS23CS058	3rd	em, A sec	Excellent	Good	Excellent	Excellent	Excellent
30	2024/12/19 6:	AISHWARYA B C	1KS23CS004	3rd	em, A sec	Good	Excellent	Excellent	Excellent	Excellent
31	2024/12/19 6:	GC LIKITH CHOWDAR	1KS23CS045	3rd	em, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
32	2024/12/19 6:	CHAITRA N KIRANAG	1KS23CS028	3rd	em, A sec	Good	Good	Good	Good	Good
33	2024/12/19 6:	Dhanush J	1KS23CS040	3rd	em, A sec	Good	Excellent	Excellent	Excellent	Excellent
34	2024/12/19 6:	ARPITA RATHOD	1KS23CS018	3rd	em, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
35	2024/12/19 6:	Aditi S H	1KS23CS002	3rd	em, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
36	2024/12/19 7:	JEEVITHA A P	1KS23CS061	3rd	em, A sec	Good	Good	Good	Good	Good
37	2024/12/19 7:	Hemanth raje urs HK	1KS23CS051	3rd	em, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
38	2024/12/21 7:	G AKASH	1KS23CS044	3rd	em, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
39	2024/12/19 8:	JM HARSHITHA REDD	1KS23CS057	3rd	em, A sec	Good	Good	Good	Good	Good
40	2024/12/19 11	Ameena Fathima	1KS23CS009	3rd	em, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
41	2024/12/20 7:	Harshith.K	1KS23CS056	3rd	em, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
42	2024/12/20 2:	K Harini	1KS23CS062	3rd	em, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
43	2024/12/20 2:	Jeevan M	1KS23CS060	3rd	em, A sec					

44	2024/12/21 7:	G Madhu Prathika	1KS23CS050	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Good
45	2024/12/23 11	AMRUTH C K	1KS23CS010	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Good
46	2024/12/23 10	Chiranth Gowda S	1ks23cs036	3rd sem, A sec	Good	Good	Good	Good	Good
47	2024/12/23 11	Bhoomika M H	1KS23CS024	3rd sem, A sec	Good	Good	Good	Good	Good
48	2024/12/23 11	Chiranth G	1KS23CS035	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
49	2024/12/23 11	Brinda.G	1KS23CS026	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
50	2024/12/23 2:	DARSHAN G	1KS23CS037	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
51	2024/12/23 11	Dheeraj M S	1KS23CS042	3rd sem, A sec	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory
52	2024/12/23 12	Pavan kumar M	1KS24CS407	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
53	2024/12/23 12	Arun Chavan	1ks23cs019	3rd sem, A sec	Good	Good	Good	Good	Good
54	2024/12/24 12	GARV B JAIN	1KS23CS048	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
55	2024/12/23 12	Akash R	1ks23cs006	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
56	2024/12/23 1:	Akshaya B	1KS23CS008	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Good
57	2024/12/23 2:	RAKESH J	1KS24CS411	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
58	2024/12/23 2:	Charan Sai Tej K V	1KS23CS029	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
59	2024/12/23 7:	Harsh Mishra	1ks23cs054	3rd sem, A sec	Excellent	Good	Excellent	Good	Excellent
60	2024/12/23 8:	Gagana Poojari	1KS23CS046	3rd sem, A sec	Excellent	Good	Good	Good	Good
61	2024/12/23 8:	Gayana.V	1KS23CS049	3rd sem, A sec	Good	Excellent	Excellent	Excellent	Excellent
62	2024/12/24 9:	Aryaman Tiwari	1KS23CS020	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
63	2024/12/24 12	HARSHAVARDHAN B	1KS23CS055	3rd sem, A sec	Good	Excellent	Excellent	Excellent	Excellent
64	2024/12/24 12	H L Darshan	1KS23CS052	3rd sem, A sec	Excellent	Excellent	Good	Good	Good
65	2024/12/24 12	Ganesh m	1ks23cs047	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
66	2024/12/24 12	Chetan	1ks23cs031	3rd sem, A sec	Excellent	Excellent	Excellent	Excellent	Excellent
				Excellent	**40**	**42**	**41**	**43**	**37**
				Good	**23**	**22**	**22**	**20**	**27**
				Satisfactory	**3**	**2**	**3**	**3**	**2**
				Percentage	**95.45**	**97.05**	**95.45**	**95.45**	**97.05**

K.S. INSTITUTE OF TECHNOLOGY, BANGALORE
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
INDIRECT ATTAINMENT COURSE END SURVEY

YEAR / SEMESTER	II/IV/A
COURSE TITLE	Sub: Analysis and Design of Algorithms
COURSE CODE	BCS401
ACADEMIC YEAR	2024-25

Excellent	40	42	41	43	37	96.09
Good	23	22	22	20	27	
Satisfactory	3	2	3	3	2	
STUDENTS RESPONSE(GOOD & ABOVE)	95.45	97.05	95.45	95.45	97.05	

STAFF SIGNATURE

HOD
Head of the Department
Dept. of Computer Science & Engg
K.S. Institute of Technology
Bengaluru -560 109

K S INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

YEAR / SEMESTER	II/IV
COURSE TITLE	ANALYSIS & DESIGN OF ALGORITHMS
COURSE CODE	BCS401
ACADEMIC YEAR	2024-25(EVEN)

SL No	USN	NAME	Internals					Assignment					Activity					SEE
			CO 1	CO 2	CO 3	CO 4	CO 5	CO 1	CO 2	CO 3	CO 4	CO 5	CO 1	CO 2	CO 3	CO 4	CO 5	
			15	15	15	15	15	3	3	3	3	3	2	2	2	2	2	50
1	1KS23CS001	ABHIMANYU N SHETTIGAR	12	11	11	15	14	3	3	3	3	3	2	2	2	2	2	
2	1KS23CS002	ADITI S H	8	15	15	15	13	3	3	3	3	3	2	2	2	2	2	
3	1KS23CS003	ADITYA A	6	9	10	12	12	3	3	3	3	3	2	2	2	2	2	
4	1KS23CS004	AISHWARYA B C	15	11	15	15	14	3	3	3	3	3	2	2	2	2	2	
5	1KS23CS005	AISHWARYA N	8	6	15	13	6	2	2	2	2	2	2	2	2	1	1	
6	1KS23CS006	AKASH R	5	9	12	15	12	3	3	3	3	3	2	2	2	2	2	
7	1KS23CS007	AKASH S	4	6	7	15	7	3	3	3	3	3	2	2	2	2	2	
8	1KS23CS008	AKSHAYA BALAKUMAR	3	0	7	11	10	3	3	3	3	3	2	2	2	2	2	
9	1KS23CS009	AMEENA FATHIMA	15	13	15	15	14	3	3	3	3	3	2	2	2	2	2	
10	1KS23CS010	AMRUTH C K	10	10	12	15	7	3	3	3	3	3	2	2	2	2	2	
11	1KS23CS011	AMRUTHA J	15	15	15	15	14	3	3	3	3	3	2	2	2	2	2	
12	1KS23CS012	AMULYA V	15	13	15	10	6	3	3	3	3	3	2	2	2	2	2	
13	1KS23CS013	ANGELINA SHARON ROBERT	14	9	12	12	10	3	3	3	3	3	2	2	2	2	2	
14	1KS23CS014	ANUJA V M	15	15	15	15	15	3	3	3	3	3	2	2	2	2	2	
15	1KS23CS015	ANUSHA V	15	14	15	15	13	3	3	3	3	3	2	2	2	2	2	
16	1KS23CS016	ANVITHA T A	11	15	14	15	11	3	3	3	3	3	2	2	2	2	2	
17	1KS23CS017	APOORVA R NAVDA	15	14	15	15	12	3	3	3	3	3	2	2	2	2	2	
18	1KS23CS018	ARPITA RATHOD	8	2	4	10	6	3	3	3	3	3	2	2	2	2	2	
19	1KS23CS019	ARUN CHAVAN	10	3	2	15	4	3	3	3	3	3	2	2	2	2	2	
20	1KS23CS020	ARYAMAN TIWARI	4	7	7	15	10	2	2	2	2	2	2	2	2	1	1	
21	1KS23CS021	ASIYA NAAZ	15	15	15	15	12	3	3	3	3	3	2	2	2	2	2	
22	1KS23CS022	BHAGYASHREE	14	8	10	13	12	3	3	3	3	3	2	2	2	2	2	
23	1KS23CS023	BHAVANI S	15	15	12	15	14	3	3	3	3	3	2	2	2	2	2	
24	1KS23CS024	BHOOMIKA M H	4	11	10	15	13	3	3	3	3	3	2	2	2	2	2	
25	1KS23CS025	BHUVAN B	12	4	7	11	5	2	2	2	1	1	2	1	1	1	1	
26	1KS23CS026	BRINDA G	15	15	15	12	14	3	3	3	3	3	2	2	2	2	2	
27	1KS23CS027	C SINDHU	15	15	15	15	11	3	3	3	3	3	2	2	2	2	2	
28	1KS23CS028	CHAITRA N KIRANAGI	15	10	15	15	12	3	3	3	3	3	2	2	2	2	2	
29	1KS23CS029	CHARAN SAI TEJ K V	15	12	13	15	6	3	3	3	3	3	2	2	2	2	2	
30	1KS23CS030	CHARAN TEJA G S	4	7	10	13	4	2	2	2	2	2	2	2	2	2	2	

31	1KS23CS031	CHETAN C DESAI	9	6	8	8	0	2	2	2	2	2	2	2	2	1	1	
32	1KS23CS032	CHIMPARA NAGENDRA REDDY	4	4	10	11	12	3	3	3	3	3	2	2	2	2	2	
33	1KS23CS033	CHINMAY B H	4	4	9	14	9	2	2	2	2	2	2	1	1	1	1	
34	1KS23CS034	CHIRAG T	11	7	9	11	5	3	3	3	3	3	2	2	2	2	2	
35	1KS23CS035	CHIRANTH G	14	4	15	12	10	2	2	2	2	2	2	2	2	2	2	
36	1KS23CS036	CHIRANTH GOWDA S	15	15	15	11	13	3	3	3	3	3	2	2	2	2	2	
37	1KS23CS037	DARSHAN G	8	8	10	6	3	3	3	3	3	3	2	2	2	1	1	
38	1KS23CS038	DEEKSHA J	15	10	14	12	9	2	2	2	2	2	2	1	1	1	1	
39	1KS23CS039	DEEPIKA K A	7	1	4	13	5	2	2	2	1	1	2	2	2	2	2	
40	1KS23CS040	DHANUSH J	7	2	10	10	0	3	3	3	3	3	2	2	2	2	2	
41	1KS23CS041	DHEERAJ A	5	7	9	10	7	3	3	3	3	3	2	1	1	1	1	
42	1KS23CS042	DHEERAJ H S	5	7	10	6	9	2	2	2	2	2	2	2	2	2	2	
43	1KS23CS043	DURGASHREE M	8	7	15	15	12	2	2	2	2	2	2	2	2	2	2	
44	1KS23CS044	G AKASH	7	9	7	11	9	3	3	3	3	3	2	2	2	2	2	
45	1KS23CS045	G C LIKITH CHOWDARY	15	15	11	15	13	3	3	3	3	3	2	2	2	2	2	
46	1KS23CS046	GAGANA POOJARI	15	15	15	15	15	3	3	3	3	3	2	2	2	2	2	
47	1KS23CS047	GANESH M	10	7	5	7	0	2	2	2	1	1	1	2	2	1	1	
48	1KS23CS048	GARV B JAIN	7	5	11	15	7	3	3	3	3	3	2	2	2	2	2	
49	1KS23CS049	GAYANA V	15	14	15	15	13	3	3	3	3	3	2	2	2	2	2	
50	1KS23CS050	GOPALAKRISHNAN MADHU PRATHEKA	11	11	5	15	13	3	3	3	3	3	2	2	2	2	2	
51	1KS23CS051	H K HEMANTH RAJE URS	12	11	14	15	13	3	3	3	3	3	2	2	2	1	1	
52	1KS23CS052	H L DARSHAN	10	11	10	14	10	2	2	2	2	2	2	2	2	2	2	
53	1KS23CS053	HARISH DEEKSHITH	13	10	15	13	10	3	3	3	3	3	2	2	2	2	2	
54	1KS23CS054	HARSH MISHRA	15	9	10	14	9	3	3	3	3	3	2	2	2	2	2	
55	1KS23CS055	HARSHAVARDHAN B K	6	7	6	15	3	2	3	1	2	2	2	2	2	1	1	
56	1KS23CS056	HARSHITH K	13	13	15	15	13	3	3	3	3	3	2	2	2	2	2	
57	1KS23CS057	J M HARSHITHA REDDY	5	13	9	10	8	3	3	3	3	3	2	2	2	2	2	
58	1KS23CS058	JANHAVI M	8	7	15	14	10	3	3	3	3	3	2	2	2	2	2	
59	1KS23CS059	JAYADITYA DEV	15	10	10	15	14	3	3	3	3	3	2	2	2	2	2	
60	1KS23CS060	JEEVAN M	15	15	15	15	14	3	3	3	3	3	2	2	2	2	2	

[illegible]	JEEVITHA A P	1	7	10	12	7	3	3	3	3	3	2	2	2	2	2	
[illegible]	K HARINI	15	12	15	15	14	3	3	3	3	3	2	2	2	2	2	
63	1KS23CS063	11	12	7	15	12	3	3	3	3	3	2	2	2	2	2	
64	1KS23CS064	10	14	14	15	14	3	3	3	3	3	2	2	2	1	1	
65	1KS23CS065	10	15	13	15	15	3	3	3	3	3	2	2	2	2	1	
66	1KS23CS066	14	15	15	15	14	3	3	3	3	3	2	2	2	2	2	
67	1KS23CS067	15	14	14	15	13	3	3	3	3	3	2	2	2	2	1	
68	1KS23CS068	10	10	12	15	8	3	3	3	3	3	2	2	2	2	2	
69	1KS23CS069	14	14	14	15	15	3	3	3	3	3	2	2	2	2	2	
70	1KS23CS070	10	1	2	7	7	3	3	3	3	3	2	2	1	1	1	
71	1KS23CS071	15	14	10	15	15	3	3	3	3	3	2	2	2	1	2	
72	1KS23CS072	15	9	15	14	14	3	3	3	3	3	2	2	2	2	2	
73	1KS23CS073	14	13	14	15	9	3	3	3	3	3	2	1	1	2	2	
74	1KS23CS074	9	7	3	8	4	3	3	3	3	3	2	2	2	2	2	
75	1KS23CS075	15	11	15	15	13	3	2	2	2	3	1	2	2	2	2	
76	1KS23CS076	15	14	14	12	14	3	3	3	3	3	1	2	2	2	2	
77	1KS23CS077	7	5	10	11	4	2	2	2	2	2	1	1	1	1	2	
78	1KS23CS078	9	9	9	12	10	3	3	3	2	3	2	2	2	1	2	
79	1KS23CS079	13	13	14	9	9	3	3	3	3	3	2	2	2	2	2	
80	1KS23CS080	3	0		0		3	3	3	2	2	2	1	1	1	1	
81	1KS23CS081	7	7	6	15	8	3	3	3	3	3	2	1	2	2	2	
82	1KS23CS082	14	13	10	10	11	3	3	3	3	3	1	2	2	0	0	
83	1KS23CS083	8	13	9	14	11	3	3	3	3	3	2	2	2	2	2	
84	1KS23CS084	15	12	14	11	15	3	3	3	3	3	2	1	2	2	2	
85	1KS23CS085	14	15	14	13	15	3	3	3	3	3	2	1	2	2	2	
86	1KS23CS086	8	12	9	14	10	3	3	3	3	3	2	2	2	2	2	
87	1KS23CS087	15	14	15	15	10	3	3	3	3	2	2	1	2	2	2	
88	1KS23CS088	10	8	5	9	11	3	3	2	2	2	2	1	1	2	2	
89	1KS23CS089	15	13	11	10	14	3	3	2	3	3	2	2	1	2	2	
90	1KS23CS090	9	9	9	13	5	3	3	3	3	3	2	2	1	1	2	
91	1KS23CS091	15	14	14	15	14	3	3	3	3	3	2	2	2	2	2	
92	1KS23CS092	12	9	13	10	12	3	3	3	3	3	2	2	2	2	2	
93	1KS23CS093	15	12	14	12	11	3	3	3	3	3	2	2	1	1	2	
94	1KS23CS094	7	7	8	13	12	3	3	3	3	3	2	2	1	1	2	
95	1KS23CS095	10	8	6	7	8	3	3	3	3	3	2	2	2	2	2	
96	1KS23CS096	10	6	5	11	9	3	3	3	3	3	2	2	1	1	1	
97	1KS23CS097	15	14	13	13	11	3	3	3	3	3	2	2	2	2	2	
98	1KS23CS098	5	11	3	11	4	3	3	3	3	3	2	2	2	2	2	
99	1KS23CS099	14	9	12	14	12	3	3	3	3	3	2	2	2	2	2	
100	1KS23CS100	14	9	15	15	13	3	3	3	3	3	2	2	2	2	2	
101	1KS23CS101	6	6	13	10	3	3	3	3	3	3	2	2	2	2	1	
102	1KS23CS102	15	13	14	15	15	3	3	3	3	3	2	2	2	2	2	

103	1KS23CS103	PAVAN SAI P	9	5	10	10	3	3	3	3	3	3	2	2	2	1	1	
104	1KS23CS104	PINKEY	12	9	13	13	15	3	3	2	3	3	2	2	2	1	2	
105	1KS23CS105	POOJA	15	13	14	15	14	3	3	3	3	3	2	2	2	1	1	
106	1KS23CS106	POONAMLAL	6	11	15	12	9	3	3	3	3	3	2	1	1	2	2	
107	1KS23CS107	PRAGNA M	11	11	12	13	5	3	3	3	3	3	2	2	2	2	2	
108	1KS23CS108	PRAJWAL B	10	3	4	11	2	3	3	3	3	3	2	1	2	2	2	
109	1KS23CS109	PRAJWAL N	14	14	14	15	14	3	3	3	3	3	2	2	2	2	2	
110	1KS23CS110	PRANAV C M	4	5	4	12	3	2	2	2	2	2	1	1	1	1	1	
111	1KS23CS111	PRANAV	14	15	15	15	11	3	3	3	3	3	2	2	2	2	2	
112	1KS23CS112	PRANAVIKA M	12	10	9	15	12	3	3	3	3	3	2	2	2	2	2	
113	1KS23CS114	PRIYADHARSHINI E P	13	9	9	12	7	3	3	3	3	3	2	2	2	2	2	
114	1KS23CS115	PRIYANKA M	7	12	15	14	6	3	3	3	3	3	2	2	2	2	2	
115	1KS23CS116	PUNITH P	8	5	4	10	3	2	2	2	2	2	1	1	1	1	1	
116	1KS23CS117	PUNYASHREE B	15	13	15	15	14	3	3	3	3	3	2	2	2	2	2	
117	1KS23CS118	NITISH R	11	11	10	17	7	2	2	2	2	1	1	1	1	1	2	
118	1KS23CS119	RAGHU J	11	10	13	15	9	3	3	3	3	2	2	1	1	1	1	
119	1KS23CS120	RAJATH KUMARY	15	14	15	15	11	3	3	3	3	3	2	2	2	2	2	
120	1KS23CS121	RASHMI SONI	9	8	10	15	10	3	3	3	3	3	2	2	2	2	2	
121	1KS23CS122	RAVICHANDRA K	15	14	15	15	15	3	3	3	3	3	2	1	1	2	2	
122	1KS23CS123	RAZIYA	15	11	9	13	8	3	3	3	3	3	2	2	2	2	2	
123	1KS23CS124	REEMA J	15	11	14	15	11	3	3	3	3	3	2	2	2	2	2	
124	1KS23CS125	RITIKA SINGH	9	8	0	9	11	3	3	2	2	2	2	2	1	1	2	
125	1KS23CS126	RUBY KUMARI R	14	12	15	14	15	3	3	3	3	3	2	2	2	0	2	
126	1KS23CS127	RUDRESH S C	8	10	9	15	15	3	3	3	3	3	2	2	2	2	2	
127	1KS23CS128	RUSHITHA K	0	5	11	13	5	3	2	3	3	3	2	2	2	2	2	
128	1KS23CS129	S AVINASH	5	2	12	10	4	3	2	2	2	3	2	2	2	2	2	
129	1KS23CS130	S HARSHA	4	5	8	8	2	2	3	3	3	3	2	2	1	2	2	
130	1KS23CS131	S SUMANTH	2	7	9	13	9	2	2	3	3	2	2	2	2	2	2	
131	1KS23CS132	S V NAVYA	7	7	5	11	2	2	2	3	2	2	0	2	2	2	2	
132	1KS23CS133	SACHIN R	8	8	5	8	7	3	3	3	2	3	2	2	2	1	2	
133	1KS23CS134	SADHANA M	11	11	15	15	11	3	3	3	3	3	2	2	2	2	2	
134	1KS23CS135	SAGARIKA B PATIL	12	12	13	14	19	3	2	3	3	2	2	0	2	2	1	
135	1KS23CS136	SAHANA O	15	15	15	15	12	3	3	3	3	3	2	2	2	2	2	
136	1KS23CS137	SAKSHI RAMESH	15	15	15	15	15	3	3	3	3	3	2	2	2	2	2	
137	1KS23CS138	SANDHYA	14	15	12	13	14	3	3	3	3	2	2	2	2	2	1	
138	1KS23CS139	SANJANA JAGANNATHA	11	12	11	10	13	3	3	2	3	3	2	2	2	2	2	
139	1KS23CS140	SANJANA N	5	3	6	4	2	2	2	2	2	2	0	2	2	2	1	
140	1KS23CS141	SANJAY T	9	13	14	15	10	3	3	3	2	3	2	1	2	2	2	
141	1KS23CS142	SANJEETH KUMAR K R	7	8	9	10	4	3	3	2	3	3	2	2	1	2	2	
142	1KS23CS143	SARVAGNA S RAO	8	10	11	14	11	3	3	3	3	3	2	2	2	1	2	
143	1KS23CS144	SHAMA SHIVARAJ SHETTY	15	15	15	15	15	3	3	3	3	3	2	2	2	2	2	
144	1KS23CS145	SHAMITH GOWDA A G	4	5	10	8	3	2	3	3	2	2	1	2	2	2	2	
145	1KS23CS146	SHASHANK GOWDA U	10	7	7	13	13	3	2	3	3	2	2	2	2	2	2	

[illegible]147	SHIVA M	8	9	11	15	10	3	3	3	2	3	2	2	2	2	2	
148	1KS23CS148 SHIVAMANI N	5	2	5	11	0	0	2	0	2	3	2	2	2	2	0	
149	1KS23CS149 SHRAVYA PRAKASH	14	9	15	15	15	3	3	3	3	3	2	2	2	2	1	
150	1KS23CS150 SHREYA S	7	9	13	15	14	3	3	3	3	3	2	2	2	1	2	
151	1KS23CS151 SHREYA S UPADHYA	6	8	5	9	13	3	2	3	3	3	1	2	2	2	2	
152	1KS23CS152 SHREYAS S	7	7	11	13	10	3	3	2	3	3	2	2	2	2	2	
153	1KS23CS153 SHRIHARI I B	14	10	14	15	14	3	3	3	3	3	2	2	2	2	1	
154	1KS23CS154 SHRISHA C M	4	12	13	14	10	3	3	3	3	3	1	2	2	2	2	
155	1KS23CS155 SHRUSTI L	7	9	15	14	15	3	3	3	3	3	2	1	2	2	2	
156	1KS23CS156 SHRUSTI L	5	8	5	6	2	3	3	2	3	3	2	2	0	2	1	
157	1KS23CS157 SOMESH K N	10	1	14	7	6	3	3	3	2	3	2	2	2	1	2	
158	1KS23CS158 SRAVYA ILLURI	15	14	15	15	15	3	3	3	3	3	2	2	1	2	2	
159	1KS23CS159 SRIGOWRI S KULKARNI	15	5	14	15	14	3	3	3	3	3	2	2	2	2	2	
160	1KS23CS160 SUDARSHAN V G	6	4	12	14	12	3	3	3	3	2	0	2	1	2	2	
161	1KS23CS161 SUDHANVA K JOSHI	12	8	12	13	13	3	3	3	3	3	2	1	2	2	2	
162	1KS23CS162 SUREKHA Y S	11	12	9	15	10	3	3	3	3	3	2	2	2	2	2	
163	1KS23CS163 T S R SRIRAGA	11	10	12	15	10	3	3	3	3	3	2	2	2	2	2	
164	1KS23CS164 TALLURU SAMITHYA	13	14	15	15	13	3	3	3	3	3	2	2	2	2	2	
165	1KS23CS166 TARUN R	6	6	8	10	12	3	3	3	3	1	2	2	1	2	2	
166	1KS23CS167 THANUSHREE V S	9	13	15	14	12	3	3	3	3	3	2	2	2	2	2	
167	1KS23CS168 UJWAL G NAIK	2	7	6	9	7	3	3	3	3	1	2	2	2	1	2	
168	1KS23CS169 VARNIKA G	4	4	7	14	10	3	3	3	3	3	2	2	2	0	2	
169	1KS23CS170 VARSHA D R	5	8	9	8	7	3	3	3	3	3	2	2	2	2	0	
170	1KS23CS171 VARSHA DATTATREYA BHAT	14	13	13	13	15	3	3	3	3	3	2	1	2	2	2	
171	1KS23CS172 VARSHA S K	4	5	11	5	6	3	3	3	2	3	2	0	2	2	2	
172	1KS23CS173 VARSHITHA	8	6	6	7	11	3	3	3	3	3	2	1	2	2	2	
173	1KS23CS175 VATSAL VIGNESH B C	2	5	4	9	14	3	3	3	3	3	2	2	2	2	2	
174	1KS23CS176 VEERENDRA R	15	12	14	15	13	3	3	3	3	3	2	2	2	2	2	
175	1KS23CS177 VENKAT S S	8	9	10	13	15	3	3	3	3	3	1	2	2	2	2	
176	1KS23CS178 VIGASINI S	15	14	15	15	15	3	3	3	3	3	2	2	2	2	2	
177	1KS23CS179 VIJAYALAKSHMI C	12	8	8	15	15	3	3	3	3	3	2	2	2	1	2	
178	1KS23CS180 VIKAS K B	13	14	15	15	11	3	3	3	3	3	2	2	2	2	2	
179	1KS23CS181 VINITH M R	3	1	3	6	4	3	0	2	0	3	2	1	2	2	2	
180	1KS23CS182 VISHAL R	7	6	7	13	7	3	3	3	2	2	2	2	2	2	2	
181	1KS23CS183 VISHAL T K	0	6	8	12	11	3	2	3	3	3	2	2	2	2	2	
182	1KS23CS184 VISHAL VASS S	1	2	1	3	4	3	2	0	3	3	2	0	0	1	2	
183	1KS23CS185 VUPINAM THARUN	11	12	15	15	15	3	3	3	3	3	2	2	2	2	2	
184	1KS23CS186 YASHASWI R	11	8	12	12	10	3	3	3	3	2	2	2	2	1	2	
185	1KS23CS187 YASHASWINI A T	14	12	15	15	15	3	3	3	3	3	2	2	2	2	2	
186	1KS23CS188 YASHASWINI S	12	8	13	15	10	3	3	3	3	3	1	2	2	2	2	
187	1KS24CS402 DARSHAN A R	2	6	8	10	10	3	3	3	3	3	2	2	2	2	2	
188	1KS24CS409 RACHANA	8	8	6	12	11	3	3	3	3	3	2	1	2	2	2	
189	1KS24CS403 RAGAN GOWDA D	3	8	5	9	5	3	3	3	3	3	2	0	2	1	2	

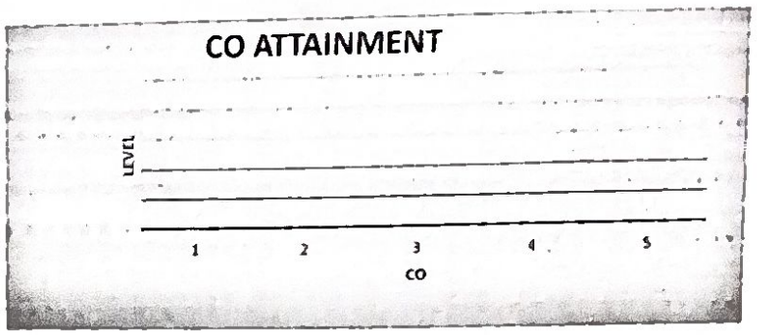
189	1KS24CS415	VARSHINI J	4	5	7	13	13	3	3	3	3	3	2	2	2	2	2	
190	1KS24CS412	RAKESH R	5	8	9	11	10	3	3	3	2	3	2	2	1	2	2	
191	1KS24CS400	ANIL KUMAR N	6	7	8	15	6	2	2	2	2	2	2	1	1	1	1	
192	1KS24CS401	BHAVITHA E G	4	9	9	14	6	3	3	2	2	2	2	1	1	2	2	
193	1KS24CS405	NAGASHREE S	5	7	10	4	5	3	3	3	3	3	2	2	1	2	2	
194	1KS24CS408	PUNEETH S V	6	9	8	12	14	3	3	3	3	3	2	1	1	1	2	
195	1KS24CS410	RAJEEV B S	8	6	7	5	8	3	3	3	2	2	3	2	2	2	2	
196	1KS24CS414	SWATHI G A	14	11	13	5	8	3	3	3	3	3	2	1	2	2	2	
197	1KS24CS406	NAVYA K	10	5	10	10	7	3	3	3	3	3	2	2	2	1	1	
198	1KS24CS407	PAVAN KUMAR M	5	7	13	4	0	1	2	1	1	1	2	1	1	1	1	
199	1KS24CS417	YASHASWINI B	9	4	12	8	3	3	3	3	1	2	2	1	1	1	1	
200	1KS24CS411	RAKESH J	2	3	14	7	3	1	1	1	1	2	2	1	1	1	1	
		60% of Maximum marks (X)	9	9	9	9	9	1.8	1.8	1.8	1.8	1.8	1.2	1.2	1.2	1.2	1.2	30
		No. of students above X	120	115	149	175	134	197	198	196	193	193	184	162	162	152	162	0
		Total number of students (Y)	200	200	199	200	199	200	200	200	200	200	200	200	200	200	200	0
		CO Percentage	60	57.50	74.87	87.50	67.34	98.50	99.00	98	96.5	96.5	92	81	81	76.00	81	#DIV/0!
			CO 1	CO 2	CO 3	CO 4	CO 5	CO 1	CO 2	CO 3	CO 4	CO 5	CO 1	CO 2	CO 3	CO 4	CO 5	SEE

CO	CIE	SEE	DIRECT ATTAINMEN	Level	COURSE EXIT SURVEY	LEVEL	ATTAIN MENT
CO1	83.50	#DIV/0!	#DIV/0!	#DIV/0!	99.30	3.00	#DIV/0!
CO2	79.17	#DIV/0!	#DIV/0!	#DIV/0!	99.30	3.00	#DIV/0!
CO3	84.62	#DIV/0!	#DIV/0!	#DIV/0!	99.30	3.00	#DIV/0!
CO4	86.67	#DIV/0!	#DIV/0!	#DIV/0!	99.30	3.00	#DIV/0!
CO5	81.61	#DIV/0!	#DIV/0!	#DIV/0!	99.30	3.00	#DIV/0!
AVERAGE							#DIV/0!

	IA	Ast	ACTIVITY		AVG
CO1	60.00	98.5	92.00		83.50
CO2	57.50	99	81.00		79.17
CO3	74.87	98	81.00		84.62
CO4	87.50	96.5	76.00		86.67
CO5	67.34	97	81.00		81.61

CO Attainment Level	Significance
Level 3	60% and above students should have scored >= 60% of Total marks
Level 2	55% to 59% of students should have scored >= 60% of Total marks
Level 1	50% to 54% of students should have scored >= 60% of Total marks

For Direct attainment , 50% of CIE and 50% of SEE marks are considered.
For indirect attainment, Course end survey is considered.
CO attainment is 90%of direct attainment + 10% of Indirect atttainment.
PO attainment = CO-PO mapping strength/3 * CO attainment .



Co-Po Mapping Table														
CO'S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	2	2		2				2	2		2	2	2
CO2	3	2	2		2				2	2		2	2	2
CO3	3	2	2	2	2				2	2		2	2	2
CO4	3	2	2	2	2				2	2		2	2	2
CO5	3	2	2	2	2				2	2		2	2	2
AVG	3.00	2.00	2.00	2.00	2.00				2.00	2.00		2.00	2.00	2.00

PO ATTAINMENT TABLE																
CO'S	CO Attainment	CO RESULT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
CO2	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
CO3	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
CO4	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
CO5	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Average			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Course Incharge

HOD